Sunday Creek Reconfiguration Project

Socio-Economic Impacts

FINAL REPORT

9 October 2020

Goulburn Murray Water Connections Program

Sunday Creek Reconfiguration Project

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Contents

Executive Summary

Background

The Lake Moodemere-Sunday Creek wetland complex is located on the Murray River floodplain in north east Victoria, near to the township of Rutherglen. Water is currently diverted from the Murray River, through Lake Moodemere and into Sunday Creek where it is extracted for irrigation purposes.

The proposed Sunday Creek Reconfiguration Project delivers a more water efficient and cost-effective irrigation supply to the Sunday Creek Irrigation Syndicate, generating water savings by delivering water directly to Sunday Creek. This will achieve a total water savings of 462 ML (based on current modelling estimates), with the option for additional savings from Sunday Creek. Key features of the project, include:

- A new purpose built 36 ML/day electric pump station to extract water from the Murray River
- A direct pipeline to transfer water from the pump station to Sunday Creek.
- A fixed sill structure at Hells Gate embankment, allowing the creek and Lake Moodemere to be operated independently of each other
- Decommissioning the old pump station and replacing the existing Lake Moodemere regulator on the Murray River to bring it up to safety standard and facilitate the ongoing management of water levels in the lake (Jacobs, 2019).

In addition, the project allows the hydraulic diversity of the Lake Moodemere wetland complex to be restored resulting in improved biodiversity outcomes at the site. The use of the lake for the transfer of irrigation water supports a range of recreational values that may otherwise not be possible. Maintaining these values has been a fundamental consideration in the project planning.

The need for this assessment

Due to the water savings generated by the project, it may be eligible for funding under the Commonwealth's Water Efficiency Program, being delivered as part of the Murray-Darling Basin Plan. Projects submitted for funding under this program must demonstrate there would be **neutral** or **positive socio-economic impacts** from recovering this water. This report documents the outcome of that impact assessment.

Summary of findings

Key findings of the assessment against the socio-economic criteria established by the Victorian Government includes:

- **Environmental:** Decommissioning the old pump station and replacing the existing Lake Moodemere regulator creates the opportunity to reinstate the hydraulic diversity of the site, as well as providing management levers currently not available under the existing operating arrangement. As a result, there are expected to be significant net benefits to the environment primarily due to improved biodiversity outcomes. In addition to the direct and immediate ecological benefits, the project provides the opportunity for targeted environmental management of the site.
- **Economic:** Rutherglen has established itself as one of Victoria's main wine producing regions. Approximately 70% of the regions total grape crush is generated by the wineries that are part of the Sunday Creek Irrigation Syndicate and reliant upon the successful implementation of this project for the future security of their water supply. The proposed project will have a positive impact on the local irrigation sector and the businesses that are dependent on it. The direct economic benefits of the project will improve the longer-term sustainability and resilience of the irrigation sector with flow on impacts to the regional community, including regional employment. There will be no adverse economic impacts.
- **Cultural:** Yorta Yorta Nation Aboriginal Corporation is the Traditional Owner of the Lake Moodemere Reserve and have a historic and contemporary connection to the site. The reserve was legally set aside for Aboriginal use in the late 1800s and early 1900s. The environmental outcomes generated by the project

provide the opportunity to enhance plant and animal species of cultural significance to Yorta Yorta peoples. The project also provides opportunities to celebrate and share the site's rich cultural history and to facilitate Yorta Yorta's involvement in the ongoing management and rehabilitation of the site.

- **Social and recreational:** The artificially high lake levels which occur under the current irrigation supply arrangement have allowed a range of recreational values to be supported by the lake. The project design incorporates operating rules to sustain these values, particularly the Lake Moodemere Rowing Regatta, accepting a reduction in potential water savings as a consequence. The proposed project protects and enhances the activities that are most commonly engaged in by the community. The project is expected to deliver net benefits to existing and new recreational users of Lake Moodemere. The only exception may be water skiers who may need to ski in alternative nearby locations when the water level at Lake Moodemere is too low as a result of reinstating fluctuating water levels in the lake.

Mitigating activities

A high-level overview of activities to offset the impact or leverage the benefits of this project include:

- The planned operating regime incorporates the water needed for the tradition of the rowing regatta to continue
- Information hubs and picnic tables in main visitation areas will augment other nature-based tourism initiatives in the region and build community understanding of the project
- Provision of a platform to enable all abilities access to deep water for recreational fishing
- Site restoration and cultural heritage protection activities, as guided by a rehabilitation plan developed between Yorta Yorta and Parks Victoria.

Conclusion

The Sunday Creek Reconfiguration Project is a multi-benefit water efficiency project that has adopted a considered approach to striking a balance between possible environmental, cultural, economic, social and recreational outcomes. As a result, the proposed project meets the requirements of state and Commonwealth governments for a neutral or positive socio-economic impact.

1. Introduction

The Lake Moodemere-Sunday Creek wetland complex is located on the Murray River floodplain in north east Victoria, near to the township of Rutherglen. Water is currently diverted from the Murray River, through Lake Moodemere and into Sunday Creek where it is extracted for irrigation purposes.

The proposed Sunday Creek Reconfiguration Project delivers a more water efficient and cost-effective irrigation supply to the Sunday Creek Irrigation Syndicate, generating water savings from bypassing the lake and delivering water directly to Sunday Creek. In addition, the project allows the hydraulic diversity of the Lake Moodemere wetland complex to be restored resulting in improved biodiversity outcomes at the site. The use of the lake for the transfer of irrigation water supports a range of recreational values that may otherwise not be possible. Maintaining these values has been a fundamental consideration in the project planning.

Due to the water savings generated by the project, it may be eligible for funding under the Commonwealth's Water Efficiency Program, being delivered as part of the Murray-Darling Basin Plan.

1.1 The need for a socio-economic assessment

The Basin Plan allows for the recovery of additional water above the 2,750 GL target through initiatives such as the Commonwealth's Water Efficiency Program on the condition there would be **neutral** or **positive socio-economic impacts** from recovering this water.

At the Murray-Darling Basin Ministerial Council meeting in December 2018, Ministers agreed that socio-economic criteria and the associated assessment be adopted as the basis of the neutrality test for assessing efficiency measures projects. Project compliance with the criteria is assessed though a process established by the states prior to being submitted to the Commonwealth.

The Victorian Government has since established a process through which the Department of Environment, Land, Water and Planning (DELWP) and partner agencies work with proponents to develop water efficiency project proposals that comply with the agreed socio-economic criteria. This process has been followed in the completion of this assessment.

1.2 Purpose of this paper

The purpose of this report is to assess the socio-economic impacts of the proposed Sunday Creek Reconfiguration Project in a manner that complies with the agreed assessment criteria.

Following review by DELWP, the report will be released for public comment. Whilst extensive consultation has shaped both the project and the socio-economic assessment contained in this report, the public consultation process is intended to allow more people from within the community to better understand the project and raise any issues or concerns.

2. Summary of evaluation criteria

The socio-economic criteria adopted by Victoria are listed in the table below, along with the relevant sections in this report where they are addressed.

Criteria	Section
1) Projects must be made public	
a) A regional map must indicate where investments are being made to depict how these interrelate to improving the efficiency of the district. This includes showing the broad location of the project, the amount of water to be recovered for the environment, the type of project and relevant socioeconomic information.	Section 3.1 Section 6.1
b) Where possible, reports or outcomes of past projects should be made available	NA
c) Technical reports on completed projects must be made available to inform the development of any future projects.	NA
d) Following in-principle government approval, non-sensitive information about project applications must be advertised to allow relevant stakeholders to make submissions to the proposal.	NA
2) Projects do not negatively impact on social and environmental outcomes	
a) All projects are required to describe the expected socio-economic and environmental benefits of their proposed project, with delivery partners required to coordinate and communicate with local communities and community bodies on the program and describe the expected socio-economic and environmental impacts of each program on the local community, region or state.	Section 4 Section 7
b) Social values may include the amenity to local communities of weirs, storages and parks that may be affected by efficiency projects.	
c) Large projects must describe the expected socio-economic outcomes of their proposal. In doing so, they must address the following: ▪ the anticipated socio-economic impacts to the local community, region or state; ▪ their project's strategy for increasing the socio-economic benefit to participants and their communities (e.g. local sourcing of goods, services and labour); and ▪ if and how the project will contribute to regional investment and development in the geographic area	NA
d) Both project and delivery partners are required to comply with all relevant laws including work health and safety laws. Each project must show an understanding of all relevant legislation or regulation (including environmental laws and regulations) that will require approval prior to works commencing.	Section 3.4 Section 3.5 Section 3.6 Appendix A
e) Australian Government to fund facilitators to work with communities to develop proposals that have community support and positive social and economic outcomes.	NA
3) The project assessment for funding must be clear, timely, simple and transparent, and not unduly increase red tape.	
a) The project assessment for funding must be clear, timely, simple and transparent, and not unduly increase red tape.	NA
4) Projects need to demonstrate how they contribute to the current and future viability of proponent businesses and irrigation districts	
a) Proponent consider how the project would contribute to the current and future financial viability of the irrigation district/region where it will occur, including identification of potential irrigation network improvements	Section 7.2.1
b) Projects should avoid upgrading water supply infrastructure where the system, or parts of the system, are not going to be used in the future.	
c) Project proposals in an irrigation district should take account of relevant irrigation business' strategies or plans.	

Criteria	Section
5) Programs or projects support regional economies	
a) Programs or projects should identify opportunities to support local industry and regional development.	Section 7.2.1 Section 7.2.2 Section 7.2.3
b) Programs or projects should focus on increasing water use efficiency in ways that address industry, network/system and local/regional priorities, future needs and risks and may include research and extension services	
c) Programs or projects in an irrigation district don't reduce the overall productive capacity of the relevant region	
d) Programs or projects should not impact negatively on regional jobs	
6) Programs or projects do not have negative third party impacts on the irrigation system, water market or regional communities	
a) Where a proposed project is located within an irrigation network, the proponent must provide evidence that the relevant network operator or water corporation is involved in or aware of the project.	Section 4 Appendix B
b) The relevant government or proponent must consult industry bodies, irrigation network operators/, local governments or regional development organisations, on a strategic regional approach which will focus on ensuring there is a mix of water efficiency projects in a region in ways that address industry, network/system and local/regional priorities, future needs and risks and may include research and extension services.	Section 4
c) The socio-economic assessment of programs or projects must consider impacts not just on participants, but for broader regions.	Section 7.1 Section 7.2 Section 7.3
7) Projects need to be assessed for their potential to impact on the price of water.	
a) Proponents can only transfer water rights that they own at the time of their application. They cannot receive funding to acquire water rights. A project cannot transfer more water than the project will save, and the proposed quantity must be independently verified as being a conservative estimate of the resulting water savings. A proponent may keep any water savings beyond the amount transferred.	Section 7.1.1
b) Proponents applying for project funding would be required to provide evidence that the water entitlements have been held for a minimum of 3 years at the time of application.	Section 6.2
c) Project proponents must ensure there is no direct impact on the reliability of water from cumulative implementation of projects	Section
d) Projects must not directly increase the price of water.	Section 7.2.5
8) Any cultural impacts identified, protected or improved	
a) Projects are required to describe the expected cultural benefits of their proposed project, with delivery partners required to coordinate and communicate with local communities and community bodies on projects and describe the expected cultural benefits of each project on the local community, region or state.	Section 7.3.3
b) Projects must describe the expected cultural benefits of their proposal. In doing so, they must address the following: ▪ the anticipated cultural benefits to the local community, region or state; ▪ their project's strategy for increasing the cultural benefit to participants and their communities (e.g. local sourcing of goods, services and labour)	
c) Projects over $3 million must identify cultural heritage sites and manage any impacts in accordance with relevant Commonwealth and State laws.	
9) Program design should include close engagement with community and industry leaders.	
a) The relevant government or proponent must consult with industry bodies, IIOs, local governments or regional development organisations, or investment corporations on relevant strategic regional projects, and consider community support	Section 4 Appendix B

Criteria	Section
b) This consultation should focus on increasing water use efficiency in ways that address industry, network/system and local/regional priorities, future needs and risks and may include research and extension services	
10) Where practical, seek to develop and implement integrated implementation of efficiency measures to maximise benefits to the irrigation network and local enterprises	
a) Programs or projects must focus on increasing water use efficiency in ways that address industry, network/system and local/regional priorities, future needs and risks and may include research and extension services. This would include integrated proposals.	Section 7.1 Section 7.2 Section 7.3
11) Monitoring and evaluation, including of socio-economic outcomes, should be built into programs and used to regularly review and adapt programs as required.	
a) The Commonwealth will develop a monitoring and evaluation framework to assess the progress of projects in real time, post-approval.	Will be addressed in detailed business case
12) Projects must deliver real water savings and not result in profiteering or rorting.	
a) Projects must not allow participants to individually profit without creating water savings	Section 7.1.1
13) Projects should identify improved capacity to respond to changes in business environment including drought and climate resilience	
a) Provide information on how the project will improve resilience to climate variability.	Section 7.2.1

3. The Project

3.1 Project description

The Sunday Creek Reconfiguration Project ('the project') proposes to change how irrigation water is delivered to Sunday Creek.

Currently Lake Moodemere is filled via the Lake Moodemere regulator and pump station located adjacent to the Murray River. The water then flows down a 150 m excavated channel into the lake and through Hells Gate to Sunday Creek where it can be pumped by the Sunday Creek Irrigation Syndicate, a consortium of 14 irrigators (predominantly vignerons). Under this arrangement, approximately 40% of diverted water is lost to seepage and evaporation before it is extracted by irrigators (DEPI, 2014).

Figure 1: Lake Moodemere regulator, looking toward the lake from the Murray River (August 2020)

3.1.1 Project proponent

Goulburn-Murray Water (GMW) is the proposed project proponent for the Sunday Creek Reconfiguration Project.

3.1.2 Planned irrigation infrastructure works

The project proposes to deliver water directly to Sunday Creek from the Murray River whilst providing the upgrades needed to enable the creek and lake to be operated independently of each other, and for Lake Moodemere to return to a more hydraulically diverse water regime.

Preliminary Designs for the proposed works were completed in late 2019. Key design features of the project, include:

- A new purpose built 36 ML/day electric pump station to extract water from the Murray River
- A direct pipeline to transfer water from the pump station to Sunday Creek.
- A fixed sill structure at Hells Gate embankment, allowing the creek and Lake Moodemere to be operated independently of each other
- Decommissioning the old pump station and replacing the existing Lake Moodemere regulator on the Murray River to bring it up to safety standard and facilitate the ongoing management of water levels in the lake (Jacobs, 2019).

The general locality of these works is shown in Figure 2.

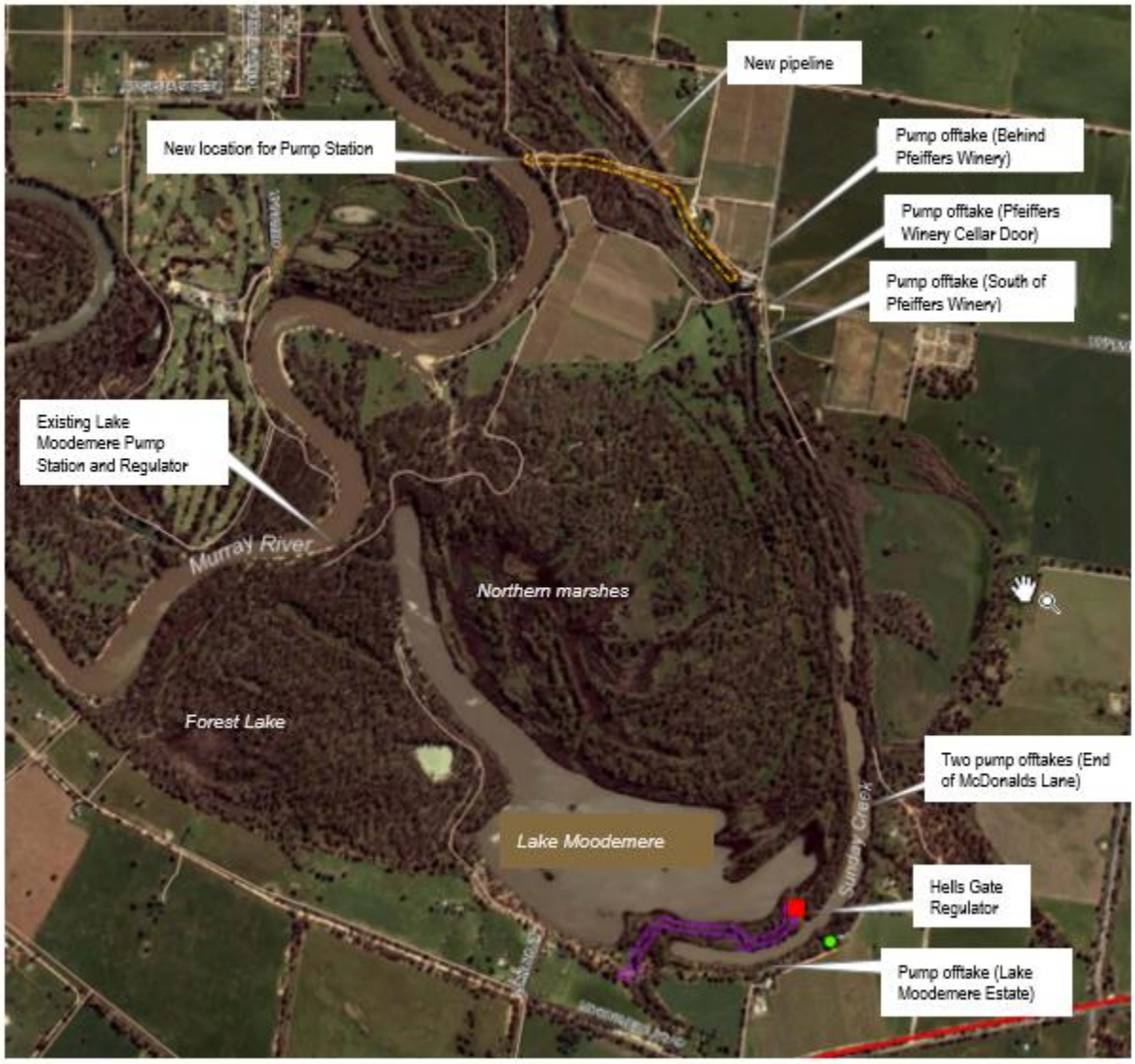

Figure 2: Project Location and layout

3.1.3 Proposed operating rules

A preliminary set of operating rules are set out by Jacobs (2019), building on past modelling work and consultation with community and agency stakeholders regarding the future management of lake levels. Key elements of the planned operating rules following construction of the new pump and pipeline include the following:

- During the irrigation season, Sunday Creek will be kept at an average level of 128.8m AHD. Maximum and minimum operating levels of the creek will be 128.7m and 128.9m AHD respectively. At these levels the creek holds 10.1ML of water (GHD, 2010) which acts as a supply buffer to each of the irrigators in the syndicate.
- To ensure there is enough water in Lake Moodemere to run the annual rowing regatta, and for other recreation purposes, water levels in Lake Moodemere will be raised up to a maximum of 128.7m AHD by December via the new Lake Moodemere Regulator, in time for the regatta. This level will be held until the end of January. Outside of these times the regulator will remain closed with no inflow or outflow.

The planned operating regime incorporates the water needed for the tradition of the rowing regatta to continue.

- Lake Moodemere and its marshes may also be filled from Sunday Creek by overtopping the fixed sill in the Hells Gate embankment in two ways. Firstly, water may spill into the lake during naturally occurring overbank flows in the Murray River. Secondly, it can be pumped (using the Sunday Creek Irrigation Syndicate's infrastructure) in years when the river is too low to fill the lake through the Lake Moodemere regulator. An agreement will be developed between the Sunday Creek Management Committee (SCMC) and the North East Catchment Management Authority (CMA) to allow the delivery of environmental water via pumping when needed.

Under this proposed operating regime, no marsh area will be inundated due to water supply into Sunday Creek for the Sunday Creek Irrigation Syndicate. It is this reduction in undesirable flooding in the northern marshes that leads to the majority of proposed water savings through decreased evapotranspiration and seepage.

Information on control and operating levels commonly uses a local relative level compared to a gauge at "Chambers Pump" on Sunday Creek. The Chambers Gauge zero datum level has been surveyed at 127.1m AHD. Important levels are listed below (Table 1) in both the local level and in meters AHD.

Table 1: Important levels in the Lake Moodemere system

Site	Level @ Chambers (m)	Level in mAHD
Chambers gauge	0	127.1
Invert level of Lake Moodemere regulator	1.21	128.31
Invert level of Hiskin's Bend regulator	2.6	129.7
Minimum level for rowing regatta	1.6	128.7
Northern marshes commence inundation	1.6	128.7
Murray overbank flow	2.9	130.0
Proposed operating range – Sunday Creek	1.6 – 1.8	128.7 – 128.9
Proposed spill level at Hells Gate	1.9	129.0

3.1.4 Community infrastructure, education and information

It was recognised through the stakeholder engagement process that some of the lake users may prefer a more consistent lake water level throughout the year, particularly over the spring/summer period when peak usage occurs. Often this preference is based on past experience or a perception that a full lake is more aesthetically pleasing and represents environmental health. In reality, the artificially high lake levels have led to environmental degradation and the continuation of this practice is a barrier to effective environmental management of the lake and the surrounding wetland marshes.

In response, the Indigo Shire has recommended that the project includes a provision for an interpretive information hub at key locations within the reserve. These could include a combination of physical signage and digital applications where users can engage with information about the lake, its history, its cultural significance and the environment it supports. The information can extend to exploring the impact that irrigation has had on the region, and the changed management of the lake. The information will highlight that lower water levels can support critical vegetation and habitat for fish, frogs, and waterbirds.

Providing visitors with access to this information at targeted locations will help them interpret the environment and cultural features of the site, and to engage with them in a more meaningful way. This will both protect and enhance visitors' experience. The nature of the information provided, and the optimal medium will be explored by the Council in more detail and be integrated with other planned initiatives for the development of cycling and walking trails that connect the reserve to other visitor destinations nearby, such as the local wineries.

In addition to these information hubs, the project will also provide some recreational facilities such as picnic tables and chairs and an all abilities jetty to maintain access to deeper water areas for fishing. Currently, there is no designated area for visitors at the reserve to sit, relax and engage with the site. Locating some basic facilities near the information hubs will create a lakeside destination as well as a place for cyclists and bushwalkers to take a break. This will support Council's broader plans to build on the established cellar door tourism to promote nature-based tourism experiences in the region.

Information hubs and picnic areas have also been supported through consultation with the rowing clubs and Yorta Yorta Nation Aboriginal Corporation (YYNAC), with the view of capturing the long history of the site by the rowing clubs and the even longer history of Aboriginal peoples. YYNAC are also interested in opportunities for the further identification, protection and interpretation of remaining cultural heritage sites within the reserve.

3.2 Ownership and governance

Once the new infrastructure is built at the site, the Sunday Creek Irrigation Syndicate will take over the ownership, operation and maintenance of the new pump station, pipeline and fixed sill structure in the Hells Creek embankment. The new Lake Moodemere regulator is expected to be recorded on the Environmental Assets Register, with its future governance arrangements being resolved through standard Victorian environmental water management processes.

3.3 Land tenure

Figure 3 shows the current land classifications for the Lake Moodemere-Sunday Creek complex (Water Technology, 2012). Much of the land within the project activity area is public land managed by Parks Victoria with all activity occurring within existing disturbed footprints.

Figure 3: Public land reserves within the project area (Water Technology, 2012)

Parks Victoria is also the designated waterway manager for Lake Moodemere and has legislative responsibilities under the *Marine Safety Act 2010*.

3.4 Compliance with relevant legislation

All relevant laws and regulations will be complied with and approvals acquired prior to commencing work, as is standard process for Victorian construction projects. The project has liaised with a range of approval and referral agencies to confirm the regulatory approvals requirements and the matters that may need to be addressed through these processes. A summary of the outcome of this assessment is provided as Appendix A.

3.5 Legislative and policy amendments and inter-jurisdictional agreements

No legislative or policy amendments are required for this project to proceed. A 2016 letter from the Victorian Minister for Water (L. Neville 2015, personal communication, 1 December) states that Victoria and NSW have an agreement regarding accounting for water savings generated by small projects on the Murray River. Under this agreement, the Sunday Creek Irrigation Syndicate will be issued an entitlement for 462 ML, subject to the syndicate:

- Applying for the issue of a water entitlement with supporting evidence confirming that 462 ML of water savings has been achieved, in the form of an independent audit
- Completing all statutory requirements for issue of water entitlements under the Victorian *Water Act 1989.*

The volume of 462 ML is based on modelling estimates (DEPI, 2014) which assigns individual monthly water savings to regulated or non-regulated flows. Of the total estimated saving of 594 ML, the model predicts that 462ML (78%) of savings comes from regulated flows and 132ML (22%) of savings from unregulated flows. Only the savings generated from regulated flows will be claimed by this project.

3.6 Cultural heritage assessment

An approved Cultural Heritage Management Plan (CHMP) will be required for this project. Under the Victorian *Aboriginal Heritage Act 2006* (the Act), a CHMP is required if the proposed activity is specified in the *Aboriginal Heritage Regulations 2007* (the Regulations) as a high impact activity, and the activity area (or part thereof) is specified as an area of cultural heritage sensitivity.

The scope of works planned for this project will include works that constitutes “high impact”. The project site is located in an area of cultural heritage sensitivity pursuant to the Regulations. Therefore, a CHMP is mandatory under s.76 of the Act.

An initial cultural heritage assessment was undertaken for the project area (Terraculture, 2010) and found:

- No Aboriginal places are recorded within the project activity footprint
- Twenty-Four Aboriginal sites are located within a 20km radius of the Project site, including 23 scarred trees and one stone artefact scatter
- No Aboriginal cultural heritage was identified.

Further cultural heritage surveys will be required of the revised project footprint following the completion of preliminary designs in 2019. Yorta Yorta is interested in expanding the scope of these surveys beyond the mandatory minimum to identify other cultural heritage sites in the reserve, as discussed in section 3.1.4. Yorta Yorta would also like to better understand the history of Aboriginal connection to the reserve through the carbon dating of any middens identified through these surveys.

3.7 Integration with other projects

The Sunday Creek Irrigation Syndicate are the only irrigators that divert from Sunday Creek, and the only irrigators that currently have their water supplied by Lake Moodemere. There are no opportunities to integrate this project with other efficiency measures and it will proceed as a stand-alone project.

Higher Murray River flows proposed through the Basin Plan's Constraints Management program may increase the number of occasions when water levels in the river exceed the commence to flow threshold into the lake. This may provide an opportunity to shift the timing of inflows away from late spring/summer (when there are higher flows in the river due to irrigation demand) to the winter/spring period. This better aligns with the needs of aquatic biota and reflects what would have happened prior to the construction of Hume Dam. Additionally, should the target flows proposed under the Constraints Management program be realised, environmental water will be able to be delivered to the northern marshes without the need for pumping.

4. Stakeholder Engagement

Initial scoping for this project commenced in 2008, and there has been various consultation with key stakeholders and interest groups over the past 12 years. Consultation has informed the proposed design, operating rules and provisions. In particular, the preference to maintain the annual regatta has been incorporated into the operating rules despite the impact of that decision on reducing water savings.

As part of the socio-economic assessment undertaken in mid-2020, stakeholders were engaged through:

- Meetings with Yorta Yorta Nation Aboriginal Corporation
- Targeted workshops and meetings with agencies – including DELWP, North East Catchment Management Authority, Parks Victoria and Indigo Shire
- Targeted workshops with the Sunday Creek Management Committee
- Phone conversations with local rowing clubs – including Rutherglen, Corowa and Wahgunyah
- Phone conversation with local interest groups - the Friends of Lake Moodemere and VRFish
- Phone conversation and survey of the Lake Moodemere Water Ski Club
- Phone conversations with Marine Safety Victoria and the Victorian Fisheries Authority.

A summary of the consultation activities, the nature of interest of key stakeholders and their level of support is provided in Appendix B. Key feedback provided from this consultation has been incorporated throughout this assessment report.

5. Summary of project need

By pumping their water entitlements into Lake Moodemere before channelling it into Sunday Creek, the Sunday Creek Irrigators have kept the lake's water levels artificially high through the irrigation season. Although recreational users have benefited from these higher water levels high during the warmer months, the associated economic and environmental costs are not reflective of contemporary practice.

The proposed project addresses the following key problems with the current irrigation supply system:

- **High water losses.** Diverting water into Sunday Creek via Lake Moodemere results in significant water losses through evapotranspiration, seepage and evaporation. Based on available modelling (DEPI, 2014), the current estimated losses are 1,407 ML/year.
- **Prohibitive cost of supply.** The existing pump station is owned and operated by the Sunday Creek Irrigation Syndicate. It is manually operated and fuelled by diesel given that there is no access to a cheaper alternative (electricity) at its current location. These inefficient and high cost processes are exacerbated by the high water losses discussed above. These inefficiencies have been identified by the irrigators as a key barrier to on-farm investment and growth (pers. comm. SCMC, July 2020).
- **Barrier to effective environmental management of high-value ecosystems**. The need to maintain water levels in Lake Moodemere artificially high during the irrigation season has significantly altered and deteriorated the ecological value of the site. Continuing this practice prohibits restoring the hydraulic diversity of the lake. This is an ongoing constraint to improving ecosystem health and biodiversity at the site.
- **Impediment to economic resilience of the sector.** The high cost of irrigation water supply means that only high-value crops (e.g. grapes) are commercially viable to grow. This limits options for irrigators to diversify their crop type which would support the resilience in the face of climate uncertainty. Additionally, lack of confidence in the security of supply under the current system is limiting plans for expansion amongst some businesses (pers. comm. SCMC, July 2020).
- **Risk of pump failure will have devastating economic impacts.** The existing pump has reached the end of its useful life and the bank where it is located is at risk of collapse. Should this result in an inability to supply irrigation water at critical growth stages, it may result in a loss of yield for that season, causing devastating impacts to the irrigators.
- **Risk of pump failure is a significant public safety concern**. The current pump station and regulator are approximately 40 years old and were not designed with public safety in mind. In addition to reaching the end of its useful life, the pump is located on an eroding bank. There is a real risk that it will collapse or wash away and injure someone. The infrastructure can be accessed by public using the reserve and poses a potential safety risk.

The Commonwealth Government's Water Efficiency Program has made $1.5 billion in funding available for efficiency measures that contribute to an additional 450 GL of water recovery for the environment under the Basin Plan. Based on existing estimates, the Lake Moodemere project would achieve a water savings of 594 ML of which 462 ML will be claimed. This provides an opportunity for Commonwealth funding to be made available for the proposed project as well as additional costs of measures that may be needed offset adverse impacts.

6. Context

Lake Moodemere is located in the Rutherglen area within Indigo Shire (Figure 4). Rutherglen has established itself as one of Victoria's main wine producing regions, with 20 wineries located in the area. Of these wineries, nine are part of the Sunday Creek Irrigation Syndicate (discussed further in Section 6.2) and reliant upon the successful implementation of this project for the future security of their water supply.

Figure 4: Location map (Indigo Shire Council, 2018)

6.1 Overview of Indigo Shire's socio-economic profile

Indigo Shire has a population estimate of 16,701 (2019). Rutherglen's population is approximately 2,378 (ABS Census, 2016), with a higher proportion of the population in the 60-75 age bracket. In Rutherglen, the median age is 47, compared to 37 for Victoria (Indigo Shire Council, 2018).

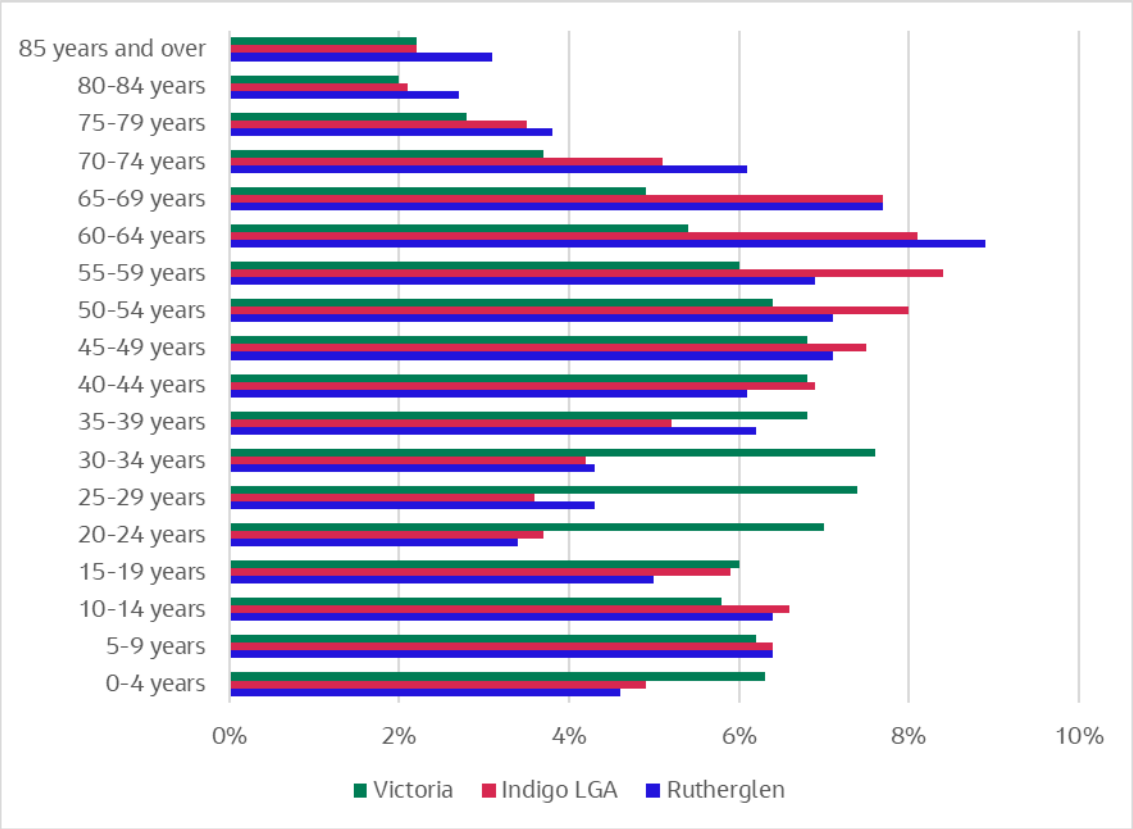

Figure 5: Age distribution (Australian Bureau of Statistics, 2016)

6.1.1 Social disadvantage

Socio-Economic Indexes for Areas (SEIFA) is an ABS product that ranks areas in Australia according to relative socio-economic advantage and disadvantage. The indexes are based on information from the five-yearly Census of Population and Housing – based on characteristics such as income, educational attainment, unemployment and occupations. SEIFA scores range from 188 (most disadvantaged) to 1,186 (least disadvantaged). A score less than 1000 means relative disadvantage relative to the mean and a score greater than 1000 means relative advantage.

Rutherglen has a relatively older population. It is ranked as disadvantaged relative to the rest of Indigo Shire and other Victorian suburbs.

The areas are ranked in order of their score, from lowest to highest, with rank 1 representing the most disadvantaged area. The lowest 10% of areas are given a decile number of 1, the next lowest 10% of areas are given a decile number of 2 and so on, up to the highest 10% of areas which are given a decile number of 10.

In 2016, Indigo scored 1,016 on the SEIFA Index, with a decile score of 8. However, Rutherglen scored 966 with a decile of 3. This in indicates a much higher level of socio-economic disadvantage.

6.1.2 Regional Economy

Indigo's industry is generally rural in nature with supporting services in small towns (REMPLAN, 2016). The economy of the Shire is based on farming, processing of local primary produce and the provision of services including tourism, retail, health and education.

The wine industry (manufacturing) is the most significant sector within the Shire and has expanded into the tourism sector through its cellar door experience. As seen in Figure 6, the Indigo industries generate an estimated $720.7 million to the regional economy (measured as Value Added[1]). Manufacturing is the largest contributor (46.6%) followed by Agriculture (10.1%).

The wine industry (manufacturing) is the most significant sector within the Shire and has expanded into the tourism sector through its cellar door experience.

Within Rutherglen, nearby to where the Sunday Creek Irrigation Syndicate is located, the manufacturing sector is even more significant. It contributes approximately $110.9 million in Gross Value Added, approximately 47% of the Rutherglen's total Value Added and 63% of value added for the manufacturing industry within the Indigo region.

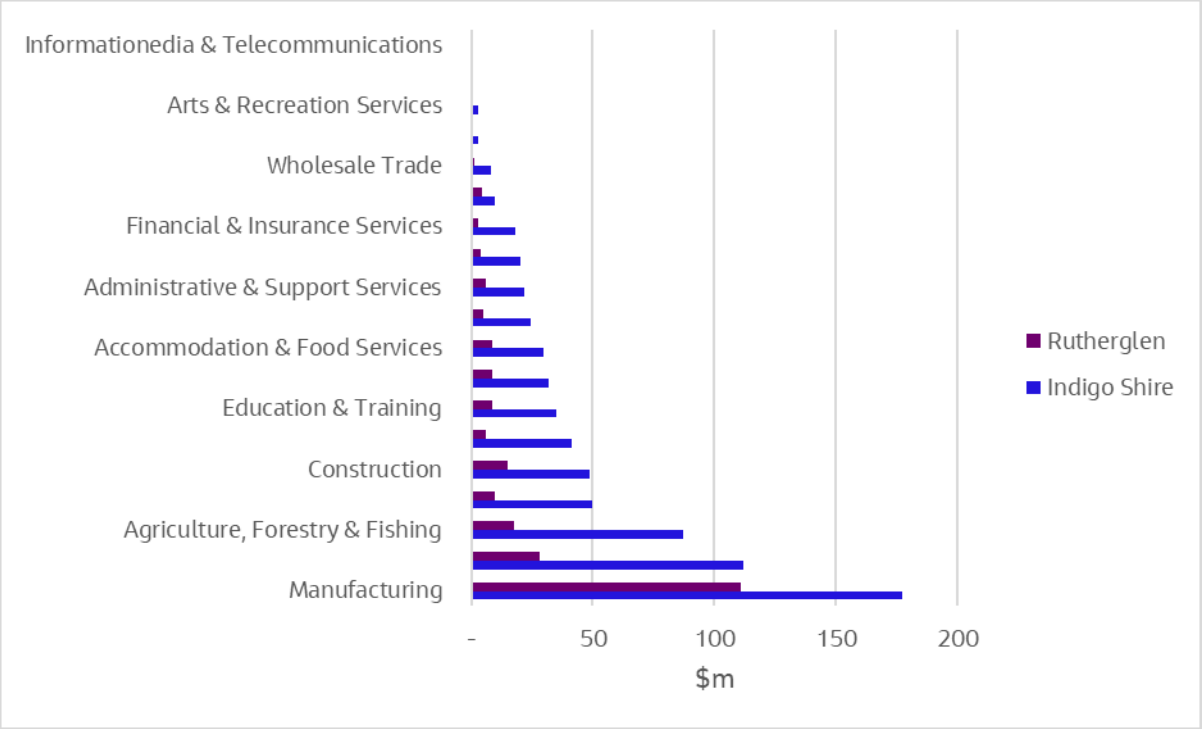

Figure 6: Value Added by industry (REMPLAN, 2016)

The strength of the Rutherglen's manufacturing sector is also reflected in employment numbers; 43% of the jobs in the Indigo region are in manufacturing of which 61% are located within Rutherglen. Retail Trade and Agricultural, Forestry and Fishing Sector are second and third largest employers in Rutherglen. All three industries are directly or indirectly linked to the strength of the irrigation sector and, in particular, the Sunday Creek Syndicate which accounts for approximately 70% of wine produced in the region (pers. comm. SCMC, 23 July 2020).

[1] Value-Added data represents the marginal economic value that is added by each industry sector in a defined region. Value-Added can be calculated by subtracting local expenditure and expenditure on regional imports from the output generated by an industry sector, or alternatively, by adding the Wages & Salaries paid to local employees, the gross operating surplus and taxes on products and production. Value-Added by industry sector is the major element in the calculation of Gross Regional Product.

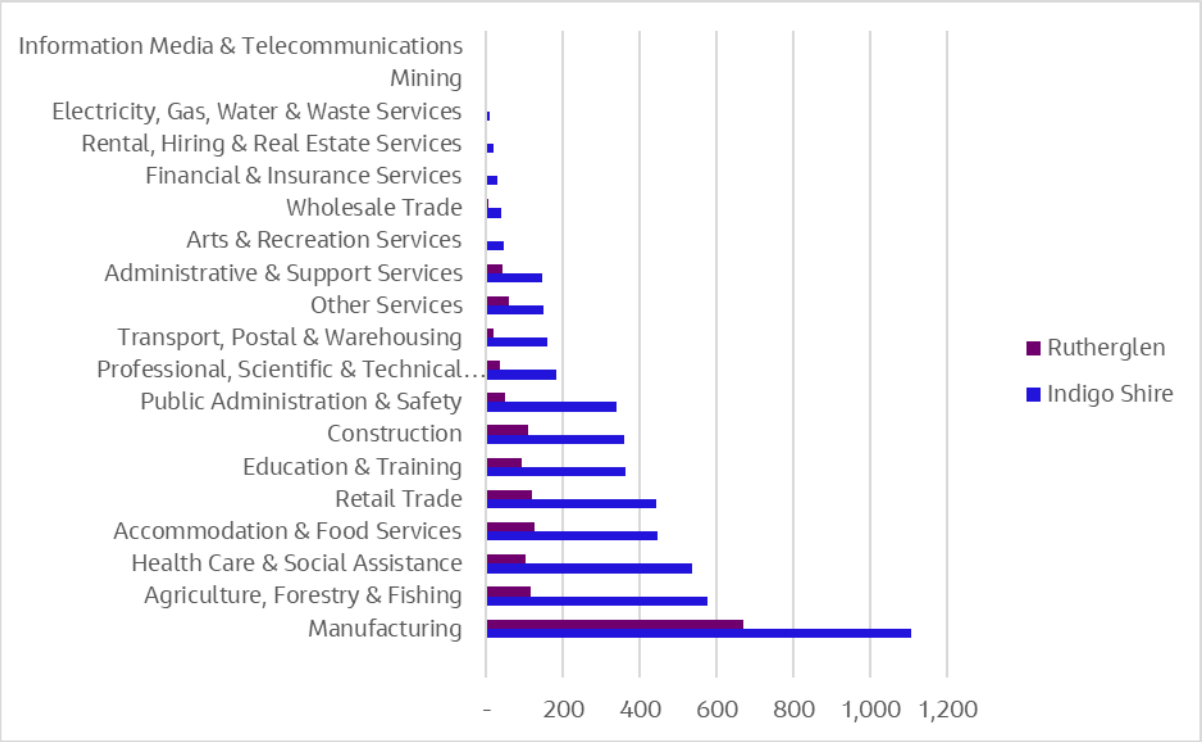

Figure 7: Employment by industry (REMPLAN, 2016)

The Indigo Shire Council's Economic Development Strategy (2018) highlighted the importance of the thriving tourism industry:

> *"Indigo Shire captures around 850,000 visitors per annum and the tourism industry contributed around $105M in output to the economy and over 500 jobs in 2017".*

Output from this industry is particularly important to the accommodation and food services sector (52% of tourism output) and the manufacturing sector (25% of tourism output). This is most likely due to wine production in the region.

6.2 The Sunday Creek Syndicate

The Sunday Creek Irrigation Syndicate is a consortium of irrigators whose supplied water from Sunday Creek. A Syndicate (or a private water scheme) is a private arrangement between a group of landowners to share the costs and obligations of installing and operating a private water scheme comprising of pumps, pipelines, channels etc[2].

Irrigation extractions from Sunday Creek commenced in 1950s and informal arrangements for the management of scheme were put into place in the late 1970s, at the time the current infrastructure was installed. A formal pumping agreement was subsequently developed in 2001. The syndicate was incorporated in 2014 and comprises of 14 landowners (predominantly vignerons). They have a combined total licensed annual allocation of 2,322.5 ML, all of which is high reliability share. The total licensed allocation will not be changing under this proposal.

The Syndicate owns and operates the Lake Moodemere regulator and pump station.

[2] https://www.g-mwater.com.au/water-resources/private-water-scheme-information

6.3 The Lake Moodemere wetland complex

The project lies within the Lake Moodemere Reserve on the Murray River floodplain in north east Victoria - an area of approximately 500 hectares of floodplain forest that includes Sunday Creek, Lake Moodemere and other scattered wetlands. Lake Moodemere is one of the largest wetlands along the Murray River between Lake Hume and Yarrawonga and provides important drought refuge in a regional context. The Lake Moodemere-Sunday Creek complex is a priority wetland under the North East Catchment Management Authority's Waterways Strategy (NECMA, 2014). Under current arrangements, water is diverted into these wetland areas before entering Sunday Creek.

Lake Moodemere is a permanent water body covering an approximate area of 62 hectares. The body of water has a long narrow "finger" extending to the north where inflows are generally received from the Murray River, and a small protrusion at the eastern end where Hells Gate (an excavated channel) connects with Sunday Creek. When in flood, or with raised water levels for irrigation purposes, the lake extends to the east into the wetland marshes inundating a further 25 to 30 hectares. The southern side of the lake is characterised by tall fringing rushes overarched by large river red gums. On the northern side of the lake, banks are also lined with tall rushes, with a small section of sedgy forest separating the lake from the aquatic herb land marshes. Maximum depth in in the lake is approximately 2.2m (Water Technology, 2012). Substrate is variable, consisting of silt in some sections to areas of concentrated organic matter. Water quality is considered to be very good.

Sunday Creek is a narrow waterbody approximately 3.5km long. Towards the southern end, the creek is widest between 20 – 80m, with depths to 2 metres, which extends approximately 1.5km to the north. Immediately past this point the creek narrows to 5m width and less than 1m in depth. Beyond this relatively short section Sunday Creek again opens up to form a channel of 10-20m in width to its termination point just south of Hyde Road. Sunday Creek is characterised by a high variability of in-stream woody debris, and littoral macrophytes. Large river red gums line both banks and provide significant shading in many sections. Water quality in the creek is poorer than in Lake Moodemere with higher temperatures and low dissolved oxygen (especially in the northern portions of the reach where anoxic condition have been reported).

Water levels in Lake Moodemere have been artificially managed for around 100 years. The current operating regime sees Lake Moodemere filled from the Murray River by use of a gravity fed regulator and a pump station that is used during times of low flows. The lake is filled to a height (128.55m AHD) that allows water to flow by gravity through Hells Gate into Sunday Creek, which acts as a holding lagoon for irrigation water extraction. At the same time water also pushes over the northern bank of the lake into the marshes. Up to 31.2 hectares of marsh land may remain inundated for a prolonged period (DSE, 2004). This current arrangement has been in place since 1979 and has created an altered water regime whereby sustained flooding of the wetland complex occurs during the irrigation season (typically September to April), rather than the winter/spring months, which would have typically occurred prior to irrigation management.

The current operating rules specify "*The regulator gates should be closed in December each year, allowing the lake level to be drawn down to 1.9 m through irrigation and evaporative demands. If the lake falls to a level which creates irrigation supply difficulties, the regulating structure should be operated to restore a maximum level of 1.9 m. The regulator gates should be open between May 1st and August 31st each year to allow for variation in lake level.*" In practice, the maximum level was revised down to 1.6m.

The Hiskins Bend regulator, constructed in 2008, operated to control flows from the Murray River to Forest Swamp and hence, under high Murray River levels, to Lake Moodemere. The regulator was constructed to provide a more natural regime to Forest Swamp, including connectivity to the river during the cooler months (May to October) and exclusion of regulated flows in the warmer months. This regulator is currently not operational.

6.3.1 Current ecological condition

The natural values of the Lake Moodemere-Sunday Creek complex have been significantly altered through its development as an irrigation supply system. Despite this, Richardson and Stoffels (2011) concludes that the

biodiversity of the Lake Moodemere system: "*may be high within a regional context – it contains a diverse turtle community, including threatened species, and the small-bodied fish community is at least the equal of other wetlands situated between lakes Hume and Mulwala. Also, given that it is the largest wetland between lakes Hume and Mulwala, the regional importance of the Lake Moodemere – Sunday Creek complex is expected to be considerably greater during dry periods*."

The altered hydrology has led to both positive and negative changes in vegetation composition and faunal diversity. Thirty-nine years of consistent flooding of the wetland marshes at Lake Moodemere has led to some new flora and fauna species entering the area, some threatened. Key changes in the lake complex driven by artificially high water levels include:

- Dominance of giant rush (*Juncus ingens)* to the detriment of species variability, principally at the margins of permanent water
- A large-bodied fish community dominated by exotic species, primarily carp and gambusia
- Relatively low diversity of aquatic vegetation within Lake Moodemere
- Limited frog diversity and abundance in Lake Moodemere compared to the surrounding complex, due to lack of hydraulic diversity and aquatic vegetation
- Poor representation of wading waterbirds and mudflat foragers, due to the limited access to shallow water and exposed mudflats for feeding.

Other historic management practices, including grazing and firewood collection, have also contributed to reduced species diversity and increased weediness. Other site issues include low dissolved oxygen conditions in the upper sections of Sunday Creek and reduced connectivity with the Murray River floodplain limiting opportunities for carbon and nutrient cycling (Water Technology, 2012).

6.3.2 Environmental values supported by the complex

A summary of the site's ecosystem values includes:

- A large area of open water habitat, providing permanent water (drought refuge) for many species even in dry years
- The largest wetland on the Murray River floodplain between Lake Hume and Lake Mulwala
- Thermal refuge (buffered from unseasonal variations in the river temperature due to releases from storage)
- Mature, scattered trees (mainly river red gums) surrounding the lake that provide hollows, nesting and refuge sites for a range of fauna including birds, reptiles and mammals.

Whilst the natural value of the lake's ecosystems is altered by its development as an irrigation supply system, it continues to support a range of ecological values including:

- Nine water dependent Ecological Vegetation Classes (EVCs), typically classified as vulnerable within the Victorian Riverina bioregion. Several of these are expected to benefit from more variable water levels in the Lake Moodemere complex as a result of this project, principally Rushy riverine swamp (EVC 804), Tall marsh (EVC 821), Aquatic herbland (EVC 653) and Floodway pond herbland (EVC 810).
- A broad diversity of both terrestrial and aquatic habitats. A flora and fauna survey undertaken in 2011 identified 278 vascular flora species in the project area, of which approximately 60% (169) were indigenous
- Fourteen rare or threatened species, including one species listed as vulnerable under the EBPC Act (1999) and Victorian FFG Act (1988) – river swamp wallaby-grass (*Amphibromus fluitans*) and one additional species listed under the Victorian FFG Act (1988) – wavy marshwort (*Nymphoides crenata*)
- Important habitat for aquatic vertebrates including fish and turtles

- Eight native aquatic vertebrate species including:
  - Three turtle species (broad shelled turtle (*Chelodina expansa*), eastern long-necked turtle (*Chelodina longicollis*) and the Murray River turtle (*Emydura macquarii*)
  - One large bodied native fish, golden perch (*Macquarie ambigua*)
  - Four small bodied native fish, Australian smelt (*Retropinna semoni*), flyspecked hardyhead (*Craterocephalus stercusmuscarum),* flathead gudgeon (*Philypnodon grandiceps*) and carp gudgeon (*Hypseleotris spp.*). Of these, flyspecked hardyhead is listed as threatened under the Victorian FFG Act.
- A range of frog species found mainly within the northern marshes and Fresh Lake where fluctuating water levels occur, including Sloane's froglet (*Crinia sloanei*) a frog species typically associated with periodically inundated areas in grassland, woodland and disturbed habitats which is listed as endangered under the EPBC Act (1999).
- A total of 73 bird species were surveyed within the project area during the five-day survey (last week of July). Of these, 12 wetland dependent threatened bird species were recorded as using the wetland complex.

It is noted that the EPBC listed Mueller daisy (*Brachyscome muelleroides*) was not present during the survey nor have any previous records been made of its occurrence at the site[3].

6.3.3 Passive and active recreational use

The local regatta has been running for over 100 years. Held over two days in January, it is popular with locals and visitors and generates social and economic benefit to the region.

Lake Moodemere is located within Indigo Shire. Locals are attracted to Lake Moodemere's calm water, which is considered to be a safe and inviting place for rowing, sailing and water skiing. A local regatta has been held at the lake for over 100 years and is the oldest and one of the most popular rowing regattas in Victoria. The two-day event occurs in January and its popularity attracts competitors, support crew and spectators.

Moodemere is also a popular for fishing, swimming, walking, cycling and bird watching. The site is frequented throughout the year by recreational fishers, with ready access to the shoreline making it a good site for people of all ages and abilities. The lake is regularly stocked with yellow belly (*Macquaria ambigua*) by the Victorian Fisheries Authority and has on occasion been stocked with freshwater catfish (*Tandanus tandanus*). These fish are difficult to catch and most anglers enjoy the lake for the experience it provides and are satisfied catching carp (pers. comm. R, Alexander, September 2020).

There is a shared 13 km picturesque trail that takes in both the river and Lake Moodemere past vineyards and along the shores of the lake. There are also plans to extend this with a walking and cycling track from Wahgunyah to Lake Moodemere (Indigo Shire Council, 2018). Camping is not permitted around the lake, but there are small campsites along the banks of the Murray River a short distance away. Toilet facilities are available within the reserve.

Due to the relatively small area Lake Moodemere, boating speeds are restricted to 5 knots (9.3 km/hour) across most of the lake for safety of other users (Figure 8). In the deeper areas of the lake, these speed limits do not apply however access to the lake is limited to one boat for 15 minutes at a time. It is this area of lake enjoyed by water skiers (Figure 8) with the peak usage months being October to April. The calm water on the lake means it is highly valued as a slalom skiing site and a number of records have been set at the site (pers. comm. J. Adams, August 2020). Following a period of inactivity, the Lake Moodemere Water Ski Club has recently reconvened and in 2019 commenced hosting the Lake Moodemere Slalom Classic. The event is hosted over two days in February in the lead up to the Moomba Masters which is held annually on the Yarra River in Melbourne during March. Professional skiers, such as those who compete in the Lake Moodemere event, can reach speeds of up to 58 km/hour (~31 knots).

[3] Identified as potentially being in the area by the EPBC protected matters search tool

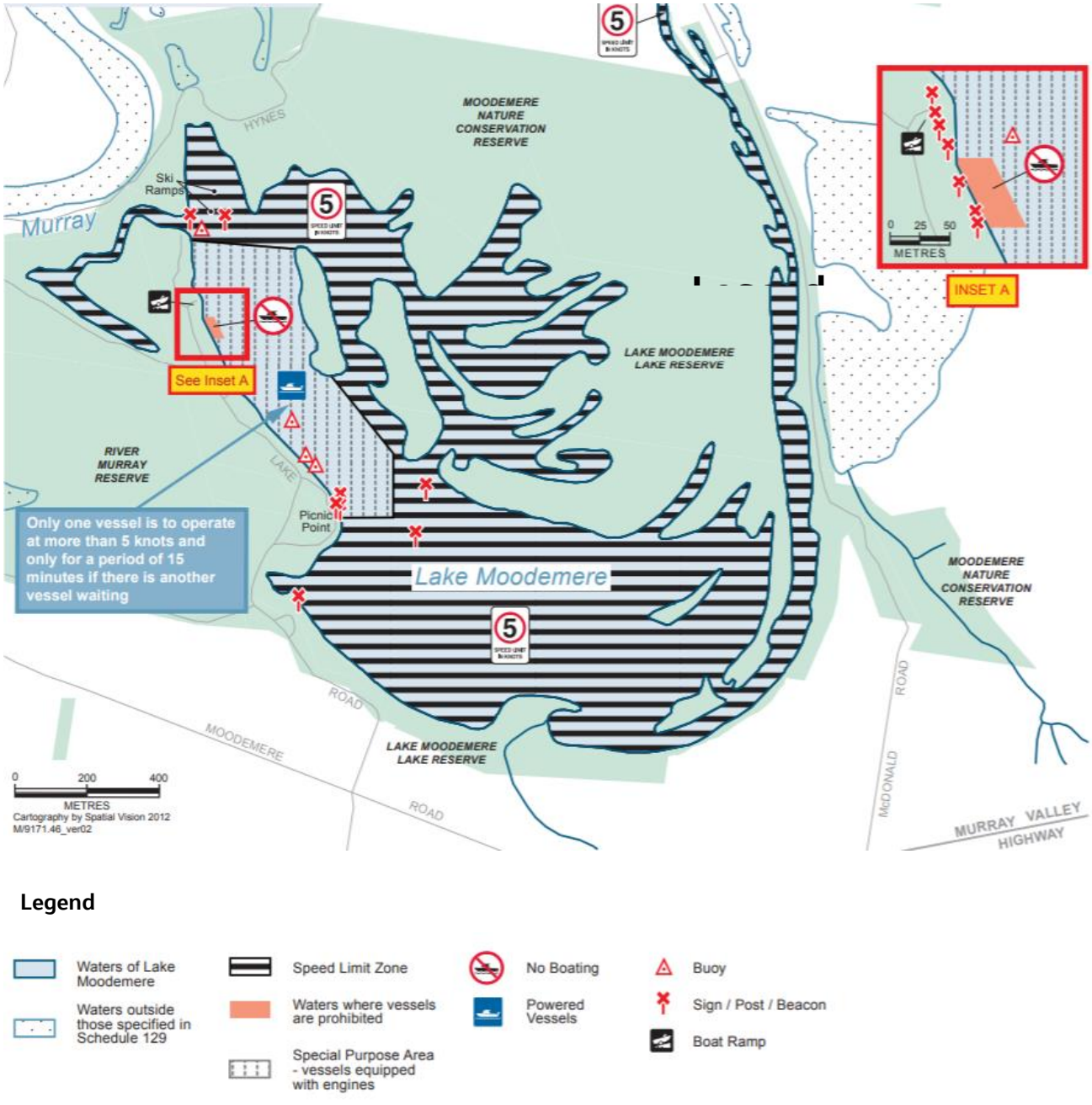

Figure 8: Boating regulations for Lake Moodemere (source: transportsafetyvictoria.vic.gov.au)

As can be seen in Figure 9, although Indigo Shire is the second smallest local government area in the north-eastern region, it has the highest visitor numbers for waterway/waterbody activities. The greatest share is for canoeing/ kayaking and row boating (30%) and events and other use (30%).

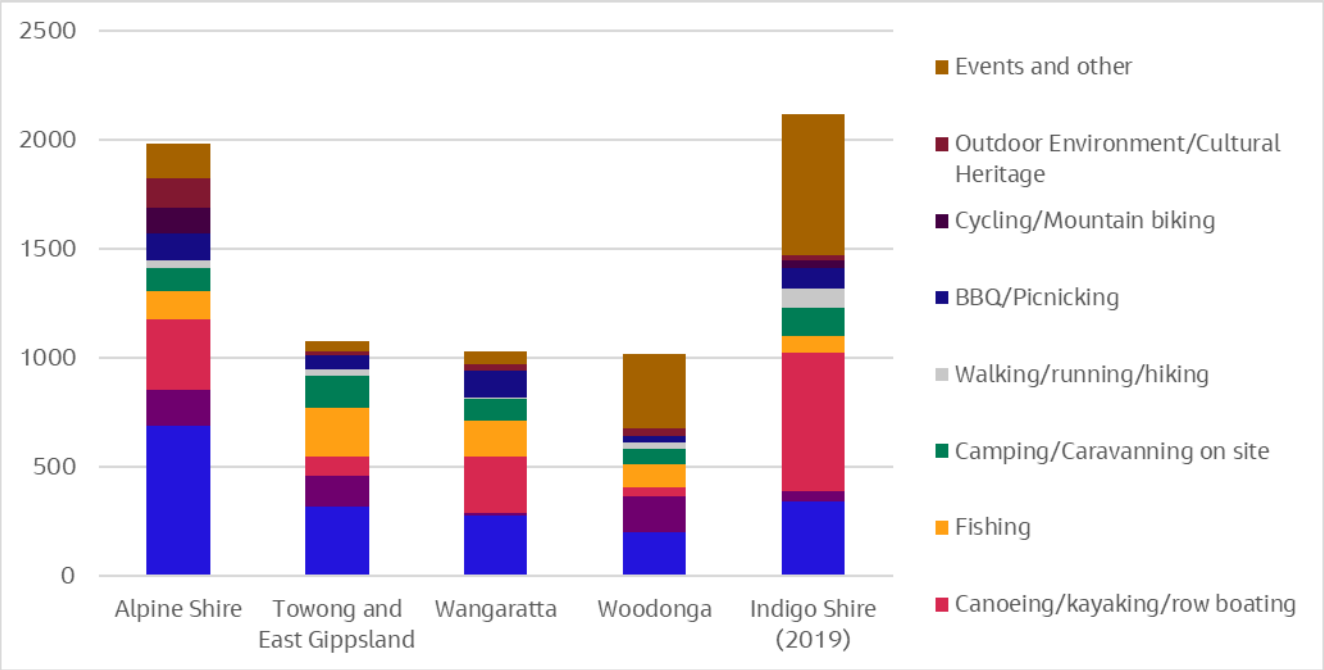

Figure 9: Activities undertaken by visitors at waterways January -February 2018 and Indigo 2019 (NECMA, 2019)

6.3.4 Economic contribution

A 2019 assessment of the socio-economic contribution of selected waterways and waterbodies in the North East Region (NECMA, 2019) found that:

- In 2019, there were 3,878 active day visitors at the lake and 9,047 participants in recreational activities at the lake. This accounts for 17% of the total participation in waterways and waterbodies within Indigo Shire.
- Direct expenditure in 2019 from recreational users of the lake was estimated at approximately $280,000 with total economic impact (direct and indirect contribution) likely to be approximately $790,000[4] .
- In 2019, the two-day regatta held in January attracted around 600 competitors with a further 1,200 coaches, assistants, friends and family members[5]. It generally attracts approximately 4,000 visitors to the area. This activity generates significant social and economic benefit to the region. Groups from visiting clubs tend to stay 2-3 nights in the region and, on average, one-third also take the opportunity to visit local wineries and other attractions.
- Direct expenditure from visitors to Lake Moodemere was estimated at $277, 626 in 2018-19. The Indigo Shire's waterways and waterbodies contributed $3.2 million to the local economy (direct and indirect contribution), approximately 11% of the total contribution from waterways and waterbody's in the north east region. Water users were responsible for 35% of this contribution, suppliers 20% and businesses 45% (Figure 10).

[4] This is based on the direct contribution of Lake Moodemere being equal to 24% of the direct expenditure on the waterways and waterbodies in Indigo Shire. It was assumed that this proportion also applied to the total economic impacts – estimated at #3.225 million for the shire.
[5] NE Region socio-economic Value (2019)

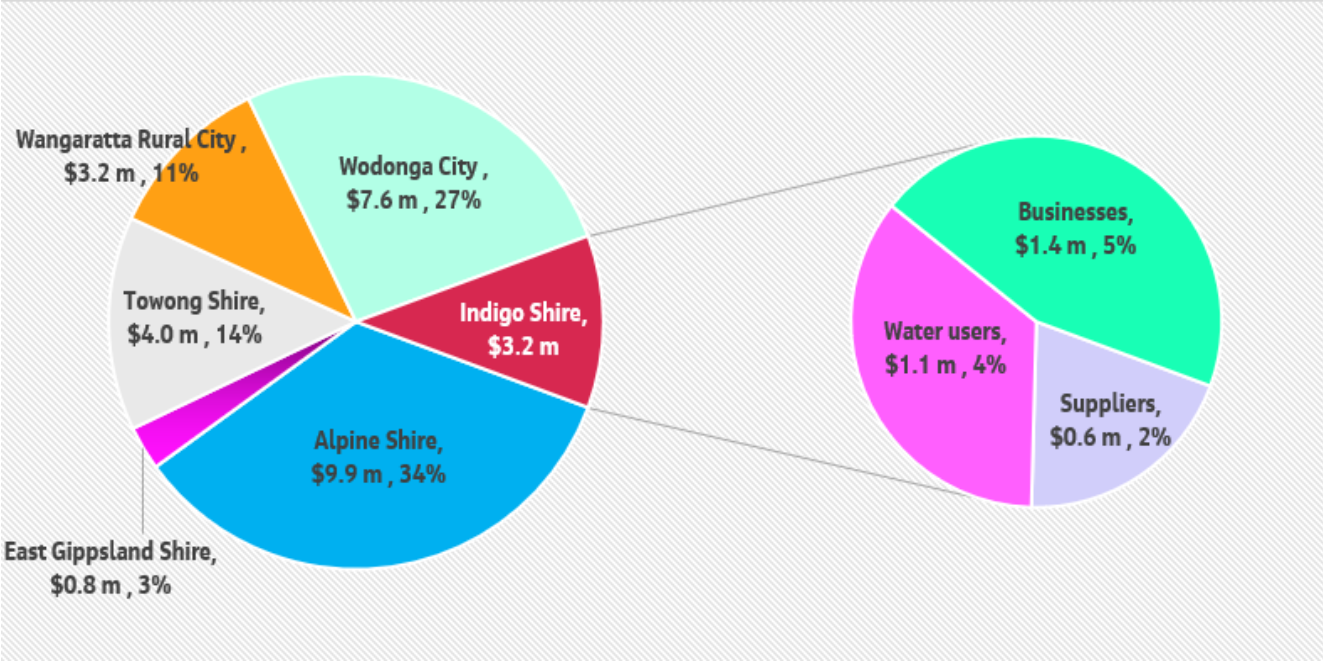

Figure 10: Waterways and waterbodies economic contribution to the regional economy (NECMA, 2019))

6.3.5 Cultural significance

The Lake Moodemere Reserve area has a rich history of Aboriginal occupation and early accounts following European settlement describe large gatherings of Aboriginal people at Lake Moodemere (NECMA, 2014). In 1891, twenty-one acres of land at Lake Moodemere (Wahgunyah) was set aside by the Victorian Government for Aboriginal use, later being revoked in 1937 (Terraculture, 2010). In the earlier years of this period the reserve became an 'unofficial' refuge for Aboriginal people seeking to avoid being moved to missions. Aboriginal people at Lake Moodemere largely supported themselves by working for pastoralists and farmers or by selling fish, possum-skin rugs and Indigenous weapons.[6] The cultural significance of the Lake Moodemere Reserve overlaps with the recreational history of the site, with anecdotal evidence of Aboriginal residents competing in the rowing regatta using bark canoes cut from trees within the reserve.

The Registered Aboriginal Party (RAP) for the Lake Moodemere-Sunday Creek complex is the Yorta Yorta Nation Aboriginal Corporation.

[6] https://dhudhuroaandwaywurruancestors.wordpress.com/2019/03/30/duplicity-and-cunning-at-lake-moodemere-the-kitty-brangy-photographs-that-did-not-exist

7. Socio-Economic Impacts of the Sunday Creek Reconfiguration Project

The social, environmental and economic impacts of this proposal are far-reaching. Irrigators are currently paying to pump additional water into Lake Moodemere that is evaporated before it can be used on-farm. While some recreational users of the lake have been benefitting from this inefficiency, it has been at the expense of the environment and economic productivity.

Recreational users have benefited from the inefficient means of delivering irrigation water to Sunday Creek.

The ability to bypass Lake Moodemere will significantly reduce water losses and improve reliability and efficiency of supply for irrigators. Reducing the cost of supply will provide the investment certainty needed for this important sector to expand and become more resilient. This will provide direct and indirect benefits to the local and regional economy.

Importantly, water saved can be used for environmental watering to restore the ecological health of this site and other areas. The ability to reinstate a more variable water levels in the lake and the surrounding marshlands will enhance the environmental value of the site which has deteriorated as a result of the current irrigation system.

The project will also deliver a range of social impacts – some which are positive and some which are negative. For example, a return to a more variable water levels will support passive and active recreational and tourism activities that are enhanced by biodiversity (such as birdwatching and bushwalking). However, activities that benefit from consistent and high lake water levels during the summer month such as kayaking and water skiing, may have a perceived or real disadvantage.

The project scope, as outlined in Section 3.1 takes significant steps to protect and improve the recreational value of Lake Moodemere. For example:

- The operating rules will provide maintain water levels over the summer months to support the continuation of the local regatta which benefits the community and the local economy
- There is a provision for some community facilities at the lake including a fishing platform, some picnic tables, seating and shelter.
- There is a provision for information hubs at key points around the lake that provide education and interpretation of the local environment, history and cultural heritage (See Section3.1.4). These proposed facilities will enhance Indigo Shire's plans for the Rutherglen Wine, Walk, Cycle Trail and align with its signage strategy.

A range of measures have been introduced to protect and improve the recreational values and cultural connections of Lake Moodemere.

The project also takes significant steps to enhance the cultural outcomes of the project. A range of initiatives and opportunities have been identified in consultation with Yorta Yorta.

Figure 11 provides a summary of the range of environment, social and economic impacts associated with the project, and the project features that contribute to them.

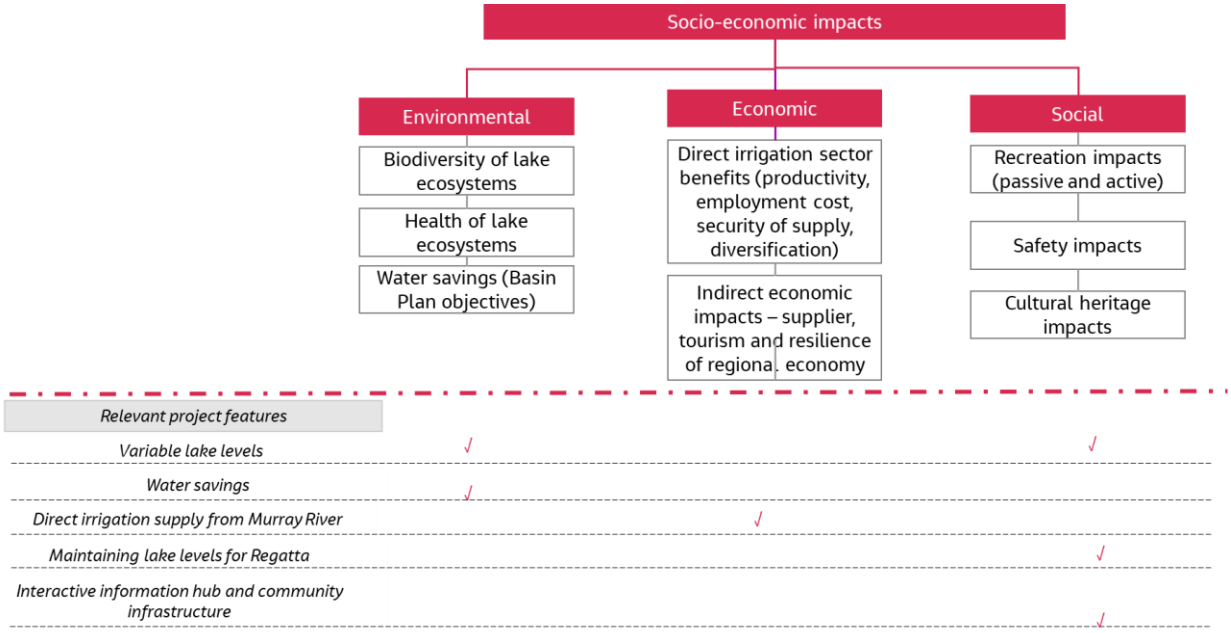

Figure 11: Socio-economic impacts attributable to the proposed project features

The following sections provide more detail on the socio-economic impacts that are likely to occur as a result of the project.

7.1 Environmental impacts

7.1.1 Water savings

The Sunday Creek Reconfiguration project generates water savings through the more efficient supply of irrigation water. The estimated water savings as a result of the project are summarised in Table 2 which highlights:

- The bulk of water savings are generated by reduction in undesirable flooding to the northern marsh areas
- Minimal evaporative savings are made in Lake Moodemere once the need to maintain water levels for the rowing regatta are provided for.

Maintaining lake water levels for recreational purposes is at the expense of the total water savings possible from this project.

Water savings generated by this project will become part of the Commonwealth's environmental water holdings and contribute to the improvement of ecological health at this this or elsewhere.

Table 2: Modelled water losses and potential savings (DEPI, 2014)

Site	Losses under current operation	Losses under proposed operation	Savings
Lake evaporation	485 ML	465 ML	20 ML
Sunday Creek evaporation	123 ML	75 ML	49 ML
Marsh evapotranspiration	705 ML	246 ML	459 ML
Marsh seepage	94 ML	28 ML	66 ML
TOTAL	**1407 ML**	**813 ML**	**594 ML**

Currently, Sunday Creek losses form part of the Murray River loss being shared equally between New South Wales and Victoria and is outside of the MDBA cap. However, under the proposed arrangement Sunday Creek

losses will become part of the Victorian Murray River diversion and within the MDBA cap. This, in theory, will reduce the amount of water available to Victorian Murray users, however as the volume is very modest amount (average of 75ML/year, Table 2) the impact on the system overall will be insignificant (DEPI, 2014).

7.1.2 Anticipated changes to the health of the Lake Moodemere complex

Sustained high water levels in the Moodemere wetland complex means management levers for enhancing environmental values are currently limited. By removing irrigation water from lake, it creates the opportunity for environmental water managers to manage the site for ecological outcomes. For example, Hells Gate regulator (from Sunday Creek) can be used to divert environmental flows from Sunday Creek into the lake if environmental water managers (North East CMA and the Victorian Environmental Water Holder) decide that it will be beneficial to do so.

A key benefit of the project, and one that drives much of the savings, is the reinstatement of a more ephemeral regime to the 32 ha of marshlands adjacent to Lake Moodemere. Inundation of this area commences when Murray River flows reach approximately 22,000 ML/d at Doctors Point[7]. Prior to regulation, this would have resulted in the shallower marshes receiving water from the Murray River in most years followed by a drying phase over the warmer months.

The proposed alteration in Lake Moodemere will generally see a gradual decrease in lake levels following the initial fill in spring or early summer. Habitat diversity at the lake is increased when water levels are lower and a mix of deep water, shallow water and mudflat habitats are present simultaneously. However, this greater ephemerality may be at the detriment to some species that have adapted to a more permanent water regime. The anticipated changes in water levels (modelled based on 25 years of historic climate data and river levels) is illustrated in Figure 12 and shows that – in the absence of overbank flooding – water levels in the lake are anticipated to fluctuate between 128.4 and 128.7 mAHD. Surveys of Lake Moodemere found 50% of the bed levels measured were below RL 128.25 suggesting that, even under a full drawdown scenario, substantial refuge pool habitat would remain in the lake (Water Technology, 2012).

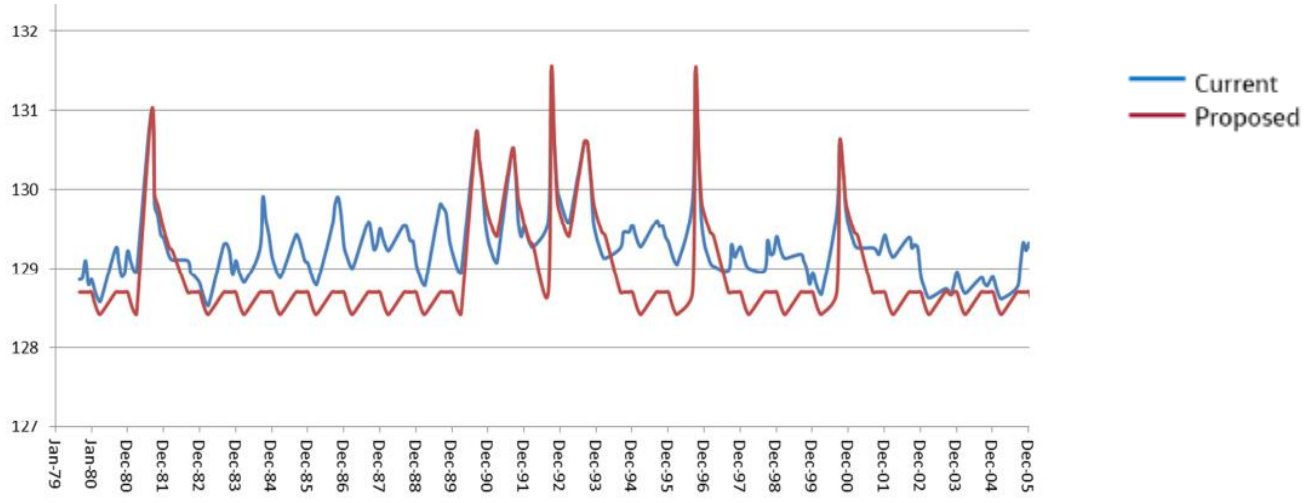

Figure 12: Comparison of water levels for current and proposed operating rules under historic conditions

A high-level summary of anticipated benefits and risks as a result of the project is summarised in Table 3.

[7] As estimated by the Murray-Darling Wetlands Working Group

Table 3: Summary of anticipated impacts as a result of the project

System Component	Potential benefits	Potential risks	Net impact
Lake Moodemere wetland complex	▪ Reinstatement of a more natural watering regime to approximately 32 ha of marshland ▪ Greater diversity of vegetation communities in Lake Moodemere and the northern marshes ▪ Improved habitat for native fish, particularly important fish species such as southern pygmy perch and flat-headed galaxias not currently found in the complex ▪ Regeneration of threatened and less represented vegetation types currently present but not prevalent, including river swamp wallaby grass ▪ Greater availability of frog habitat with an expected increase in frog diversity and abundance ▪ An increase the diversity of waterbirds present, driven by an improvement in the availability of feeding habitat for wading waterbirds and mudflat specialists ▪ Improved condition of fish and turtles due to increased food availability because of increased variability in water height	▪ Increase in the extent and quantity of Juncus ingens beds at the expense of other habitats. ▪ Localised reduction in the quantity of suitable habitat for certain threatened vertebrates (fly specked hardyhead and broad shelled turtle) ▪ Colonisation by invasive plant species within areas of wetting and drying habitats. ▪ Exotic fish may benefit from the drawdown as they are generally more tolerant of warmer water and poor water quality, particularly carp, gold fish and eastern gambusia.	▪ Positive
Sunday Creek	▪ Reduced hypoxia events, and overall improved water quality. In-turn this is likely to increase native diversity of fish and other aquatic vertebrates ▪ Decrease populations of noxious fish species such as carp which tolerate poorer conditions, while increasing the abundance of native species. ▪ Opportunities for re-introduction of native fish species such as freshwater catfish which prefer more stable habitat.	▪ Loss of thermal refuge, assuming that Sunday Creek offers some protection from cold water present in the Murray River. ▪ Disconnection of Sunday Creek via the concrete sill at Hells Gate, increases fragmentation of the wetland complex. ▪ Some additional siltation of Sunday Creek may occur under the new arrangement, although is expected to be minor.	▪ Neutral to positive

7.1.3 Conclusion

Overall there are expected to be significant net benefits to the environment by reinstating the hydraulic diversity of the site. In addition to the direct and immediate ecological benefits, the project provides the opportunity for targeted environmental management of the site.

7.2 Economic impacts

The economic impacts considered include

- Direct impacts – these relate to impacts directly attributable to the change in the irrigation water supply system. These include benefits to irrigators from more efficient and reliable supply, as well as any disbenefits to irrigators
- Indirect impacts - these relate to any second-round impacts. This may include businesses that have a dependency on the irrigation sector, or the tourism sector which may be affected by changes to how the lake may be perceived or used.

A summary of the direct and indirect economic benefits as well as disbenefits is summarised in Table 4 and discussed in more detail below.

Table 4: Summary of direct and indirect economic impacts

	Advantages	Disadvantages	Net impact
Direct impacts			
Irrigation sector productivity	▪ Reduced pumping costs ▪ Reduced manual operation and maintenance (cost and time)	▪ Minor loss of water along Sunday Creek reducing total entitlements by approximately 3% per annum	▪ Positive
Irrigation sector resilience	▪ Improved water reliability ▪ Greater business certainty to expand and/or diversify production	▪ NA	▪ Positive
Indirect Impact			
Businesses	▪ Strengthen tourism industry from nature based tourism and growth in wine cellar door activity ▪ Some opportunities for businesses to establish around nature based tourism businesses ▪ Improved resilience of businesses dependent on irrigation sector	▪ Reduced consistency in view for waterfront businesses. There is only one known business known to be affected and that business is also part of syndicate and supports the project.	▪ Neutral to positive
Other irrigators/water market	▪ NA	▪ NA	▪ Neutral

7.2.1 Direct economic benefits to the Sunday Creek Irrigation Syndicate

The proposed project will directly improve productivity and resilience of the Sunday Creek irrigators by:

- **Reducing pumping costs**

  The inefficiency of the current irrigation supply system means that irrigators are forced to pump a significantly higher volume of water into the lake than what ends up being delivered on-farm. The losses from seepage and evapotranspiration within the Lake Moodemere-Sunday Creek complex is estimated at an average of 1,400 ML/year. To compensate for this loss, the volume of water pumped, and the associated operating cost is much higher than if this loss was avoided.

  Further, the existing pump is diesel fuelled, which is a common solution in areas that don't have access to the electricity network. However, the running cost of diesel pumps are significantly higher than electricity pumps. The proposed location for new pump and pipeline has access to the electricity network, which would

result in much lower running costs. Based on typical operating costs the proposed project could more than halve the operating costs per ML pumped.

- **Reducing manual operation and maintenance costs**

  A shift to an electric pump will reduce the labour requirements for operation, servicing and maintenance relative to a diesel pump. Electric pumps also integrate more easily with automation functions. Currently, irrigators must manually operate the pump which is time consuming (approximately 80 hours over the irrigation season) and less reliable than an automatic electric pump. Whilst the Sunday Creek Irrigation Syndicate has a volunteer arrangement for this operation, an automatic pump would free up their time for more productive use on farm or at the cellar door.

- **Improving water reliability**

  The current pump is reaching the end of its useful life and the bank where it is located is eroding. The risk of failure is real in the short to medium term if the pump is not replaced. Should failure occur at critical growth stages of the vines, it may result in a loss of yield for that season, causing devastating impacts to the irrigators. The best-case scenario would be the loss of the annual harvest. The worst-case scenario would be loss of the vines. A new and reliable pump would reduce this risk and provide the security of reliable supply for the irrigators.

- **Providing the certainty and the commercial conditions to expand and diversify**.

  The improved efficiency of the irrigation supply system, and the associated cost saving, will provide the commercial conditions needed for production to expand and diversify. This will protect and enhance local production and local employment.

  The current pumping inefficiencies increase operating cost per ML of water supplied and therefore restrict land use to higher value crops such as vines. Reducing the costs and increasing reliability of supply will facilitate investment by current land owners and water entitlement holders to expand and diversify agricultural activities reliant on irrigation.

  During the consultation process, representatives from the Syndicate claimed that the project would be a key driver for irrigators to increase production. Some have projected that this will support a 10%-30%[8] increase in turnover within 5 years of the project being completed.

These direct benefits will improve the longer-term sustainability of the sector with flow on impacts to the regional community, including regional employment.

7.2.2 Direct disbenefit to Sunday Creek Irrigators

As discussed in Section 7.1.1, the Syndicate's water use is currently metered at the Sunday Creek offtakes, meaning that water losses (primarily evaporation) from Sunday Creek currently form part of the Murray River losses. Under the proposed arrangement, water will be metered at the pump station offtake and the Sunday Creek losses will impact the water that is available on-farm. However, given that the losses average 75ML/year (or 3% of the total High Reliability Water Share entitlement), the impact on irrigators is not expected to be material.

The Sunday Creek Irrigation Syndicate supports the proposal, in recognition that the benefits far outweigh this small cost.

7.2.3 Indirect economic benefits

A growth in the irrigation sector is expected to generate increased demand from local suppliers and business for other dependent industries. The manufacturing, agriculture and food and accommodation sectors are very

[8] This is based on high level estimates from three irrigators with intentions to expand if this project goes ahead. The estimate is not based any modelling.

important for the regional economy. As highlighted in Section 6.1.2, nearly 60% of Rutherglen's workforce is currently employed in the manufacturing sector, agriculture and accommodation and food services sectors.

Local production and employment is heavily dependent on the wine sector. Improving the reliability of water supply to the Sunday Creek Irrigators and reducing the risk of pump failure will also protect other businesses from supply disruptions. If the reduced cost of water supply supports diversification of irrigation crops, irrigators and other dependent businesses will be more resilient in the future.

If the irrigation sector grows, this may also drive on-farm investment in cellar door activities which will further strengthen tourism in the region. There may also be new opportunities for nature-based tourism (birdwatching, photography etc) which may increase visitation to the area.

The text box below provides an example of how the decommissioning of Lake Mokoan and restoration of Winton Wetlands has attracted visitors to the site – in both dry and wet periods.

How visitor numbers can be sustained despite varying water levels – Experience at Winton Wetlands

In 1971, the Winton Swamp was flooded to create Lake Mokoan, which was used as an irrigation storage. As a secondary benefit it was used for recreational purposes, including a range of water sports. However the flooding killed around 150,000 iconic river red gums, including many Aboriginal scar trees

In 2008-09, the lake was decommissioned due to high water loss and poor water quality and in 2010 the Winton Wetlands Committee of Management was charged with restoring and renewing the site. The ecological integrity of the site is being restored, and native species are being protected and re-introduced.

With the decommissioning of the lake, duck shooting in the area was no longer permitted and boating and fishing became severely limited. These activities previously attracted many people to the area and some in the community were concerned that with the draining of the lake, visitors would not come.

However, people now visit the wetlands for a different type of experience. Popular activities include walks, bike rides, canoeing, stargazing and birdwatching. There are 60km of roads, nine bush walks, 30km of cycling trails and artworks celebrating the landscape and its history. School groups also visit the site for guided nature excursions. (Lloyd & Finlayson, 2020)

The visitor numbers are increasing annually despite the drying of the wetlands in 2018. 2018-19 had the highest visitation, of approximately 65,000.

Reinstating the natural environment may attract new visitors to the region. The Indigo Shire's Tourism Strategy identified nature-based tourism as an opportunity for the region (Figure 13) but noted that it was a secondary product within the Rutherglen Area (Indigo Shire Council, 2018) . Reinstating the health of the Lake Moodemere Complex may elevate the strength of this offering.

	Food and agritourism	Nature based	Arts and culture	History and heritage	Festivals and events	Cycling
Beechworth area	☑	☑	☑	☑	☑	☑
Chiltern area		☑	☑	☑	☑	☑
Rutherglen area	☑	☑	☑	☑	☑	☑
Yackandandah area	☑	☑	☑	☑	☑	☑

☑ Primary product strength ☑ Secondary product strength ☑ Emerging product

Figure 13 Product strengths of Indigo's Areas (Indigo Shire Council, 2018)

7.2.4 Indirect economic disbenefits

Lake Moodemere Estate is located on Sunday Creek overlooking Moodemere Lake. A winery with a lakeside restaurant and accommodation, it also a location for lakeside functions. The lake view is important, and there is some concern that changing water levels will have an impact. However, the owner is also one of the irrigators in the Syndicate and has endorsed the proposed operating rules as, although the vista will change, views of water throughout the season will be retained. The benefit of secure and more efficient water is considered to outweigh any disbenefit from the change in views

There are not expected to be any other adverse impacts. Complementary activities to manage the risk of loss of open water habitat, such as cultural burning to prevent excessive encroachment of Giant Rush, is supported as part of the suite of project activities.

7.2.5 Water Market impacts

The project will not impact the water market. Water losses at Lake Moodemere were not metered and therefore the proposed savings will not impact entitlement volumes.

Sunday Creek losses (discussed in Section 7.2.2) are not considered material enough to change demand. Further, most of the Sunday Creek Irrigators do not currently use the full share of their existing entitlements. They will therefore not need to purchase additional water from the market.

7.2.6 Conclusion

The proposed project will have a positive impact on the local irrigation sector and the businesses that are dependent on it. There will be no adverse economic impacts

7.3 Social impacts

7.3.1 Impact on recreation value of the lake

As highlighted in Section 6.3.3 , although Indigo Shire is a relatively small local government area in the region, it has high visitor numbers for waterway/waterbody activities. Locals and visitors use the lake for of range of passive and active recreational purposes. Some are expected to benefit from the proposed projects, some will experience no change, and some may be slightly inconvenienced. The project scope, including allowances for community infrastructure and the proposed operating rules is proactive in mitigating adverse impacts and enhancing the overall visitor-experience.

It is expected that **bushwalkers, picnickers and cyclists** will likely benefit from the improved health of the environmental assets in the Lake Moodemere complex– including the diversity of vegetation, frog habitat, diversity of fish, waterbirds etc. Although some may prefer higher lake levels, it is believed that the funding allowance for an interpretative information hub will likely help visitors 'see' why a varying lake level supports environmental health above and below the water surface. Importantly, the interactive experience will provide visitors with a better understanding of the environmental value of Lake Moodemere wetland complex. Overall, an interpretive information hub is expected to improve the lake experience for these recreational users as well as build local support for the project.

Campers are also expected to benefit from the proposed project. Currently the diesel pump used by irrigators is located near a camp site on the Murray. This pump is noisy and operates 24 hours a day during the irrigation period which coincides with the peak period for camping. If this pump is replaced with an electric pump further upstream, campers will be better off. Some visitors may not experience a noticeable change, including those **fishing** or **swimming** at the lake. The presence of carp in the lake is not expected to change as a result of the project, a target species for recreational fishers. Over time, the diversity of aquatic vegetation is expected to improve and the lake may provide more suitable habitat for smaller bodied native fish. These fish provide a food source for piscivorous waterbirds and large bodied native fish prized by anglers. The inclusion of an all abilities

fishing platform in the project activities will maintain access to deeper water areas of the lake for fishing offsetting the potential impacts of variable water levels on this user group.

The **regatta event** and the visitor experience will not be affected by the project. As discussed in Section 3.1.3, water levels in Lake Moodemere will be raised by the end of December in time for the regatta. This water level will be held until the end of January. Outside of these times the regulator will remain closed with no inflow or outflow. The operating rules have been designed to ensure that rowers can continue using and enjoying the lake. If these operating rules were not introduced, high level projections estimate this project could have achieved an additional 250 ML of water savings (40% increase).

Water skiers and potentially **kayakers** who have benefitted from the consistently high lake levels maintained by irrigators, may be the main group that is inconvenienced by the project. While the lake will still be suitable for water skiing, the year-round access this user group has historically enjoyed may be reduced. However, there are other water bodies nearby that can be used for water skiing or kayaking during periods where the conditions at Lake Moodemere are less favourable. Nearby sites include the Murray River as well as Lake Mulwala, Lake Hume and Lake Buffalo. These alternative lakes are within an hour's drive away from Lake Moodemere and have less restrictions in place for water skiing than Lake Moodemere where access is restricted to one boat at a time. As discussed in Section 6.3.3, the Lake Moodemere Water Ski Club commenced hosting the Lake Moodemere Slalom Classic in 2019. This project may impact the timing or location of this event.

The following table summarises some of the passive and active recreation uses of the lake and a summary of how these would be impacted by the project.

Table 5: Summary of recreation impacts

Recreation activity	Advantages	Disadvantages	Expected net impact
Passive recreation			
Picnicking	▪ Provision for additional picnic facilities (refer to Section 3.1.4) ▪ Provision for a potential interactive information hub to enhance user experience ▪ Amenity of healthier ecosystems/ biodiversity to enjoy ▪ Lower noise disturbance if there are less water skiers on the lake.	▪ Some people may prefer to have more consistent views of higher water levels year- round	Positive
Bird watching	▪ Increased biodiversity and bird activity for current visitors ▪ Will be recognised as a bird watching location and attract new visitors.	▪ None	Positive
Active recreation			
Bushwalking / cycling	▪ Provision for additional break spots/ points of interest along the way – including picnic facilities and interactive information hub (refer to Section 3.1.4) ▪ More variability in views throughout the year ▪ Amenity of healthier ecosystems/ biodiversity to enjoy ▪ Increased amenity if there are less water skiers on the lake.	▪ Some people may prefer to have more consistent views of higher water levels year-round.	Positive
Swimmers	▪ Increased amenity if there are less water skiers on the lake when levels are lower	▪ Lake levels at times may be less conducive to swimming	Neutral (the swimming

Recreation activity	Advantages	Disadvantages	Expected net impact
	▪ May have more access to shallower lake levels.		experience will be largely unchanged)
Fishing	▪ Provision of all abilities platform for fishing ▪ Increased amenity if there are less water skiers on the lake when levels are lower	▪ Growth of vegetation along the lake banks may reduce the extent of open areas for shoreline anglers	Neutral
Rowing/ kayaking	▪ Increased amenity if there are less water skiers on the lake when levels are lower.	▪ There may be some months where lake levels are lower and less attractive to rowers/kayakers. ▪ Higher lake levels for the regatta should mitigate most of not all of these impacts during peak rowing/kayaking periods	Expected to be neutral
Water skiers	▪ None.	▪ There may be some months where lake levels are lower and less attractive for water skiers. Higher lake levels for the regatta during the peak usage period (October to April) period, will mitigate some of these impacts. ▪ The lake levels may impact the timing and location the Slalom Classic	Neutral to negative
Camping	▪ Reduced noise from diesel pump. ▪ More nature-based activities for campers to enjoy ▪ Reduced noise from water skiers.	▪ Some people may prefer to have more consistent views of higher water levels year-round.	Expect to be positive
Events (e.g. regatta)	▪ None – the lake levels are to be maintained for this event to continue as planned.	▪ None – the lake levels are to be maintained for this event to continue as planned.	Neutral
Education / excursions	▪ Improving the natural environment combined with plans for information hubs that support interaction and appreciation of the environment, history and culture will provide an improved experience for outdoor education. This will benefit student groups and nature-based tourism groups.	▪ None	Expect to be positive

Whilst data on visitor numbers to the lake, and purpose of visit is not collected by Parks Victoria or the Shire, Indigo Shire has undertaken significant community engagement as part of its Active Indigo Plan (Indigo Shire Council, 2018). From 382 surveys received from the community (of which 16% were from Rutherglen), residents identify 39 different types of physical activity they engaged in. The most popular outdoor activities (refer to Figure 14) supported by Lake Moodemere and its surrounds from most popular to least popular in terms of percentage participation, included:

- Bushwalking (59%)
- Mountain bike riding (40%)
- Fishing (30%)
- Canoeing/Kayaking (26%)
- Water skiing (12%)
- Trail bike riding (9%).

The proposed project therefore protects and enhances the activities that are most commonly engaged in by the community.

Lake users that may be perceived as being disadvantaged or inconvenienced are water skiers and potentially kayakers/ rowers. The operating rules around the regatta have been designed to offset these impacts for rowers and kayakers and to partially mitigate these impacts for water skiers. While the impact to water skiers cannot be fully offset, the sport can continue at alternative locations in the local area, all with less restricted access than Lake Moodemere. Further, as seen in Figure 14, water skiing was one of the two activities listed that was primarily undertaken outside the shire indicating a willingness to travel for this activity.

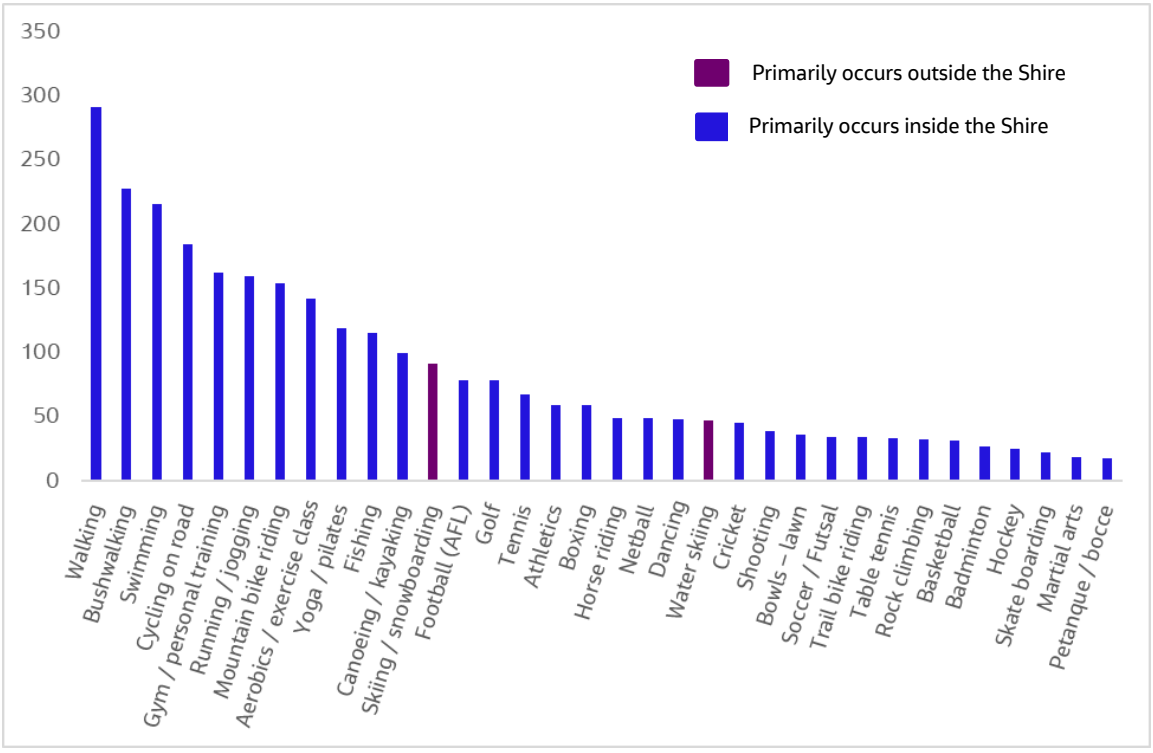

Figure 14 Indigo Shire survey respondents' participation in Physical activity (Indigo Shire Council, 2018)

Indigo Shire's recently released Lakes and Waterways Activation Plan 2020-2030 (Indigo Shire Council, 2020) includes an action to prepare a new master plan for the lake and use areas. Some of the consideration for the master plan include improved wayfinding and signage, improved facilities (e.g. picnic tables), relocation or replacement of the rowing club shed, walking tracks and linkages to surrounding trails and paddle trails. The proposed project has either a neural or positive impact on these master plan considerations.

Another recommendation in the plan is ensure future water levels remain suitable for recreation by working with responsible authorities to establish an agreement. The proposed project ensures that this is the case for most recreational uses of the lake, including the annual regatta. Water skiing will still be possible during the peak season when the lake is filled for the regatta, but there will be months in the year where lake levels may be too low for water skiing.

Indigo Shire has been consulted about this project, including the impact of the varying lake levels. Based on consultation to date, the Council believes that the overall impact on recreational users of the lake and the surrounding area will be positive.

7.3.2 Safety impacts

The project will involve decommissioning the Lake Moodemere pump station and replace the existing regulator that are currently at risk of failure. The safety benefits are summarised below.

Table 6: Summary of safety impacts

Recreation activity	Advantages	Disadvantages	Expected net impact
Safety	▪ Decommissioning of existing Moodemere pump station will mitigate the risk of the bank collapsing and the pump station falling into the river (e.g. during a flood) ▪ The replaced regulator will be built to current safety standards improving the safety for all visitors and operators.	▪ None	Positive

7.3.3 Cultural impacts

An Aboriginal cultural heritage investigation was undertaken in 2009 which included both a standard and complex assessment for the construction footprint of the reconfiguration project. No cultural heritage was identified through this process (Terraculture, 2010), however 24 Aboriginal sites were found to be located within a 20 km radius of the project site including scarred trees and one stone artefact scatter. This is considered to be a low density of sites and is likely reflective of the limited surveys that have been undertaken in the area (Terraculture, 2010).

Information hubs can be used to celebrate history of Yorta people at the site - such as their involvement in the regatta and Lake Moodemere's role as a refuge and meeting place for Aboriginal people. GMW will work with the Indigo Shire, Parks Victoria and Yorta Yorta to agree on the most appropriate response which will likely include a combination of signage and digital technology. It is expected that Indigo Shire will seek opportunities to integrate this with its vision for improved wayfinding and signage at the lake. The information provided will benefit the local community, tourists and school groups. It will incorporate education with recreation so that visitors have a more interesting and memorable experience.

Once the project is implemented, Yorta Yorta has expressed interest in exploring opportunities to be more involved in the management and rehabilitation of the site. This may include:

- Identification, protection and interpretation of cultural heritage within the reserve, possibly as an extension to the information hubs discussed in section 3.1.4.
- Managing the northern marshes. This could include being involved in the pumping of water into this area, cultural burning and monitoring of responses.
- Site based ecological monitoring to capture species of cultural significance. In particular, monitoring the impacts of the project on the broad shelled turtle (the totem of the Yorta Yorta clans).
- Involvement in the rehabilitation of the lake and its surrounds. Some possibilities discussed include:
  - Potential reintroduction of southern pygmy perch (in the lake) or freshwater catfish (in the creek)
  - Cultural burning in the surrounding reserve. This could help with fire management and improve the nativeness of the understorey species
  - Rehabilitation of culturally important plant species that could act as early colonisers e.g. old man weed
  - Investigation into techniques to increase the abundance of river swamp wallaby grass in the lake
  - Monitoring potential encroachment of giant rush into the lake following draw down and potential cultural burning as a management option.

The Sunday Creek Irrigation Reconfiguration Project plan includes provision for the development of a site rehabilitation plan led by Yorta Yorta to explore opportunities for joint management opportunities with Parks Victoria and using the Woka Walla works crew, an enterprise arm of the Yorta Yorta Nations Aboriginal Corporation.

Table 7: Summary of cultural impacts

Recreation activity	Advantages	Disadvantages	Expected net impact
Cultural impact	▪ Opportunity to celebrate Aboriginal history, connection and culture ▪ Opportunities for ongoing involvement in site management that protects and enhances cultural value and connection. ▪ Opportunity to enhance species of cultural significance	▪ None. However, plans to increase visitation at the site may impact of remaining cultural heritage values.	Positive

7.3.4 Conclusion

The project is expected to deliver net benefits to existing and new recreational users of Lake Moodemere. The only exception may be water skiers who may need to ski in alternative nearby locations when the water level at Lake Moodemere is too low. The project also provides opportunities to celebrate and share the site's rich cultural history and to facilitate Yorta Yorta's involvement in the ongoing management and rehabilitation of the site.

8. Conclusion

The proposed Sunday Creek Reconfiguration Project delivers a more water efficient and cost-effective irrigation supply to the Sunday Creek Irrigation Syndicate, generating water savings from bypassing the lake and delivering water directly to Sunday Creek.

Based on a review of the socio-economic impacts, the project is expected to deliver:

- Net benefits to the local environment by reinstating the hydraulic diversity of the site.
- Net benefits to irrigators through more efficient and reliable water supply
- Net benefit to the regional economy that is dependent on agriculture, wine production and tourism.
- Net benefits to most affected recreational users of the lake and surrounds – including passive visitors (picnickers), birdwatchers, bushwalkers, cyclists, campers, and educational groups.
- Neutral impacts on swimmers, recreational anglers, rowers and kayakers. The proposed operating rules will allow the annual regatta to continue
- Improved community safety by removing or replacing assets that don't comply with safety standards
- Improved appreciation and connection to the site's cultural significance, its history and environmental value through interpretive information hub at key locations within the reserve.

Whilst there are some inconveniences to local water skiers, some of these are avoided by the operating rules introduced to support the local regatta and the social and economic value that it provides to the community. When the water levels are too low for water skiing there are local alternatives, including the Murray, Lake Hume, Lake Mulwala and Lake Buffalo. These alternatives have less restrictions in place for water skiing than Lake Moodemere.

Overall, the project is expected to deliver significant net social, environmental and economic benefits to the region.

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Appendix A. Regulatory approvals requirements

A.1 Victorian regulatory approvals

Potential Victorian regulatory approvals required for the project at the concept design phase are outlined in (Jacobs, 2018a) and summarised in Table A-1.

Table A-1: Victorian Regulatory Approvals for the Sunday Creek Irrigation Reconfiguration Project

Approval	Description
Environmental Effects Act 1978 (EE Act)	
Referral	The Environmental Impact Statement notes that the project does not trigger any criteria under the EE Act however, the full extent of native vegetation impacts is not yet known and may still trigger a referral if native vegetation loss exceeds 10 hectares (Aquaterra Scientific, 2018).
Planning and Environment Act 1987	
Planning Permit	A planning permit is likely to be required under the Indigo Planning Scheme from Indigo Shire Council. The exact permit triggers and requirements will be confirmed following confirmation of the final design and further ecological studies.
Public Land Manager Consent	Works within the Public Conservation and Recreation Zone will require consent from Parks Victoria (as the public land manager for land in this zone) as a referral agency under the permit process
Aboriginal Heritage Act 2006	
Cultural Heritage Management Plan (CHMP)	An approved CHMP will be required before a planning permit can be issued (further detail provided in Section 3.6).
Heritage Act 2017	
Consent	Consent under the Heritage Act 2017 to carry out works within the Sunday Creek Chinese Camps and Market Garden Site which is listed on the Victorian Heritage Inventory, may be required from Heritage Victoria
Flora and Fauna Guarantee Act 1988	
Permit to Take/Keep Protected Flora, Permit to Take Fish	A permit may be required to remove flora from public land under the Flora and Fauna Guarantee Act 1988 In addition, a permit may also be required if native fish such as the Murray Cod require translocation as a result of construction activities.
Crown Land (Reserves) Act 1978	
Licence	A license under the Crown Land (Reserves) Act 1978 to carry out the works on Crown land may be required from DELWP
Land Act 1958	
Licence	A licence under the Land Act 1958 may be required to carry out works on unreserved Crown land from DELWP
Water Act 1989	
Works on Waterways Permit	A Works on Waterways Permit is likely to be required from the North East Catchment Management Authority (NECMA) as works are proposed within Sunday Creek and Lake Moodemere. Feedback received from the NECMA has indicated that the Permit application will need to be supported by a locality plan, a site plan, detailed design and drawings, an Environmental Impact Assessment and a Site Construction Management Plan (Jacobs, 2019).
Works Licence	An application for a Works Licence would need to be submitted to Goulburn Murray Water to construct the pump station and pipeline.
Works Licence to Construct, Alter or Decommission a Dam or other structure on or off a waterway	An application for a Works Licence to Construct, Alter or Decommission a Dam or other structure on or off a waterway would need to be submitted to Goulburn Murray Water to construct an embankment at Hell's Gate and replace the existing Lake Moodemere regulator.

A.2 NSW regulatory approvals

The proposed infrastructure is predominately on Victorian land, however the proposed suction line associated with the new pump station will extract water from the Murray River and therefore will be located on NSW land.

Based on advice from the relevant NSW agencies, the relevant NSW regulatory approvals include a Development Application made to the Federation Council and a Statement of Environmental Effects to support the application. The Development Application is likely to trigger the Integrated Development provisions in Division 4.8 of EPAA. Integrated development means that the consent authority (in this case Federation Council) is required to obtain the general terms of approval proposed to be granted by other approval bodies prior to granting development consent, and the consent is to be consistent with those terms. The following approvals as part of the integrated development application have significant potential to be required:

- An approval to carry out dredging or reclamation work (e.g. installation of a suction pipeline into the bank) under the *Fisheries Act 1994*. An approval would also be necessary to avoid committing an offence under s219 of the *Fisheries Act 1994*.
- An Aboriginal heritage impact permit may be required if the results of specialist site investigations identify Aboriginal items that would be impacted on the riverbank area.
- A water management work approval is required as the suction pipeline is a water management work under the *Water Management (WMA) Act 2000* (s90(2)). This approval is distinct from licensing water use, which is not required as the NSW Murray Water Sharing Plan only applies to NSW' share of the Murray Water Source.
- A controlled activity approval would be required under s91 of the *WMA Act 2000* as there is activity occurring on or under waterfront land, being the bed and bank of the river within NSW. It is not clear if the riparian corridor provisions of the *WMA Act 2000* effectively extend into Victoria, which would result in the s91 approval application considering the impacts on a further 40 metres of corridor. The relevant guideline for laying pipes and cables in watercourses has a comprehensive list of application requirements.

The *Biodiversity Conservation Act 2016* will likely be activated as the Murray River has been identified as having sensitive biodiversity values. This means that a Biodiversity Development Assessment Report is likely to be required to be prepared to address terrestrial biodiversity values as part of the development application. Depending on the results of the assessment it may be necessary to offset the impacts of the suction line.

A.3 Commonwealth legislation

The *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act) is the federal process for the assessment of proposed actions likely to have a significant impact on matters of National Environmental Significance (MNES). Where an activity is identified as likely to have a significant impact on a MNES, the proposed action is referred to the Australian Government Minister for the Environment for assessment. The Environmental Impact Statement (EIS) prepared for this project assessed the proposed activity against the nine MNES criteria defined in the Act.

Based on this EIS, there is the potential for three MNES (Ramsar Sites, Threatened Species and Communities, and Migratory Species) to be impacted by the proposed activity however, if appropriate mitigation measures and design features are adopted, significant impacts can be avoided (Aquaterra Scientific, 2018). The need for a referral under the *EPBC Act* will be determined in the next phase of the project adopting a precautionary approach.

Appendix B. Summary of stakeholder consultation

Stakeholder	Nature of interest	Consultation type	Date*	Support for the project
Agencies				
GMW Connections Project	Lead agency for project investigations	Workshops	3 August 2020	Positive
GMW	Proposed project proponent for the detailed design and construction phase	Email correspondence and phone calls	3 August 2020 2 September 2020	Positive – supportive of water savings initiatives
Parks Victoria	Parks Victoria is the land manager for the site as well as the waterway manager.	Workshops and email correspondence	3 August 2020 2 September 2020	Positive – provided that multiple benefit outcomes are sought
Yorta Yorta Nation Aboriginal Corporation	Yorta Yorta are the Registered Aboriginal Party for the region and have a long history of connection with the site.	Workshops and email correspondence	17 August 2020 2 September 2020	Positive – provided that opportunities to enhance past and ongoing cultural connections are included.
North East Catchment Management Authority	North East CMA are responsible for environmental water in the region.	Workshops and email correspondence	3 August 2020 2 September 2020	Positive – require infrastructure to deliver environmental water
Indigo Shire Council	Indigo Shire Council is the local government authority.	Workshops Site visit with shire CEO	3 August 2020 10 August 2020 2 September 2020	Positive – provided that multiple benefit outcomes are sought
DELWP	Recreational fishing, biodiversity protection, rural water efficiency programs	Workshops and email correspondence	30 July 2020 3 August 2020 2 September 2020	Positive – provided water savings and environmental outcomes are optimised
Victorian Fisheries Authority	Recreational fishing, fish restocking	Phone call	22 September 2020	Positive
Marine Safety Victoria	Boating safety regulator	Phone call	20 August 2020	NA
Community groups/ site users				
Sunday Creek Irrigation Syndicate	Supply of irrigation water from the scheme	Workshops	22 July 2020 11 September 2020	Positive
Local rowing clubs – Rutherglen and Wahgunyah	The Rutherglen Lake Rowing Club is based at Lake Moodemere. Other clubs are involved and benefit from the annual regatta.	Phone call	14 August 2020	Neutral – water levels will allow regatta to proceed but higher levels preferred
Lake Moodemere Water Ski Club	Use of Lake Moodemere for recreational and competitive skiing	Phone call and survey	14 August 2020 19 August 2020 (survey)	Negative – range of concerns raised through the survey response

Stakeholder	Nature of interest	Consultation type	Date*	Support for the project
Friends of Lake Moodemere	Group currently not active	Phone call	14 August 2020	Neutral – focus of feedback was on water skiers
VRFish	Recreational fishing	Phone call	24 September 2020	Neutral – access required (e.g. platform) to deeper water areas when water levels are low

* Key workshop dates with agency representatives shown only