Sunday Creek Project

8 August 2022

The Hon. Lizzie Blandthorn
Minister for Planning
PO Box 500
East Melbourne
Victoria, 8002

Dear Minister Blandthorn,

**Sunday Creek Reconfiguration Project Referral for a decision on the need for assessment under the *Environmental Effects Act 1978***

I am writing to advise you of the referral of the Sunday Creek Reconfiguration Project (SCRP) under the *Environment Effects Act 1978* (*EE Act*).

The SCRP has been in development for a number of years having undergone extensive stakeholder and agency consultation in the development of the business case, funding proposal and subsequent implementation of project planning and design.

Consultation throughout the project has been undertaken collaboratively with:

- the Federal Department of Climate Change, energy, the Environment and Water (DCCEEW);
- The Department of Environment, Land Water & Planning (DELWP) Hume region;
- DELWP Impact Assessment Unit, Planning Facilitation;
- Indigo Shire Council (VIC);
- Parks Victoria;
- North East Catchment Management Authority; and
- Federation Council (NSW).

Our early engagement with these agencies identified a preference for the SCRP to be referred voluntarily under the *EPBC Act*, to ensure that the project is assessed at the highest level.

The detailed ecological and environmental assessments undertaken by the SCRP Project Team indicate that the project does not present potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context.



PO Box: 165 Tatura Victoria 3616 Australia | Email: wep@gmwater.com.au
Phone: 1800 013 357 | Website: www.gmwater.com.au

Sunday Creek Project

However, to satisfy our stakeholders, partner agencies and the broader community involved in or affected by the project, we have now referred the project to be reviewed to determine the need for an assessment.

If you have any queries or need any further information, please contact me on 0488 328 076.

Yours sincerely

Frank Fisseler
PROJECT DIRECTOR
GMW Water Efficiency Project



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Phone: 1800 013 357 | Website: www.gmwater.com.au

# REFERRAL OF A PROJECT FOR A DECISION ON THE NEED FOR ASSESSMENT UNDER THE *ENVIRONMENT EFFECTS ACT 1978*

## REFERRAL FORM

The *Environment Effects Act 1978* provides that where proposed works may have a significant effect on the environment, either a proponent or a decision-maker may refer these works (or project) to the Minister for Planning for advice as to whether an Environment Effects Statement (EES) is required.

This Referral Form is designed to assist in the provision of relevant information in accordance with the *Ministerial Guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Seventh Edition, 2006). Where a decision-maker is referring a project, they should complete a Referral Form to the best of their ability, recognising that further information may need to be obtained from the proponent.

**It will generally be useful for a proponent to discuss the preparation of a Referral with the Impact Assessment Unit (IAU) at the Department of Environment, Land, Water and Planning (DELWP) before submitting the Referral.**

If a proponent believes that effective measures to address environmental risks are available, sufficient information could be provided in the Referral to substantiate this view. In contrast, if a proponent considers that further detailed environmental studies will be needed as part of project investigations, a more general description of potential effects and possible mitigation measures in the Referral may suffice.

In completing a Referral Form, the following should occur:

- Mark relevant boxes by changing the font colour of the 'cross' to black and provide additional information and explanation where requested.
- As a minimum, a brief response should be provided for each item in the Referral Form, with a more detailed response provided where the item is of particular relevance. Cross-references to sections or pages in supporting documents should also be provided. Information need only be provided once in the Referral Form, although relevant cross-referencing should be included.
- Responses should honestly reflect the potential for adverse environmental effects. A Referral will only be accepted for processing once IAU is satisfied that it has been completed appropriately.
- Potentially significant effects should be described in sufficient detail for a reasonable conclusion to be drawn on whether the project could pose a significant risk to environmental assets. Responses should include:
  - a brief description of potential changes or risks to environmental assets resulting from the project;
  - available information on the likelihood and significance of such changes;
  - the sources and accuracy of this information, and associated uncertainties.
- Any attachments, maps and supporting reports should be provided in a secure folder with the Referral Form.
- A USB copy of all documents will be needed, especially if the size of electronic documents may cause email difficulties. **Individual documents should not exceed 10MB as they will be published on the Department's website.**

- A completed form would normally be between 15 and 30 pages in length. Responses should not be constrained by the size of the text boxes provided. Text boxes should be extended to allow for an appropriate level of detail.
- The form should be completed in MS Word and not handwritten.

The party referring a project should submit a covering letter to the Minister for Planning together with a completed Referral Form, attaching supporting reports and other information that may be relevant. This should be sent to:

Postal address

**Minister for Planning**
**PO Box 500**
**EAST MELBOURNE VIC 8002**

Couriers

**Minister for Planning**
**Level 16, 8 Nicholson Street**
**EAST MELBOURNE VIC 3002**

In addition to the submission of the hardcopy to the Minister, separate submission of an electronic copy of the Referral via email to ees.referrals@delwp.vic.gov.au is required. This will assist the timely processing of a referral.

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# PART 1 PROPONENT DETAILS, PROJECT DESCRIPTION & LOCATION

## 1. Information on proponent and person making Referral

| | |
|---|---|
| **Name of Proponent:** | **Goulburn-Murray Water (GMW)** |
| **Authorised person for proponent:**<br><br>**Position:**<br><br>**Postal address:**<br>**Email address:**<br><br>**Phone number:**<br><br>**Facsimile number:** | Frank Fisseler<br><br>**Project Director – GMW Water Efficiency Project**<br><br>**PO Box 165 Tatura, Victoria 3616**<br>wep@gmwater.com.au<br><br>0488 328 076 |
| **Person who prepared Referral:**<br>**Position:**<br>**Organisation:**<br>**Postal address:**<br><br>**Email address:**<br><br>**Phone number:**<br>**Facsimile number:** | Arthur Nemet<br>**Ecologist**<br>**SMEC Australia Pty. Ltd. (SMEC)**<br>Collins Square, Tower 4, Level 20, 727 Collins St, Melbourne, VIC, 3008, Australia<br>Arthur.nemet@smec.com<br><br>**Arthur Nemet:0408 526 641**<br>**n/a** |
| **Available industry & environmental expertise:** (areas of 'in-house' expertise & consultancy firms engaged for project) | SMEC is a large consultancy who is providing a comprehensive suite of technical consulting services to support the Sunday Creek Reconfiguration Project (SCRP). These services include planning and approvals, design, terrestrial and aquatic ecology, hydrology and social impact amongst other services. |

## 2. Project – brief outline

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|---|
| **Project title:** Sunday Creek Reconfiguration Project (SCRP) |
| **Project location:** (describe location with AMG coordinates and attach A4/A3 map(s) showing project site or investigation area, as well as its regional and local context)<br><br>This referral refers to three separate areas describing the area assessed for the project, *impact footprint, study site* and *study area.*<br><br>The impact footprint refers to areas within the study site where construction and related activities will occur, as discussed in Section 3. |

The study site refers to the area surveyed on-ground by ecologists and is located approximately 6 km west of the Victorian town of Rutherglen (-36.057636, 146.384528). The study site includes Lake Moodemere, Sunday Creek, the Northern Marshes and surrounds (see Attachment 1). It occurs on the south side of the Murray River. The study site encompasses the permanent and ephemeral waterbodies with potential to be impacted by the project through alteration of the existing water regime.

The study site occurs within the Victorian Riverina bioregion, Indigo Shire Council Local Government Area (LGA) and North East Catchment Management Authority (CMA) area. The study site is an approximately 560 ha area encompassing Lake Moodemere, Sunday Creek and associated wetland environments (Northern Marshes) which are bordered by agricultural land and vineyards to the east and the Murray River to the west.

The study area refers to a 10 km buffer of the study site and was assessed by desktop only. The study area provides ecological context and further insight as to what ecological values may occur within the study site.

**Short project description** (few sentences)**:**

The proposed Sunday Creek Reconfiguration Project (SCRP) proposes to improve water use efficiency and provide cost savings to local irrigators, deliver environmental benefits by restoring natural hydraulic diversity and enhancing cultural and community values of Lake Moodemere. The project will deliver a direct 3-phase electric pump and pipeline connection from the Murray River to Sunday Creek replacing an ageing diesel pump station and the construction of a regulating structure within the existing Hells Gate channel to hydraulically separate Lake Moodemere and Sunday Creek. This will deliver a more water-efficient and cost-effective irrigation supply to local irrigators and remove existing artificial hydrological constraints on flora and fauna.

## 3. Project description

**Aim/objectives of the project (what is its purpose / intended to achieve?):**

The aim of the project is to deliver a more water-efficient and cost-effective irrigation supply to the Sunday Creek Irrigation System (SCIS) whilst relaxing current hydrologic constraints on the flora and fauna communities of Lake Moodemere as a result of the current water regime. The project will generate significant water savings and help to restore hydraulic diversity to the Lake Moodemere wetland complex and support improved biodiversity outcomes at the site.

**Background/rationale of project (describe the context / basis for the proposal, eg. for siting):**

Goulburn-Murray Water (GMW) proposes to deliver a water savings project on behalf of the SCIS. SCIS comprises local irrigators, including vineyards and farms. Currently, for local irrigators to extract water from Sunday Creek, Lake Moodemere needs to be filled to an adequate level, via a privately owned pump station on the Murray River or via an existing regulating structure between the Lake and the Murray River. The project proposes to pump directly from the Murray River into Sunday Creek via a pipeline, bypassing Lake Moodemere providing significant water savings.

The proposed project addresses the following problems with the current regime in regard to irrigation and the local environment:

- The current system is inefficient and costly:
  - The pump is diesel-fuelled given there is no access to a cheaper alternative (electricity).
  - Irrigators cannot diversify their crops due to the high cost of irrigated water. Only high-value crops are commercially viable to grow.
  - The existing pump has reached the end of its useful life and the risk of pump failure would have devastating economic impacts.
- High water losses and deterioration of ecosystem values:
  - Lake Moodemere is currently being kept at an artificially high level to allow for flow into Sunday Creek and subsequent irrigation, resulting in significant water losses through seepage and evaporation and restricting the development of environmental values typically associated with a natural wetting and drying cycle.
- The current pump station poses a public and environmental safety concern due to the pump's location on an eroding bank which is accessible to the public and may collapse or be washed down the river.

Siting of proposed infrastructure:

- Critical infrastructure such as the proposed Hells Gate regulator has been sited at the narrowest point of the Hells Gate channel to minimise the construction footprint and material required for construction. The embankment structure has been designed to require little if any maintenance so as to reduce disturbance to flora and fauna during the operational phase of the project.
- The location of the proposed Murray River pump station was chosen to take advantage of electrical utilities present in the study site and to ensure that the associated pipeline would be able to utilise existing access tracks and areas of non-native vegetation to minimise the extent of native vegetation removal as much as possible.
- Utilising Sunday Creek as an irrigation conduit removes the need for more costly and potentially environmentally damaging infrastructure as the SCIS already has irrigation infrastructure located along Sunday Creek.
- The current Hells Gate construction access track alignment has been sited to avoid an area of the EPBC listed community Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia that occurs adjacent to the study site and to utilise an existing track from Lake Moodemere Estate winery in order to minimise the

extent of native vegetation removal to the smallest extent practical. Further micrositing of the access track will occur during the detailed design phase of the project to avoid large hollow bearing trees and areas with high biodiversity values.

**Main components of the project** (nature, siting & approx. dimensions; attach A4/A3 plan(s) of site layout if available):

To achieve the objectives, the project components include:

- Murray River pump station: Construction of a new purpose built 36ML/day 3-phase electric pump station to extract water from the Murray River located on the bank of the Murray River to be accessed by the existing Hynes Road. (40x40 m construction footprint). An existing 3-phase power line is present in proximity to the proposed pump station.
- Sunday Creek Pipeline: Construction of a 350 m long pipeline (to be buried to a depth of 600mm) to transfer water directly from the proposed Murray River pump station to Sunday Creek south of Hynes Road, bypassing Lake Moodemere and the Northern Marshes. The pipeline alignment has been sited to follow Hynes Road and an existing powerline maintenance track to minimise impacts to native vegetation and fauna habitat. The exact dimensions required for the trenching of the pipeline have yet to be finalised but a highly conservative buffer of 10m either side of the pipeline alignment has been applied to indicate a 'worst case scenario' for calculating native vegetation removal impacts. Following detailed design this footprint is likely to be greatly reduced but for the purposes of identifying potential impacts to the environment the 20 m buffer value is used for this referral and the SMEC DFFA report.
- Hells Gate regulator: Construction of a new fixed crest embankment structure at the existing artificial channel between Lake Moodemere and Sunday Creek (known as Hells Gate) (100x100 m construction footprint), which will hydraulically separate Lake Moodemere and Sunday Creek at a water level below 129 m AHD (proposed top of crest).
- Murray River-Lake Moodemere regulator: Decommissioning the old pump station and upgrading the existing regulating structure between the Murray River and Lake Moodemere in line with modern safety standards and facilitate the ongoing management of water levels in the lake (40x40 m construction footprint).

**Ancillary components of the project** (eg. upgraded access roads, new high-pressure gas pipeline; off-site resource processing):

Hells Gate Access track: Construction of an approximately 1km long 4 m wide access track required for construction of the proposed Hells Gate regulator. A conservative buffer of 10m either side of the access track has been applied to indicate a 'worst case scenario' for calculating native vegetation removal impacts. As per the buffer applied to the pipeline alignment this area is likely to be reduced following detailed design. This buffer is also being used prior to targeted surveys planned for Mueller Daisy, the findings of which will further inform track placement.

**Key construction activities:**

The drawings (attached) provide details on the proposed construction activities. These include the following:

- Construction of a new 3-phase pump station on the Murray River (40x40 m construction footprint);
- Construction of an approximately 350 m long pipeline (20 m wide preliminary footprint) from the new pump station to Sunday Creek;
- Construction of an embankment and regulating structure within the existing Hells Gate channel (100x100 m construction footprint);
- Upgrading of existing Lake Moodemere regulating structure (40x40 m construction footprint); and
- Construction of an access track is required for the construction of the proposed Hells Gate regulator beginning from the existing track at Lake Moodemere Estate vineyard (approximately 20 m wide corridor).

Construction methodology for the proposed Hells Gate embankment has yet to be determined however GMW is committed to minimising environmental impacts where possible. Design and construction considerations will take into account existing biodiversity values as a key component of the detailed design process.

**Key operational activities:**

Operational activities post-construction will be limited to opening and closing of the Lake Moodemere regulator and pumping of water from the Murray River into Sunday Creek with predicted occasional filling of Lake Moodemere via overflow from the Hells Gate regulating structure.

Proposed operating rules are as follows:

- The sill of the Lake Moodemere regulator will be set at 128.31 m AHD. The top of the structure will be set at overbank flow level of 130.00 m AHD (Jacobs, 2019a)
- The Hell's Gate Embankment will have a sill set at 129.00 m AHD (Jacobs, 2019a)
- One-way flap valves will be installed on the lake-side of the structure to allow Murray River inflow to Lake Moodemere at river levels between 128.31 – 130.00 m (Jacobs, 2019a)
- The operational strategy of the gates on the Lake Moodemere regulator has yet to be fully determined but the gates are anticipated to be closed from January each year to facilitate natural drawdown of Lake Moodemere until September each year from which water from the Murray River will be diverted into Lake Moodemere
- From September to January, if the river is higher than the lake, the regulator should be providing water to the lake. If the river is lower, the one-way flap gates should hold the water level in the lake
- A minimum level of 128.70 m AHD is required in January for the rowing regatta. In December each year, if the lake level is lower than 128.70 m, the new pump station should be operated to spill water over the embankment and into the lake, for a duration required to top the lake up to achieve 128.70 m as of January 1.

**Key decommissioning activities** (if applicable):

The current regulating system (pump station) is proposed to be decommissioned as part of the project. Decommissioning of the pump is required to meet safety standards and facilitate ongoing management of the water levels in Lake Moodemere. The regulator will be replaced 'like-for-like'. Key features of the replacement Lake Moodemere Regulator are as follows (Jacobs 2019b):

- Top of bank level at 131.40 m AHD to match into existing riverbank track;
- Top of concrete at 130.00 m AHD to ensure the overland flow level into Lake Moodemere is not altered by the structure replacement;
- Structure floor at 127.95 m AHD to allow free draining of pool between structure and riverbank through existing pipe culvert;
- 250 mm thick sidewalls, middle wall, headwalls and floor;
- 3 x No. 600 wide x 700 high rectangular openings through the middle wall;
- 3 x No. one-way flap gates installed in openings on lake side;
- Invert of openings at 128.75 m AHD to maximise flow through openings into Lake Moodemere;
- Obvert of openings at 128.80 m AHD (50 mm above level required in Lake Moodemere for the regatta);
- Symmetrical structure that allows for potential two-way flow (gates opened), as well as water retained on either side (gates closed, or gates blocked);
- Upstream and downstream headwalls to allow bank remodelling to 1V:2H around structure;
- Upstream and downstream cut-offs to avoid erosion beneath structure;
- Walkway and handrails across structure to allow safe operation of gates; and
- Handrails on sidewalls and exposed headwalls to prevent falls from the structure.

**Is the project an element or stage in a larger project?**

☒ No ☒ ~~Yes~~ ~~If yes, please describe: the overall project strategy for delivery of all stages and components; the concept design for the overall project; and the intended scheduling of the design and development of project stages).~~

**Is the project related to any other past, current or mooted proposals in the region?**

☒ No ☒ ~~Yes If yes, please identify related proposals~~.

**What is the estimated capital expenditure for development of the project?**
$4 m

## 4. Project alternatives

**Brief description of key alternatives considered to date** (eg. locational, scale or design alternatives. If relevant, attach A4/A3 plans):

The 2008 Lake Moodemere Water Savings Feasibility Assessment by SKM provided a feasibility assessment for other options to improve the efficiency of water delivery to SCIS irrigators. Option 1 (the option proposed by this project) was the preferred option based on water savings sales offsetting the initial capital expenditure and ongoing running costs. A second option (Option 2) was also proposed that would involve the construction of a pump station on the Murray River near Hyde Road (similar to Option 1), and the implementation of an extensive network of pipelines to deliver water to the 'farm gate'. The capital expenditure of Option 2 was seven times that of Option 1, and consequently, benefits generated from the sale of water savings was assessed as not sufficient to cover the high capital costs associated with the construction of the pipeline and pump station.

Jacobs provided four alternative options for the proposed pump station and pipeline infrastructure in their 2019 Sunday Creek Irrigation Reconfiguration Preliminary Design Report (Jacobs 2019b). These design

options followed a similar footprint to the currently proposed design and would have a negligible effect on proposed vegetation removal extent. Due to cost or technical reasons, the below options were considered non-viable:

- Option 1: Shallow buried pipe up the riverbank and across to the required pump location, in conjunction with above ground self-priming pumps;
- Option 2: Shallow buried pipe up the riverbank, deeper trenched and buried pipe across to the required pump location, in conjunction with self-priming pumps located in a deep dry well;
- Option 3: Wet well at the required location set back from the river, with an inlet pipe bored through the Murray Riverbank at the depth required to meet submergence requirements; and
- Option 4: Pump in a deep pit at the required location set back from the riverbank, with a shallow siphon pipe buried between the pit and the river.

The outcome of the alternative options assessment was that the current project is the preferred and only financially viable option.

**Brief description of key alternatives to be further investigated** (if known)**:**

No further alternatives are to be investigated.

## 5. Proposed exclusions

**Statement of reasons for the proposed exclusion of any ancillary activities or further project stages from the scope of the project for assessment:**

None – the SCRP is an all-encompassing project. No ancillary activities have been excluded from the scope for assessment.

## 6. Project implementation

**Implementing organisation** (ultimately responsible for project, ie. not contractor)**:** Goulburn-Murray Water Corporation

**Implementation timeframe:** Proposed construction timeline Dec 2022-June 2024

**Proposed staging** (if applicable): N/A

## 7. Description of proposed site or area of investigation

**Has a preferred site for the project been selected?**

~~No~~ Yes If no, please describe area for investigation.
If yes, please describe the preferred site in the next items (if practicable).

At a concept level, the project's preferred sites have been determined

**General description of preferred site,** (including aspects such as topography/landform, soil types/degradation, drainage/ waterways, native/exotic vegetation cover, physical features, built structures, road frontages; attach ground-level photographs of site, as well as A4/A3 aerial/satellite image(s) and/or map(s) of site & surrounds, showing project footprint):

*Topography/landform*
The study site encompasses a natural billabong (Lake Moodemere) and anabranch (Sunday Creek) of the Murray River. The study site is slightly undulating. At the study site, the ground surface elevations range from 125 to 130 m AHD. At the southern part of the site, the elevation increases rapidly on the banks of the lake to around 145 m AHD, with the Murray River approximately 128 m AHD and the banks of Sunday Creek at approximately 129 m AHD (SMEC 2022c).

*Soil types/degradation*
The soils within the impact footprint are sands, silty to sandy clays or medium to high plasticity. This is characteristic of an alluvial profile (GHD 2010).

The regional geology was determined to be:

- Quaternary (Holocene) fluvial, lacustrine deposits, clay, sand and sandy clay (believed to be across the entire study site);
- Overlying quaternary (Pleistocene) Shepparton Formation fluvial deposits silt, sand and minor gravel; and
- The Pinnak Sandstone of the Adaminaby Group Sediments (of early Ordovician age), which consists of marine, sandstone, mudstone, siltstone and minor chert.

*Drainage/waterways*
The Murray River bounds the west of the study site flowing north to south. Sunday Creek traverses the eastern boundary and flows south to north when receiving the majority of its inflow from Lake Moodemere via the Hells Gate channel or north to south (its historic flow direction) when receiving the majority of its inflow from catchment rainfall or Murray River inflows overtopping the artificial embankment located in Wahgunyah approx. 4km north of the study site.

The existing hydrological regime for the Lake Moodemere/Sunday Creek system is controlled by both natural and artificial features. Inputs from natural processes such as local catchment run-off and rainfall are considered to be relatively minor in comparison to anthropogenic diversion or flood events from the Murray River. Localised groundwater interaction has not specifically been investigated, although there is likely to be some minor hydraulic connection. Losses from the system may occur naturally via seepage and evaporation or irrigation demand.

The Murray River is in direct hydraulic connection with the groundwater. The groundwater is both gaining from and losing to the Murray River in response to seasonal variations (SMEC 2022c). It

is expected that Lake Moodemere, Sunday Creek and the Murray River are somewhat hydraulically connected but the degree of connection is not currently known.

*Native/exotic vegetation*
The study site encompasses 560 ha of public and private land comprising eight Ecological Vegetation Classes (EVCs) across four broad areas; Sunday Creek, Lake Moodemere the Murray River and the Northern Marshes. River Red-gum (*Eucalyptus camaldulensis*) is the dominant canopy species within the floodplain and the groundcover comprised mostly sedges, rushes and grasses. Vegetation surrounding Lake Moodemere and within the Northern marshes was generally of high quality. Patches of Aquatic Herbland (EVC 653) were common in areas of saturated soil or shallow inundation and aquatic herbs made up a large component of vegetation on the fringes of Lake Moodemere and the Northern Marshes.

Within and surrounding the inundation area, aquatic and terrestrial vegetation with a moderate potential for groundwater interaction (Groundwater Dependent Ecosystems (GDEs)) have been identified.

**Sunday Creek**
Sunday Creek is a still water creek, of which approximately 3 km intersects the eastern edge of the study site. It is fringed to the east by degraded riparian vegetation often including non-native escapees from bordering private properties and to the west by high-quality open forest and woodland of mature River Red Gums. Small patches of emergent aquatic macrophytes are present throughout the creek and large amounts of detritus and debris offer aquatic habitat throughout. The creek is approximately 35 m wide at its northernmost reach within the study site and widens to approximately 70 m in the south.

**Lake Moodemere**
Lake Moodemere is a freshwater lake approximately 60 ha in size and is 1-3 m deep. The lake is bordered to the south by a raised terrace formation largely vegetated by Grey Box (*Eucalyptus microcarpa*) and Buloke (*Allocasuarina luehmannii*) grassy woodland. To the north, it is dominated by River Red Gum forest swamp complex of the Northern Marshes and to the west and east it is bordered by the Murray River and Sunday Creek respectively. The lake is fringed by emergent semi-aquatic macrophytes and large mature River Red Gums and contains small island-like monocultures of Giant Rush (*Juncus ingens*), which provide breeding and foraging habitat for aquatic and terrestrial fauna.

**Northern Marshes**
The Northern Marshes are a River Red Gum-dominated swamp complex that differs in floristic and fauna composition depending on inundation levels. Raised areas of dry land dotted throughout were sparsely vegetated by native sedges and rushes under a canopy of mature River Red Gum. aquatic and flood-dependent flora were prevalent throughout the Northern Marshes and constituted the majority of vegetation within inundated areas.

**Murray River**
The Murray River borders the study site to the west and is approximately 60-100 m wide. Vegetation along the banks is of moderate quality and is generally composed of a River Red Gum canopy with the occasional River Bottle Brush (*Callistemon sieberi*) or Silver Wattle (*Acacia dealbata*) overlaying a grassy understory often with Common Reed (*Phragmites australis*). Weed incursion is variable but Willow (*Salix* spp.), White Poplar (*Populus alba*) and agricultural weeds were common along the banks. The river provides aquatic habitat for fish and turtles and foraging opportunities for avifauna.

*Physical features*
The study site is adjacent the Murray River and is a natural billabong, forming part of the floodplain. Lake Moodemere was originally a large swamp billabong fed by the Murray River and would only fill during flooding events via topping of the Murray River banks or inflows from Sunday Creek (a historical anabranch of the Murray River) (Aquaterra 2018). It was also an important wildlife refuge during times of drought (Jacobs 2020a).

*Built structures/road frontage*
In 1979, the existing Lake Moodemere regulator was constructed to further facilitate access to water for irrigation purposes, and the same scheme continues today (GHD 2009).

The following infrastructure is currently utilised under the current water regime:

- Lake Moodemere regulator – The regulating structure consists of two 600mm culverts through the Murray River bank and a concrete gated structure to regulate flows. The regulator is a one-way structure allowing inflow and preventing water from out falling back into the Murray River
- Existing pump station – Close to the existing Lake Moodemere regulator there is a pump station, which is used to divert water to Lake Moodemere during periods of low flows.
- Lake Moodemere delivery channel – An excavated channel of approximately 150m in length delivers water from the Lake Moodemere regulator to the Lake.
- Hells Gate – An artificially excavated channel between Lake Moodemere and Sunday Creek. The channel is an open channel with no regulating equipment.

Lake Road bounds the southern portion of the study site. Hynes Road and informal roads intersect for maintenance access.

*Site photos*


Floodplain Riparian Woodland (EVC 56)


Riverine Grassy Woodland (EVC 295)


Plains Woodland (EVC 803)


Riverine Swamp Forest (EVC 814)


Sedgy Riverine Forest (EVC 816)


Tall Marsh (EVC 821)

| | |
|---|---|
|  Aquatic Herbland (EVC 653) |  Floodway Pond Herbland (EVC 810) |

Refer to SMEC DFFA 2022 (Attachment 1) for further information on ecological values and impact footprints. Attachment 2 includes relevant figures from the SMEC DFFA 2022.

**Site area** (if known): approx. 560 (hectares)

~~**Route length** (for linear infrastructure) …… (km) **and width** …….. (m)~~

**Current land use and development:**

Lake Moodemere, the Northern Marshes and portions of Sunday Creek adjacent to these areas fall within the Lake Moodemere Lake Reserve currently managed by Parks Victoria. Lake Moodemere and Sunday Creek are used as irrigation storage and as a conduit for water to surrounding wineries and agricultural land by the SCIS.

Lake Moodemere currently hosts the Lake Moodemere Rowing Regatta, which occurs over two days in January every year (Jacobs 2020a). It is currently a popular fishing, swimming, walking, cycling and bird watching site. There is a shared 13 km trail that takes in both the river and Lake Moodemere, past vineyards and along the shores of the lakes which is frequently used by walkers and cyclist (Jacobs 2020a).

The project is located 6 km west of Rutherglen which is one of Victoria's main wine producing regions, with 20 wineries located in the area. Of these wineries, nine are reliant upon the current SCIS and will depend on the successful implementation of this project for the security of their water supply (Jacobs 2020a).

**Description of local setting** (eg. adjoining land uses, road access, infrastructure, proximity to residences & urban centres):

Surrounding land uses include viticulture, agriculture and across the Murray River is a golf course.

The study site can be accessed by Lake Road and Hynes Road, as well as a number of vehicle access and informal tracks.

No significant infrastructure is in close proximity.

The closest town is Wahgunyah, which is approximately 3 km north of the study site on the Victorian side of the Murray River. The township of Corowa occurs on the New South Wales side of the river. Rutherglen occurs approximately 6 km east of the study site. Residences are scattered between the study site and these townships on farming properties.

**Planning context** (eg. strategic planning, zoning & overlays, management plans):

The Lake Moodemere Environmental Water Plan (EWP) was developed in 2012 to inform future management of the hydrology of the study site. The EWP provides specific watering regime requirements to maintain and enhance the environmental value of the study site. It demonstrates that the changes in water regimes made possible by the project will create conditions that are expected to improve the ecological values of the site (Water Technology 2012).

The project's ecological objective is consistent with the overall management objective established by the Lake Moodemere EWP. The objective is to maximise the overall biodiversity of the site by reducing current hydrological constraints on the variability of native flora and fauna communities and species.

Lake Moodemere, Sunday Creek and the proposed pipeline and Hells Gate regulator works mostly fall under land designated as Public Conservation and Resource Zone (PCRZ) within the Indigo Planning Scheme. The northern extent of Sunday Creek falls within Farming Zone (FZ) (Vicplan 2022).

A bushfire management overlay (BMO) is present across the northern area of the study site however does not encroach on the proposed Hells Gate regulator.

The entire study site is included within an Environmental Significance Overlay (ESO2) with the vast majority also included within a Floodway Overlay (FO).

The ESO2 pertains to Lake Moodemere, as it is a popular location for recreational activities, such as swimming, water skiing and bird watching. ESO2 identifies the area as ideal waterfowl habitat for species such as Musk Duck (*Biziura lobata*) and Little Grebe (*Tachybaptus ruficollis*). ESO2 applies to Lake Moodemere and has the following objectives:

- To maintain and protect the diversity of native fauna and remnant vegetation
- To recognise and protect conservation attributes of Lake Moodemere;
- To protect and enhance the rural setting surrounding Lake Moodemere;
- To protect the Lake from inappropriate development; and
- To maintain and enhance the recreational use of the land for the enjoyment of all visitors.

Additional overlays that pertain to the site include:

- Heritage Overlay (HO 546);
- Flood Overlay (FO); and
- Land Subject to Inundation Overlay (LSIO).

**Local government area(s):**

Indigo Shire Council

## 8. Existing environment

**Overview of key environmental assets/sensitivities in project area and vicinity**
(cf. general description of project site/study area under section 7)**:**

Lake Moodemere is considered to be a regionally significant wetland due to its species diversity and presence of threatened species (predominantly fauna species). Lake Moodemere forms part of the natural floodplain of the Murray River. Flora and fauna surveys have been undertaken identifying potential habitat for Commonwealth and State listed threatened species present at the site. Refer to Section 12 for a list of species that may occur in the study site due to the presence of suitable habitat, as well as the two threatened communities recorded within the study site.

## 9. Land availability and control

| |
|---|
| **Is the proposal on, or partly on, Crown land?**<br>~~No~~ Yes If yes, please provide details.<br><br>The majority of impact footprints are located within Crown land with the exception of the proposed Sunday Creek pipeline alignment which covers a portion of freehold land. |
| **Current land tenure** (provide plan, if practicable):<br><br>The study site is managed by Parks Victoria and DELWP. |
| **Intended land tenure** (tenure over or access to project land):<br><br>Parks Victoria and DELWP. |
| **Other interests in affected land** (eg. easements, native title claims):<br><br>N/A |

## 10. Required approvals

**State and Commonwealth approvals required for project components** (if known):

The project will require approval under Commonwealth, Victorian and New South Wales (NSW) legislation due to the water extractions planned from the Murray River.

***Victoria***
*Regulatory Framework*
The provisions of the following Acts will be considered by the project:

- Environmental Effects Act 1978 (EE Act)
- Planning and Environment Act 1987 (P&E Act)
- Crown Land (Reserves) Act 1978
- Flora and Fauna Guarantee Act 1988 and Flora and Fauna Guarantee Amendment Act 2019 (FFG Act)
- Wildlife Act 1975
- Catchment and Land Protection Act 1994
- Water Act 1989
- Environment Protection Act 2017
- Aboriginal Heritage Act 2006
- Heritage Act 2017

***Commonwealth - EPBC Act***
GMW are self-referring under the EPBC Act. While no significant impacts to Matters of National Environmental Significance (MNES) have been identified, GMW are seeking certainty in their decision.

One EPBC act listed species was recorded within the study site during targeted surveys:

- Sloane's Froglet; Endangered

The following MNES are considered likely to occur within the study site:

Flora species:

- Mueller Daisy (*Brachyscome muelleroides*).

Fauna species:

- Regent Honeyeater (*Anthochaera phrygia*);
- Murray Cod (*Maccullochella peelii*);
- Trout Cod (*Maccullochella macquariensis*); and

- White-throated Needletail (*Hirundapus caudacutus*).

Community:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia

Targeted surveys will be undertaken for Mueller Daisy.

*Victorian Planning Context*
The project area is subject to the City of Indigo Planning Scheme and State Government planning approval. GMW intends to lodge an application for a planning permit under Clause 52.17 of the Indigo Shire Planning Scheme. An Environmental Significance Overlay (ESO1) pertains to the entire study site. A Floodway Overlay (FO) pertains to the majority of the study site.

*Planning Policy Framework*
The project approvals must consider requirements in the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017).

*Flora and Fauna Guarantee* (FFG) *Act 1988 and* FFG *Amendment Act 2019*

A detailed flora and fauna assessment and subsequent targeted survey program recorded to following species within the study site.

A total of three FFG Act-listed flora species were recorded within the study site:

- Late-flower Flax-lily (*Dianella tarda*) listed as critically endangered;
- Straw Wallaby-grass (*Rytidosperma richardsonii)* listed as endangered; and
- Riverina Bitter-cress (*Cardamine moirensis*) listed as endangered.

A total of 10 FFG Act listed fauna species were recorded within the study site:

- Plumed Egret (Ardea intermedia plumifera) listed as critically endangered;
- Murray River Turtle (Emydura macquarii) listed as critically endangered;
- White-bellied Sea-Eagle (Haliaeetus leucogaster) listed as endangered;
- Broad Shelled Turtle (Chelodina expansa) listed as endangered;
- Sloane's Froglet (Crinia sloanei) listed as endangered;
- Diamond Firetail (*Stagonopleura guttata*) listed as vulnerable;
- Musk Duck (*Biziura lobata*) listed as vulnerable;
- Platypus (Ornithorhynchus anatinus) listed as vulnerable;
- Australasian Shoveler (Spatula rhynchotis) listed as vulnerable; and
- Eastern Great Egret (Ardea alba modesta) listed as vulnerable.

One FFG listed community (Victorian Temperate Woodland Bird community) is present across most of the study site.

Six protected flora species were recorded within impact areas.

Additional permit requirements are listed below:

- GMW must obtain Management Authorisation under the *Wildlife Act 1975*.
- A 'Works on Waterway' permit is required under the *Water Act 1989*.
- CHMP required under the *Aboriginal Heritage Act 2006*.

***New South Wales***

The provisions of the following Acts will be considered by the project:

- Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulations 2017
- *Fisheries Management Act 1994* (FMA)
- *Water Management Act 2000* (WMA)
- National Parks and *Wildlife Act 1975*

**Have any applications for approval been lodged?**

☒ No ☒ ~~Yes – If yes, please provide details.~~

**Approval agency consultation** (agencies with whom the proposal has been discussed):

- DCCEEW
- DELWP
- North East CMA
- Indigo Shire Council
- Yorta Yorta Nations Aboriginal Corporation

**Other agencies consulted:**

- Parks Victoria
- Victorian Fisheries Authority

## PART 2 POTENTIAL ENVIRONMENTAL EFFECTS

### 11. Potentially significant environmental effects

**Overview of potentially significant environmental effects** (identify key potential effects and comment on their significance and likelihood, as well as key uncertainties):

The project proposes to remove 4.18 ha of native vegetation, including impact to 56 large trees, not all of which would be removed. This vegetation comprises:

- Floodplain Riparian Woodland (EVC 56) – vulnerable – 0.092 ha;
- Riverine Grassy Woodland (EVC 295) – vulnerable – 0.524 ha;
- Plains Woodland (EVC 803) – endangered – 0.100 ha;
- Sedgy Riverine Forest (EVC 816) – vulnerable – 3.323 ha; and
- Tall Marsh (EVC 821) – depleted – 0.064 ha.

The vast majority of potential impacts to environmental values (Riverine Bittercress habitat, 35 of the 56 large trees and approx. 1.8 ha of native vegetation) occur as a result of the proposed Hells Gate embankment construction access track corridor which has yet to be fully defined by detailed design. A 20 m corridor footprint has been used to identify all potentially sensitive environmental values in proximity to the access track (a likely 4 m wide impact footprint). Following further targeted surveys for Mueller Daisy the final access track design will be determined with the track micro sited within this 20m corridor to avoid sensitive environmental values (large hollow-bearing trees, threatened flora and fauna habitat) where possible.

Only 0.100ha of an endangered EVC is proposed to be removed and as this EVC falls entirely within the Hells Gate construction access track buffer this value is likely to be exaggerated. Following further survey and design, efforts will be made to avoid impacts to this endangered EVC. Given the small scale of proposed vegetation removal and construction impacts (4.1ha vs 970 ha of similar or better value contiguous habitat), the use of existing cleared areas for the siting of infrastructure (Hynes road and the associated powerline access track) and the lack of threatened fauna utilising impact areas for breeding the potential for significant effects on Victoria's environment are considered unlikely.

The current design and construction footprint for the proposed Sunday Creek pipeline alignment has been microsited to avoid Straw Wallaby-grass and Late-flowered Flax-lily. No impacts are likely to these species with the provision of No-Go zones specified in a CEMP which will be developed for the project.

Changes to the current water regime are likely to have a net benefit to the overall biodiversity of Lake Moodemere and no major or extensive effects on the health or biodiversity of aquatic ecosystems is likely over the short or long term.

Habitat for the following threatened species is present within the proposed impact areas:

- Mueller Daisy; Targeted surveys proposed for October-November
- Murray Cod and Trout Cod; Neither species were recorded in Lake Moodemere or Sunday Creek following aquatic surveys. Likely only foraging habitat present within impact areas, no high quality breeding habitat present within proposed impact areas.
- Regent Honeyeater; No previous records within study site and not detected during latest surveys (SMEC 2022), secondary foraging habitat present within all impact footprints but higher quality foraging habitat present in broader study area.
- Murray River Turtle and Broad-shelled Turtle; Likely to utilise aquatic habitat within impact areas for foraging. Approximately 0.5ha (the raised terrace portion) of the proposed Hells Gate construction access track footprint may contain suitable nesting habitat for both

turtle species. Any potential impact will be limited to a single breeding season. Fauna preclearance surveys prior to construction and fauna salvage are likely to be sufficient to mitigate any impacts to the species.

- Platypus; eDNA results detected Platypus within Sunday Creek near Pfieffers Winery however eDNA was not detected in Lake Moodemere indicating the species is not utilising the lake for foraging or breeding and the construction of the Hells Gate embankment will not fragment this population. EDNA results did not indicate the species was utilising proposed impact areas for foraging and no platypus or burrows have been detected within proposed impact areas.

Removal of habitat for Riverine Bittercress is likely to be temporary and will not significantly impact the species provided that any soil removed during the construction process was returned to its original location.

Two threatened ecological communities were recorded within the study site:

- No impacts are proposed to the EPBC Act-listed *Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-eastern Australia.*

- The project proposes to remove 4 ha of the FFG Act-listed *Victorian Temperate Woodland Bird community.* This loss is associated with the removal of large trees and native vegetation associated with treed EVCs within impact footprints. As discussed above it is likely the extent of this loss will be reduced following detailed design. The proposed infrastructure and construction will not fragment this community and contiguous habitat of similar or better quality is available surrounding all proposed impact areas.

Targeted surveys for Sloane's Froglet did not detect the species within impact areas however stringent hygiene and disinfection procedures will be detailed in a CEMP which will be developed for the project.

Targeted surveys will be undertaken for Mueller Daisy. The results of these targeted surveys will be used to further refine detailed design and placement of infrastructure with particular respect to the proposed Hells gate embankment construction access track.

No other threatened species are likely to be impacted by the proposed construction or infrastructure associated with the project based on the current information.

## 12. Native vegetation, flora and fauna

### Native vegetation

**Is any native vegetation likely to be cleared or otherwise affected by the project?**

~~NYD~~ ~~No~~ Yes If yes, answer the following questions and attach details.

**What investigation of native vegetation in the project area has been done?** (briefly describe)

The following environmental studies relating to vegetation have been undertaken for the project:

- Sunday Creek Reconfiguration Project Detailed Flora and Fauna Assessment (SMEC 2022);
- Identification of Vegetation, Bird and Frog Values and their Hydrological Requirement for input into the Lake Moodemere Environmental Watering Plan (Australian Ecosystems 2011).

Both the 2022 and 2011 investigations assessed native vegetation within the study site including a Vegetation Quality Assessment and Index of Wetland Condition assessment. The findings of both assessments were largely consistent and a number of threatened flora species were recorded across the study site.

**What is the maximum area of native vegetation that may need to be cleared?**

NYD Estimated area 4.18 (hectares)

**How much of this clearing would be authorised under a Forest Management Plan or Fire Protection Plan?**

N/A ~~…… approx. percent (if applicable)~~

**Which Ecological Vegetation Classes may be affected?** (if not authorised as above)

Preliminary/detailed assessment completed. If assessed, please list.

| Site | EVC | Area (ha) | Large tree count |
|---|---|---|---|
| New Pump Station and Pipeline | Floodplain Riparian Woodland (EVC 56) | 0.028 | 0 |
| | Sedgy Riverine Forest (EVC 816) | 0.535 | 7 |
| | Riverine Grassy Woodland (EVC 295) | 0.524 | 1 |
| | DELWP modelled wetland | 0.045 | 0 |
| **Subtotal** | | **1.087** | **8** |
| Hells Gate Regulator | Sedgy Riverine Forest (EVC 816) | 2.740 | 42 |
| | Tall Marsh (EVC 821) | 0.064 | 0 |
| | Plains Woodland (EVC 803) | 0.100 | 1 |
| | DELWP modelled wetland | 0.176 | 0 |
| **Subtotal** | | **2.908** | **43** |
| Existing Lake Moodemere Regulator | | | |
| **Subtotal** | Floodplain Riparian Woodland (EVC 56) | **0.108** | **5** |
| **Grand total** | | **4.18** | **56** |

**Have potential vegetation offsets been identified as yet?**

~~NYD~~ Yes If yes, please briefly describe.

Not as of yet.

**Other information/comments?** (eg. accuracy of information)

N/A

NYD = not yet determined

## Flora and fauna

**What investigations of flora and fauna in the project area have been done?**
(provide overview here and attach details of method and results of any surveys for the project & describe their accuracy)

A detailed flora and fauna assessment (DFFA) was undertaken by SMEC in 2022 (ATTACHED). The scope of works included:

- Desktop review of known and/or predicted ecological values occurring within the study area, including an assessment of previous reports;
- Identification of the presence and likelihood of occurrence of State and Commonwealth listed flora, fauna, and communities;
- Mapping of native vegetation recorded within the study site in accordance with the *Guidelines for removal, destruction and lopping of native vegetation* (DELWP 2017);
- Undertaking an Index of Wetland Condition (IWC) assessment;
- Preparation of a report to document the results of the ecological assessments;
- Identifying permits and referrals which may be required under State and Commonwealth environmental legislation, such as the EPBC Act and FFG Act; and
- Providing a recommendation on the necessity of targeted surveys or further assessments to inform the project.

Surveys occurred in February, April and June of 2022. Further surveys are planned for October-November 2022. Following completion of the planned future surveys the survey program will have covered all key periods of possible threatened species occurrence within the study site.

The DFFA assessment and subsequent surveys recorded the following FFG Act listed species within the study site:

Flora:

- Late-flower Flax-lily (*Dianella tarda*) listed as critically endangered;
- Straw Wallaby-grass (*Rytidosperma richardsonii)* listed as endangered; and
- Riverina Bitter-cress (*Cardamine moirensis*) listed as endangered.

Fauna:

- Plumed Egret (Ardea intermedia plumifera) listed as critically endangered;
- Murray River Turtle (Emydura macquarii) listed as critically endangered;
- White-bellied Sea-Eagle (Haliaeetus leucogaster) listed as endangered;
- Broad Shelled Turtle (Chelodina expansa) listed as endangered;
- Sloane's Froglet (Crinia sloanei) listed as endangered;
- Diamond Firetail (*Stagonopleura guttata*) listed as vulnerable;
- Musk Duck (*Biziura lobata*) listed as vulnerable;
- Platypus (Ornithorhynchus anatinus) listed as vulnerable;
- Australasian Shoveler (Spatula rhynchotis) listed as vulnerable; and
- Eastern Great Egret (Ardea alba modesta) listed as vulnerable.

One FFG listed community (Victorian Temperate Woodland Bird community) is present across most of the study site.

Six protected flora species were recorded within impact areas.

Following the identification of suitable habitat within the study site during the DFFA the following targeted surveys were undertaken in 2022:

- Targeted surveys for Yellow-bellied Sheathtail Bat: Two-week deployment of SM4Bat acoustic recorders and analysis by bat expert (sub-consultant). Yellow-bellied Sheathtail Bat was not recorded.
- Targeted surveys for Sloane's Froglet: Active searching and call playback surveys supplemented by one-week SM4 acoustic recorder deployment and in-house analysis. Sloane's Froglet detected in broader study site however not within proposed impact footprints.

An aquatic survey of Lake Moodemere and Sunday Creek was undertaken in 2022 by Austral Research and Consulting. The purpose of the surveys was to identify species to inform on potential impacts to these species as a result of the proposed infrastructure works.

- No FFG Act listed native fish were recorded within Sunday Creek or Lake Moodemere.
- Broad Shelled turtle and Murray River Turtle were recorded within Sunday creek and Lake Moodemere.
- Platypus were detected in the northern reaches of Sunday Creek following eDNA sampling as a targeted survey approach for the species.

Several other ecological studies and impact assessments have been undertaken for the project:

- Lake Moodemere/Sunday Creek Reconfiguration Project – Environmental Impact Statement (Aquaterra 2018);
- Growling Grass Frog Surveys – Lake Moodemere (Jacobs 2018);
- Identification of the aquatic vertebrate values and their hydrological requirements for input into the Environmental Watering Plan for the Lake Moodemere-Sunday Creek wetland complex (MDFRC 2011); and
- Identification of Vegetation, Bird and Frog Values and their Hydrological Requirement for input into the Lake Moodemere Environmental Watering Plan (Australian Ecosystems 2011).

**Have any threatened or migratory species or listed communities been recorded from the local area?**

~~NYD~~ ~~No~~ Yes If yes, please:

- List species/communities recorded in recent surveys and/or past observations.
- Indicate which of these have been recorded from the project site or nearby.

*Flora*

Two flora species listed as vulnerable under the EPBC Act were previously recorded within the study site, River Swamp Wallaby-grass (*Amphibromus fluitans*) and Mueller Daisy (*Brachyscome muelleroides*) (Australian Ecosystems 2011), and two additional EPBC Act-listed species were identified as having potential habitat within the study area (DAWE 2022a). Eight FFG Act-listed species have been previously recorded within the study site and five were recorded during the recent ecological assessment (SMEC 2022). These species are listed below:

- River Swamp Wallaby-grass (*Amphibromus fluitans*) – Previously recorded (V);
- Mueller Daisy (*Brachyscome muelleroides*) – Previously recorded, suitable habitat, targeted surveys proposed (V, e);
- Winged Pepper-cress (*Lepidium monoplocoides*) – Suitable habitat present (E);
- Woodland Leek-orchid (*Prasophyllum* sp. aff. *validum*). – Suitable habitat present (E);
- Late-flower Flax-lily (*Dianella tarda*) – recorded in current assessment (cr);
- Straw Wallaby-grass (*Rytidosperma richardsonii*) – recorded in current assessment (e);
- Buloke (*Allocasuarina luehmannii*) – recorded in current assessment and previously recorded (v);
- Buloke Mistletoe (*Amyema linophylla* subsp. *orientalis*) – recorded in current assessment and previously recorded (cr).;
- Pale Swamp Everlasting (*Coronidium gunnianum*) - Previously recorded (cr);
- Hydrilla (*Hydrilla verticillata*) – Previously recorded (v);
- Floodplain Fireweed (*Senecio campylocarpus*) – Previously recorded (v);
- Winged Water-starwort (*Callitriche umbonata*) – Previously recorded (e);
- Wavy Marshwort (*Nymphoides crenata*) – Previously recorded (e); and

- Riverina Bitter-cress (*Cardamine moirensis*) – Recorded in current assessment and previously recorded. (e).

*Fauna*
Five broad habitat types were identified within the study site including eucalypt woodland, riparian woodland, open water, closed swamp and aquatic herb land (SMEC 2021).
There is suitable habitat present within the study site for five EPBC Act-listed fauna species.

Five FFG Act-listed species were recorded within the study site or are known to occur and an additional 18 are considered to potentially occur due to presence of suitable habitat. While suitable habitat may be present, the majority of the below species are considered unlikely to use the habitat or only visit on an occasional basis.

- Regent Honeyeater (*Anthochaera phrygia*) – Suitable habitat present (CR);
- Sloane's Froglet (Crinia sloanei) – Recorded (E);
- Murray Cod (*Maccullochella peelii*) – Suitable habitat present (V);
- Trout Cod (*Maccullochella macquariensis*) – Suitable habitat present (E);
- White-throated Needletail (*Hirundapus caudacutus*) – Nearby records, but aerial species (V);
- Murray River Turtle (*Emydura macquarii*) – Recorded in current assessment (cr);
- Broad-shelled Turtle (*Chelodina expansa*) – Recorded in current assessment (e);
- Platypus (*Ornithorhynchus anatinus*) – Known to occur, targeted surveys proposed (v);
- Musk Duck (*Biziura lobata*) – Recorded in current assessment (v);
- Diamond Firetail (*Stagonopleura guttata*) – Recorded in current assessment (v);
- Barking Owl (*Ninox connivens*) – Suitable habitat present (cr).
- Black Falcon (*Falco subniger*) – Suitable habitat present (cr);
- Plumed Egret (*Ardea intermedia plumifera*) – Suitable habitat present (cr);
- Freckled Duck (*Stictonetta naevosa*) – Suitable habitat present (e);
- Freshwater Catfish (*Tandanus tandanus*) – Suitable habitat present (e);
- Brolga (*Antigone rubicunda*) – Suitable habitat present (e);
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) – Suitable habitat present (e);
- Murray Spiny Crayfish (Euastacus armatus) – Suitable habitat present (thr);
- Little Eagle (*Hieraaetus morphnoides*) – Suitable habitat present (v);
- Eastern Great Egret (*Ardea alba modesta*) – Suitable habitat present (v);
- Apostlebird (*Struthidea cinereal*) – Suitable habitat present (v);
- Magpie Goose (*Anseranas semipalmata*) – Suitable habitat present (v);
- Hardhead Duck (*Aythya australis*) – Suitable habitat present (v);
- Blue-billed Duck (*Oxyura australis*) – Suitable habitat present (v);
- Australasian Shoveler (*Spatula rhynchotis*) – Suitable habitat present (v);
- Grey-crowned Babbler (*Pomatostomus temporalis*) - Suitable habitat present (v);
- Diamond Dove (*Geopelia cuneate*) – Suitable habitat present (v); and
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) – Suitable habitat present (v).

*Communities*
One EPBC Act-listed community is present within the study site; Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.

One FFG Act-listed fauna community is present within the study site; *Victorian Temperate Woodland Bird Community*.

**If known, what threatening processes affecting these species or communities may be exacerbated by the project?** (eg. loss or fragmentation of habitats) Please describe briefly.

Three threatening processes listed under the FFG Act may be exacerbated by the project:

- Alteration to natural temperature regimes of rivers and streams;
- Degradation of native riparian vegetation along Victorian rivers and streams; and
- Wetland loss and degradation as a result of change in water regime, dredging, draining, filing and grazing.

The proposed project may cause changes in water quality to Sunday Creek, including thermal temperatures. Thermal changes may arise from the release of cold water from Lake Hume into the Murray River and the pumping of this water into Sunday creek. However, the current state of

Sunday Creek is not natural due to previous modification and the Project will actually revert Sunday Creek back to its historical direction of flow.

The project proposes to remove riparian habitat on the Murray River and Sunday Creek. The removal has been kept to the minimum extent necessary to undertake the work. The project proposes to remove 4.100 ha of native vegetation of which 4.000 ha is riverine or aquatic EVCs. Fragmentation of habitat is expected to be minimal considering the localised extent of proposed works.

The project will likely result in changes to the water regime of Sunday Creek and Lake Moodemere, including the Northern Marshes. Whilst the proposed water regime is likely to result in drawdown of Lake Moodemere (as a result of evaporative loss) below historically maintained levels it is expected that episodic flooding of Lake Moodemere and the Northern Marshes will still occur and thus adverse impacts on the ecological values of the study site are not expected as a result of the operational phase of the project.

**Are any threatened or migratory species, other species of conservation significance or listed communities potentially affected by the project?**

☒ No

- List these species/communities: n/a

- Indicate which species or communities could be subject to a major or extensive impact (including the loss of a genetically important population of a species listed or nominated for listing) Comment on likelihood of effects and associated uncertainties, if practicable.

*No impacts to species identified within the study site are considered to be major or extensive. Of the threatened species recorded within the study site only one species is proposed to be directly impacted; Riverine Bittercress.*

The following is discussed in greater detail in the Detailed Flora and Fauna Assessment undertaken for this project (SMEC 2022).

*Riverine Bittercress*
Riverine Bittercress was recently recorded within the study site and within the impact footprint of the proposed Hells Gate access track (SMEC 2022). Approximately 120 individual plants were recorded within drying mudflat habitat within the impact footprint however the broader study site provides extensive similar habitat and the overall population of Riverine Bittercress within the study site is potentially well over 5000 plants however this is difficult to estimate do to the nature of this species' lifecycle. As this is an annual species dependent on saturated soils for germination and growth it will have germinated, flowered (flowering occurs in winter and spring), set seed and senesced before construction activities have the potential to impact any individual plants. Provided any soil removed from these areas is redistributed where it originated there will likely be no effect on the population of Riverine Bittercress within impact areas or the broader study site.

*Mueller Daisy*
Targeted surveys are proposed for Mueller Daisy to determine if this species is present within impact areas. Suitable habitat for this species is present within the proposed Hells Gate regulator construction access track however no important populations of the species are known to be present within the study site. A previously recorded population of Mueller Daisy within the Northern Marshes is not within proximity (over 100m) to any impact areas. It is not known whether this population still persists within the study site.

Whilst there is potential for loss of habitat for Mueller Daisy this impact is not considered likely to be significant due to the small extent of potential habitat removal proposed, relative to the extent of habitat present at the study site.

*Late-flower Flax-lily*
Seven plants of this species were detected approximately 20 m south of the proposed Sunday Creek pipeline alignment (See SMEC DFFA for figures) during the site assessment. Mitigation measures including No-Go fencing during the construction phase of the project will be sufficient to mitigate any potential impacts to this species. The pipeline alignment will be sited as far as

possible from these recorded plants within the currently proposed construction buffer. Current land use practises (livestock grazing) are likely to pose a greater risk to this species than the proposed works associated with the Project.

*Straw Wallaby-grass*
Five plants of this species were detected 5-20 m south of the proposed Sunday Creek pipeline alignment during the site assessment. Mitigation measures including No-Go fencing during the construction phase of the project will be sufficient to mitigate any potential impacts to this species. Current land use practises (livestock grazing) are likely to pose a greater risk to this species than the proposed works associated with the Project.

*Buloke*
Multiple Buloke occurred fringing (outside) the study site on the raised banks surrounding Lake Moodemere and Sunday Creek. It is unclear whether these are remnant stands or have been planted, however due to their location on top of surrounding ridges, at considerable distance (100-200 m) from impact footprints, it is unlikely that the proposed works will impact the species or require their removal.

*Buloke Mistletoe*
This species was detected adjacent to the study site on the raised banks overlooking Sunday Creek and Lake Moodemere. As with its host tree the Buloke it is considered unlikely that the species will be impacted as part of the proposed works for the project.

*Murray River Turtle and Broad-shelled Turtle*

Murray River Turtle and Broad-shelled Turtle was recorded in all 3 sampling sites within Lake Moodemere and Sunday Creek indicating the local populations utilise both waterbodies (Austral 2022*).*
Reinstating a more ephemeral water regime in Lake Moodemere may result in increased macrophyte diversity in terms of species and structure (i.e. floating, submerged and emergent) which is currently dominated by emergent macrophytes. There may be a risk of reduced habitat for some species including as a result of reduced breeding habitat within macrophyte beds. The project is considered unlikely to have long-term significant impacts to these species.

*Sloane's Froglet*
Sloane's Froglet, if present, is expected to utilise most habitat types within the study site for foraging and breeding with the exception of Plains Woodland (EVC 803) and Riverine Grassy Woodland (EVC 295). Vegetation within the impact footprint associated with Tall Marsh (EVC 821) and Sedgy Riverine Forest (EVC 816) may be utilised as breeding habitat for the species and targeted surveys are recommended to confirm the presence of Sloane's Froglet within the impact area. Results of targeted surveys will be used to inform a significant impact assessment for the species.

*Trout Cod and Murray Cod*
Trout Cod and Murray Cod are known to occur in the Murray River and tributaries however, aquatic surveys undertaken in January 2022 failed to detect the species within Sunday Creek or Lake Moodemere (Austral 2022). Construction impacts from the proposed Sunday Creek pump station and works associated with upgrades to the existing Lake Moodemere regulator may impact the species. Such impacts to the species were assessed within a significant impact assessment, and it was concluded that a significant impact to the species is unlikely given that impacts to breeding and foraging habitat are likely to be minimal.

*Regent Honeyeater*
Preferred foraging habitat is located within the study site primarily in areas of Plains Woodland (EVC 803) where Grey Box (*Eucalyptus microcarpa*) is the dominant canopy species, however this habitat occurs outside the impact footprint. Regent Honeyeater may also utilise mature River Red Gums (*Eucalyptus camaldulensis*) on occasion as a food source however this is not a preferred foraging tree for the species.

The project is unlikely to have a significant impact on Regent Honeyeater due to extensive alternative (i.e. not preferred) foraging habitat of high quality occurring outside the impact footprint. Future planning of the project will avoid removal of large mature trees supporting key

foraging resources when in flower where practical through the micrositing of the proposed Hells Gate access track.

*Platypus*
Targeted surveys have confirmed the presence of Platypus within the study site however no known population occurs in proximity to impact areas. The population is assumed to be a breeding population that is restricted in its distribution to the north of the study site, near Pfeiffer Wines. Platypus dispersal from this area can only occur towards the Murray River via Lake Moodemere. The construction of the Hells Gate regulator will impede the dispersal between Sunday Creek and Lake Moodemere. Opportunities for movement during infrequent periods of connectivity during flooding will still occur post-construction and movement will still be possible with short land crossings between Sunday Creek and Lake Moodemere (approximately 30 m) and Lake Moodemere and the Murray River (100 m).

*Yellow-bellied Sheathtail Bat*
Targeted surveys were conducted in April 2022 for Yellow-bellied Sheathtail Bat. The species was not recorded.

*Freshwater Catfish*
Freshwater Catfish was not recorded within the study site during aquatic surveys undertaken in 2021 or 2011. However, it is still considered that they may occur within the study site. The project may impact habitat for this species, but impacts are expected to be minor based on the small impact footprint of the project. Post-construction impacts due to impediment of dispersal may also have an impact on Freshwater Catfish.

*Communities*
A total of 4.036 ha of the *Victorian Temperate Woodland Bird Community* is proposed to be removed by the project.

**Is mitigation of potential effects on indigenous flora and fauna proposed?**
☒ Yes If yes, please briefly describe.

The project has been designed to impact the smallest area possible to reduce impacts on native vegetation. A CEMP with stringent tree protection zone controls and erosion and sediment controls will be implemented to reduce impacts on indigenous flora and fauna and the associated waterways.

**Other information/comments?** (eg. accuracy of information)

N/A

## 13. Water environments

**Will the project require significant volumes of fresh water (eg. > 1 Gl/yr)?**

☒ NYD ☒ No ☒ Yes If yes, indicate approximate volume and likely source.

The project will not require more water than is currently utilised under the current water regime.

**Will the project discharge waste water or runoff to water environments?**

~~☒ NYD~~ ☒ No ~~☒ Yes If yes, specify types of discharges and which environments.~~

**Are any waterways, wetlands, estuaries or marine environments likely to be affected?**

~~☒ NYD~~ ~~☒ No~~ ☒ Yes If yes, specify which water environments, answer the following questions and attach any relevant details.

*Construction impacts*

The project proposes to remove 4.100 ha of native vegetation on the banks of Lake Moodemere, at the Hells Gate regulator and Sunday Creek. The vegetation removal comprises mostly of riparian woodland vegetation and a few small patches of aquatic vegetation (0.04 ha). It is assumed that the construction process will mostly only have temporary impacts and that vegetation will likely recolonise any disturbed areas post construction. Very minor impacts to the broader Lake Moodemere are anticipated as a result of the construction impacts.

*Indirect impacts due to change in water regime*

The construction of the Hells Gate regulating structure will hydraulically segregate Lake Moodemere and Sunday Creek from each other at water levels below 129 m AHD. This may fragment the wetland and impact fauna movement across the project site and should be addressed and mitigated in a site-specific CEMP. The project proposes changes to the current water regime within the study site, however, it is assumed that impacts will be minimal. The water level in Sunday Creek will be maintained between 128.7 -128.9 m RL AHD to supply local irrigators. This level is similar to the existing supply levels within Sunday Creek and as such significant changes are not expected to occur. However, an increase in water quality may occur, particularly dissolved oxygen content, which may benefit native aquatic fauna species. During drawdown periods of Lake Moodemere, Sunday Creek may provide a refuge for aquatic species, particularly species capable of movement over terrestrial environments such as amphibians and reptiles.

**Are any of these water environments likely to support threatened or migratory species?**

☒ Yes If yes, specify which water environments.

The Murray River provides habitat to Murray Cod, Trout Cod and Eel-tailed Catfish. Lake Moodemere also provides habitat to Murray Cod, but it is unlikely that Trout Cod occur within the lake. Eel-tailed Catfish and Murray Cod have been previously stocked in Lake Moodemere. None of these species were recorded during recent aquatic surveys (Austral 2022).

Murray River Turtle and Broad-shell Turtle are present within the study site and are likely utilising habitat available in Lake Moodemere and Sunday Creek for foraging (Austral 2022).

Platypus are known to occur in Sunday Creek but were not detected in Lake Moodemere (Austral 2022)

The wetland habitat within the study site is considered likely to provide habitat for a number of threatened shorebird species, including:

- Musk Duck (*Biziura lobata*) – Recorded in DFFA (v);
- Plumed Egret (*Ardea intermedia plumifera*) – Recorded in DFFA (cr);
- Easter Great Egret (Ardea alba modesta)- Recorded in DFFA (v)
- Freckled Duck (*Stictonetta naevosa*) – Suitable habitat present (e);
- Brolga (*Antigone rubicunda*) – Suitable habitat present (e);
- Eastern Great Egret (*Ardea alba modesta*) – Recorded in DFFA (v);
- Magpie Goose (*Anseranas semipalmata*) – Suitable habitat present (v);
- Hardhead Duck (*Aythya australis*) – Suitable habitat present (v);
- Blue-billed Duck (*Oxyura australis*) – Suitable habitat present (v);

- Australasian Shoveler (*Spatula rhynchotis*) – Recorded in DFFA (v);

Wavy Watermarsh (*Nymphoides crenata*) has been previously recorded within the study site (Australian Ecosystems), however, was not recorded during the recent detailed flora and fauna assessment (SMEC 2022). The location of this population was identified as occurring a significant distance from any proposed impact areas (greater than 200 m).

**Are any potentially affected wetlands listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'?**

☒ No

**Could the project affect streamflows?**

☒ Yes If yes, briefly describe implications for streamflows.

The project site is over 250 km upstream of nearest Ramsar listed wetland (Barmah) and considering the small scope of the proposed action impacts this far downstream are highly unlikely provided sediment, erosion and hygiene controls are integrated into future construction environmental management plans for the project.
No water will be entering the Murray River from the project site as a result of the operation of the project and the project is unlikely to affect flow of the Murray River.

The proposed changes are likely to result in the following effects to the Lake Moodemere water regime:

- Natural drawdown of Lake Moodemere will now occur after January each year. This will expose margins of the lake that have been inundated for the previous 43 years;
- Due to decreased lake water levels inundation events are likely to occur less frequently in the Northern Marshes particularly when high Murray River water levels are not sustained for long periods and are not sufficient to fill the lake and inundate the Northern Marshes;
- The proposed Hells Gate regulator structure will prohibit artificial drawdown of Lake Moodemere below 129 m AHD which may increase the frequency of inundation of the Northern Marshes should high Murray inflows or rainfall coincide with this period;
- The approx. 19 cm increase to the height of the overflow wall of the existing Lake Moodemere regulator may have two contradictory effects:
- The increased height of the overflow wall will cause an increase in depth and subsequently duration of inundation of the Northern Marshes during flood events
- Should the regulating structure be closed during a high discharge period of the Murray River inflows above 129.81 m AHD will no longer enter Lake Moodemere and subsequently inundation frequency of the Northern Marshes and water levels within Lake Moodemere may decline.

The water level in Sunday Creek will be maintained between 128.7 -128.9 m RL AHD to supply local irrigators. This level is similar to the existing supply levels within Sunday Creek and as such significant changes are not expected to occur. However, an increase in water quality may occur, particularly dissolved oxygen content, which may benefit native aquatic fauna species.

Environmental water level targets will be set to ensure that there is sufficient aquatic habitat (and of a suitable quality) available in Sunday Creek outside the irrigation season to support fauna values (with a specific focus on supporting threatened species such as Platypus, Broad Shelled Turtle and Murray River Turtle. During drawdown periods of Lake Moodemere, Sunday Creek may provide a refuge for aquatic species, particularly species capable of movement over terrestrial environments such as amphibians and reptiles.

**Could regional groundwater resources be affected by the project?**

☒ No ~~Yes If yes, describe in what way~~.

**Could environmental values (beneficial uses) of water environments be affected?**

☒ ~~NYD~~ ☒ ~~No~~ ☒ Yes If yes, identify waterways/water bodies and beneficial uses (as recognised by State Environment Protection Policies)

No impacts to beneficial uses have been identified as a result of the project.

**Could aquatic, estuarine or marine ecosystems be affected by the project?**

~~NYD~~ ~~No~~ Yes If yes, describe in what way.

*Lake Moodemere*

Historical water records, historical aerial imagery and anecdotal evidence suggest that prior to the 1950's Lake Moodemere underwent a natural wetting and drying cycle. The current water regime which has been in effect for at least 50 years has resulted in a decrease in the biodiversity of Lake Moodemere and the associated Northern Marshes by restricting the drying cycle of the lake which would have naturally taken place. This wetting and drying cycle is important in the development of a number of floristic and faunal communities particularly annual plants such as the threatened Riverine Bittercress which has been recorded across the study site and wading bird species including a number of migratory bird species that utilise the drying margins of lakes for habitat. The current water regime has favoured species that are tolerant of permanent waterlogging such as Giant Rush which has formed monocultures within Lake Moodemere and the Northern Marshes to the detriment of smaller annual and perennial herbaceous species through the loss of potential habitat.

Reinstating a more ephemeral water regime in Lake Moodemere may result in increased macrophyte diversity in terms of species and structure (i.e. floating, submerged and emergent) which is currently dominated by emergent macrophytes. There is a risk of reduced habitat for some species as a result of reduced foraging habitat within macrophyte beds, including Murray River turtle and Broad-shelled turtle which have a preference for permanent waterbodies. There is also a recognised risk that some exotic species may benefit from the changed hydrology leading to further negative impacts on native species.

*Sunday Creek*
The major risks to Sunday Creek were identified as fragmentation from adjoining habitat (Lake Moodemere) and changes in water quality including thermal and dissolved oxygen concerns. The construction of the Hells Gate regulating structure will hydraulically segregate Lake Moodemere and Sunday Creek from each other at water levels below 129 m AHD which may inhibit dispersal between the two bodies.
Sunday Creek provides a thermal refuge to species that prefer warmer waters than the Murray River. Issues may arise from the release of cold water from Lake Hume and the pumping of water into Sunday Creek (The Murray-Darling Freshwater Research Centre 2011).

**Is there a potential for extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems over the long-term?**

No ~~Yes If yes, please describe. Comment on likelihood of effects and associated uncertainties, if practicable.~~

**Is mitigation of potential effects on water environments proposed?**

~~NYD~~ ~~No~~ Yes If yes, please briefly describe.

water levels are proposed to be set for Sunday Creek outside of the irrigation season via a Water Management Plan to ensure a consistent level of aquatic habitat remains available for threatened species within the study site.

A detailed CEMP will be implemented to further reduce impacts on the environment. The CEMP will address (at minimum):

- Fencing of native vegetation to be retained;
- Any proposed dewatering in preparation of the works and potential impacts to fauna;
- Development of a Sediment and Erosion Control Management Plan (SECMP) to address erosion and sediment controls including mitigation of potential acid sulphate soils for adjacent waterways (i.e. Sunday Creek, Murray River and Lake Moodemere);
- Water quality management; and

| |
|---|
| A Sediment and Erosion Control Management Plan (SECMP) will be developed to address erosion and sediment controls including mitigation of potential acid sulphate soils for adjacent waterways (i.e. Sunday Creek, Murray River and Lake Moodemere). |
| **Other information/comments?** (eg. accuracy of information)<br><br>N/A |

## 14. Landscape and soils

### Landscape

**Has a preliminary landscape assessment been prepared?**

☒ No ☒ ~~Yes If yes, please attach.~~

**Is the project to be located either within or near an area that is:**

- **Subject to a Landscape Significance Overlay or Environmental Significance Overlay?**
  ☒ ~~NYD~~ ☒ ~~No~~ ☒ Yes If yes, provide plan showing footprint relative to overlay.

- **Identified as of regional or State significance in a reputable study of landscape values?**
  ☒ NYD ☒ ~~No~~ ☒ ~~Yes If yes, please specify.~~

- **Within or adjoining land reserved under the *National Parks Act 1975*?**
  ☒ ~~NYD~~ ☒ No ☒ ~~Yes If yes, please specify.~~

- **Within or adjoining other public land used for conservation or recreational purposes?**
  ☒ ~~NYD~~ ☒ ~~No~~ ☒ Yes If yes, please specify.

The study site is identified as Public Conservation Recreation Zone (PCRZ) in the local planning schemes. The construction impacts are wholly located within crown land. Lake Moodemere Reserve is located at the southern end of the study site and mainly comprises open water with native riverine vegetation along its fringes. Moodemere Nature Conservation Reserve is located towards the northern portion of the site consisting of wetland marshes and riverine forest.

The entire study site is included within an Environmental Significance Overlay with a schedule attached to this overlay pertaining specifically to Lake Moodemere and surrounds (ESO 2). This schedule highlights the following environmental objectives to be achieved:

- To maintain and protect the diversity of native fauna and remnant vegetation;
- To recognise and protect the conservation attributes of Lake Moodemere;
- To protect and enhance the rural setting surrounding Lake Moodemere;
- To protect the Lake from inappropriate development; and
- To maintain and enhance the recreational use of the land for the enjoyment of all visitors.

With the exception of the westernmost point of the Hells Gate regulator access track, the study site also occurs within a Floodway Overlay (FO).

The study site is used for a range of recreational purposes due to the natural values it hosts. Facilities for passive recreational activities have been installed, such as picnic tables, seating, shelters and informative signs. There is a shared 13 km trail that passes Lake Moodemere, local vineyards and the Murray River which is proposed to be expanded from Wahgunyah to Lake Moodemere (Indigo Shire Council 2018).

The annual Lake Moodemere Rowing regatta takes place in January on Lake Moodemere, which is dependent on the water levels being at a suitable height for rowing (i.e. 128.6 m AHD, DEPI 2014). The site is used by the community for other water sports, such as water skiing.

**Is any clearing vegetation or alteration of landforms likely to affect landscape values?**

☒ ~~NYD~~ ☒ No ☒ ~~Yes If yes, please briefly describe.~~

**Is there a potential for effects on landscape values of regional or State importance?**

☒ ~~NYD~~ ☒ No ☒ ~~Yes Please briefly explain response.~~

**Is mitigation of potential landscape effects proposed?**

☒ ~~NYD~~ ☒ No ☒ ~~Yes If yes, please briefly describe.~~

**Other information/comments?** (eg. accuracy of information)

N/A

**Note:** A preliminary landscape assessment is a specific requirement for a referral of a wind energy facility. This should provide a description of:

- The landscape character of the site and surrounding areas including landform, vegetation types and coverage, water features, any other notable features and current land use;
- The location of nearby dwellings, townships, recreation areas, major roads, above-ground utilities, tourist routes and walking tracks;
- Views to the site and to the proposed location of wind turbines from key vantage points (including views showing existing nearby dwellings and views from major roads, walking tracks and tourist routes) sufficient to give a sense of the overall site in its setting.

## Soils

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|---|
| **Is there a potential for effects on land stability, acid sulphate soils or highly erodible soils?**<br>~~NYD~~ ~~No~~ Yes If yes, please briefly describe.<br><br>An Acid Sulphate Soil assessment was undertaken for the impact footprint (GHD 2010). The results of the SPOCAS testing indicated that the soils at the proposed new pipeline and Hells Gate area were not coastal acid sulphate soils. However, they reported slightly acidic to neutral pH with potential for moderate to high net acidity. This indicated that these soils were potential acid soils in the saturated zones in the Hells Gate area. Construction works need to consider the potential impact of acidic soils on building materials or spoil excavated from the area. An appropriate soil management and mitigation plan will be implemented. |
| **Are there geotechnical hazards that may either affect the project or be affected by it?**<br>NYD ~~No~~ ~~Yes If yes, please briefly describe.~~<br>No |
| **Other information/comments?** (eg. accuracy of information)<br><br>N/A |

## 15. Social environments

| |
|---|
| **Is the project likely to generate significant volumes of road traffic, during construction or operation?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, provide estimate of traffic volume(s) if practicable.~~<br>No |
| **Is there a potential for significant effects on the amenity of residents, due to emissions of dust or odours or changes in visual, noise or traffic conditions?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, briefly describe the nature of the changes in amenity conditions and the possible areas affected.~~<br>No |
| **Is there a potential for exposure of a human community to health or safety hazards, due to emissions to air or water or noise or chemical hazards or associated transport?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, briefly describe the hazards and possible implications.~~<br>No |
| **Is there a potential for displacement of residences or severance of residential access to community resources due to the proposed development?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, briefly describe potential effects.~~<br>No |
| **Are non-residential land use activities likely to be displaced as a result of the project?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, briefly describe the likely effects.~~<br>No |
| **Do any expected changes in non-residential land use activities have a potential to cause adverse effects on local residents/communities, social groups or industries?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, briefly describe the potential effects.~~<br>No |
| **Is mitigation of potential social effects proposed?**<br>~~NYD~~ ~~No~~ ~~Yes If yes, please briefly describe.~~<br>Yes – see SCRP SEIA review 2022 |
| **Other information/comments?** (eg. accuracy of information)<br><br>Attach SCRP SEIA review 2022 |

## Cultural heritage

| |
|---|
| **Have relevant Indigenous organisations been consulted on the occurrence of Aboriginal cultural heritage within the project area?**<br>~~No If no, list any organisations that it is proposed to consult.~~<br>Yes If yes, list the organisations so far consulted.<br><br>Yorta Yorta Nations Aboriginal Corporation. |
| **What investigations of cultural heritage in the project area have been done?**<br>(attach details of method and results of any surveys for the project & describe their accuracy)<br><br>The study site is located on Yorta Yorta Country.<br><br>Terraculture Heritage Consultants (2010) prepared a medium Complex Assessment CHMP (11001) for the proposed scheme to deliver water from the Murray River to a group of irrigators (Sunday Creek Irrigators Syndicate). No Aboriginal cultural heritage was identified within impact areas as part of the Standard and Complex Assessments.<br><br>Australian Cultural Heritage Management (ACHM 2022) prepared a Complex Assessment CHMP (18553) in June 2022. A standard assessment was undertaken (though it was restricted by the visibility of ground surface due to inundation) for the impact footprints. A complex assessment |

was undertaken in the floodplain, the slight rises and gullies/minor branches of the lake. No Aboriginal cultural heritage was found within impact areas during either assessment and it was concluded impact areas are not sensitive for Aboriginal cultural heritage.
The CHMP needs to be approved under the Aboriginal Heritage Act 2006.
Numerous CHMPs relevant to the broader study area have been completed for other projects. These CHMPs and their findings are detailed within the CHMP developed by ACHM (2022) and summarised below:
Vines (2007) – Hiskins Bend, Victoria: Cultural Heritage Management Plan
Vines prepared a small Standard Assessment CHMP (10126) for a proposed weir at Hiskins Bend. No Aboriginal cultural heritage was located during the survey, and no places of cultural heritage sensitivity were identified. Large sections of the study area were determined as having been impacted by bulldozing and therefore not Complex Assessment was carried out.
Bell (2011) – Construction of a Multi-use Structure and Toilet Facilities, Lake Moodemere Cultural Heritage Management Plan
Bell (2011) prepared a small Standard Assessment CHMP (11966) for the proposed construction of a multi-use structure and toilet block. No Aboriginal cultural heritage or areas of archaeological sensitivity were identified during the survey, and therefore a Complex Assessment was not undertaken
Bell (2012) – Lake Moodemere Mast Plan Western Foreshore Development, North East Victoria Cultural Heritage Management Plan
Bell (2012) prepared a medium Standard Assessment CHMP (11947) for the proposed development of new visitor facilities on the Lake Moodemere Foreshore. No Aboriginal cultural heritage or areas of archaeological sensitivity were identified during the Standard Assessment, therefore no Complex Assessment was undertaken.
Vines (2017) – Wahgunyah to Lake Moodemere walking trails: Cultural Heritage Management Plan
Vines (2017) prepared a medium Standard Assessment CHMP (14337) for the proposed construction of a shared use trail between Wahgunyah and Lake Moodemere. During the Standard Assessment one low density artefact distribution (VAHR 8125-0426) comprising 11 flaked quartz fragments and three scarred trees (VAHR 8125-0428, 0408 and 0429) were identified. The Standard Assessment determined that although Aboriginal cultural heritage was present within the study area, this was only located in a few discrete places and therefore a Complex Assessment was not undertaken.
The study site is mapped as HO546 (Lake Moodemere and Aboriginal Reserve, Moodemere Rd).

**Is any Aboriginal cultural heritage known from the project area?**

~~NYD~~ ~~No~~ ~~Yes~~ ~~If yes, briefly describe:~~

- Any sites listed on the AAV Site Register
- Sites or areas of sensitivity recorded in recent surveys from the project site or nearby
- Sites or areas of sensitivity identified by representatives of Indigenous organisations

No Aboriginal cultural heritage was identified within impact areas as part of the Standard and Complex Assessments (AHCM 2022)

**Are there any cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the *Heritage Act 1995* within the project area?**

~~NYD~~ ~~No~~ ~~Yes~~ ~~If yes, please list.~~

**Is mitigation of potential cultural heritage effects proposed?**

~~NYD~~ ~~No~~ ~~Yes~~ ~~If yes, please briefly describe.~~

**Other information/comments?** (eg. accuracy of information)

The CHMP for the project needs to be endorsed by Yorta Yorta Nations Aboriginal Corporation.

## 16. Energy, wastes & greenhouse gas emissions

**What are the main sources of energy that the project facility would consume/generate?**

☒ Electricity network. If possible, estimate power requirement/output ……
Natural gas network. If possible, estimate gas requirement/output ……...
Generated on-site. If possible, estimate power capacity/output ……
Other. Please describe.

Please add any relevant additional information.

The proposed pump station will utilise a 3-phase 55kW electric motor delivering a nominal 36ML/d continuous flow rate. An existing 3-phase 22kV powerline is situated near the proposed pump station.

The proposed location for the pump station is in the vicinity of a former pump station at the north end of the site near Hynes Road. The power connection will also be considered in planning. Access to the proposed pump station will be via an existing track (Hynes Road) for the most part. It is envisaged that the power connection will be underground and follow Hynes road closely, reducing the need to remove trees. The full scope of the power connection is yet to be determined.

**What are the main forms of waste that would be generated by the project facility?**

☒ ~~Wastewater. Describe briefly.~~
☒ ~~Solid chemical wastes. Describe briefly.~~
☒ ~~Excavated material. Describe briefly.~~
☒ ~~Other. Describe briefly.~~

Please provide relevant further information, including proposed management of wastes.

N/A

**What level of greenhouse gas emissions is expected to result directly from operation of the project facility?**

☒ Less than 50,000 tonnes of $CO_2$ equivalent per annum
☒ ~~Between 50,000 and 100,000 tonnes of $CO_2$ equivalent per annum~~
☒ ~~Between 100,000 and 200,000 tonnes of $CO_2$ equivalent per annum~~
☒ ~~More than 200,000 tonnes of $CO_2$ equivalent per annum~~

Please add any relevant additional information, including any identified mitigation options.

The project is likely to result in a decrease in CO2 emissions in the operational phase as the existing diesel pump station will be decommissioned in favour of a 3-phase electrical pump station.

## 17. Other environmental issues

**Are there any other environmental issues arising from the proposed project?**

☒ No ☒ ~~Yes If yes, briefly describe.~~

No

## 18. Environmental management

**What measures are currently proposed to avoid, minimise or manage the main potential adverse environmental effects?** (if not already described above)

☒ Siting: Please describe briefly

As mentioned above the project components have been sited and designed to:

- Avoid threatened species and communities recorded in the area (Late-flower Flax-lily, Straw Wallaby-grass)

☒ Design: Please describe briefly

The design of the proposed Murray river pump station will integrate entrainment protection to prevent the injury or death of native large bodied fish species that may be present in the Murray River

☒ Environmental management: Please describe briefly.

The project has been designed to minimise the impact on native vegetation. A Fauna Management Plan (FMP) will be developed and implemented to inform aquatic and terrestrial fauna management throughout the construction process/program across the study site.

A detailed CEMP will be implemented to further reduce impacts on the environment. The CEMP will address (at minimum):

- Fencing of native vegetation to be retained;
- Any proposed dewatering in preparation of the works and potential impacts to fauna;
- Development of a Sediment and Erosion Control Management Plan (SECMP) to address erosion and sediment controls including mitigation of potential acid sulphate soils for adjacent waterways (i.e. Sunday Creek, Murray River and Lake Moodemere);
- Water quality management; and
- Avoid and/or minimise vegetation removal and works south of the existing Lake Moodemere regulator to avoid triggering species offsets for Trout Cod which are currently unavailable.

A Sediment and Erosion Control Management Plan (SECMP) will be developed to address erosion and sediment controls including mitigation of potential acid sulphate soils for adjacent waterways (i.e. Sunday Creek, Murray River and Lake Moodemere).

☐ Other: Please describe briefly

Add any relevant additional information.

Options for siting for this project are limited, due to the locality of the irrigators and existing infrastructure at the study site. Options for location and design of the new pump were investigated but it was determined that the current design is most suitable for the project.

## 19. Other activities

**Are there any other activities in the vicinity of the proposed project that have a potential for cumulative effects?**

☐ ~~NYD~~ ☐ No ☐ ~~Yes If yes, briefly describe.~~

## 20. Investigation program

### Study program

**Have any environmental studies not referred to above been conducted for the project?**

☐ No ☒ Yes If yes, please list here and attach if relevant.

- Lake Moodemere/Sunday Creek Reconfiguration Project – Environmental Impact Statement (Aquaterra 2018);
- Growling Grass Frog Surveys – Lake Moodemere (Jacobs 2018);
- Identification of the aquatic vertebrate values and their hydrological requirements for input into the Environmental Watering Plan for the Lake Moodemere-Sunday Creek wetland complex (MDFRC 2011);
- Lake Moodemere/Sunday Creek Reconfiguration Project – Environmental Impact Statement (Aquaterra Scientific 2018);
- Lake Moodemere Environmental Watering Plan (Water Technology 2012); and
- Lake Moodemere – Water Savings Assessment (DEPI 2014);

**Has a program for future environmental studies been developed?**

~~☒ No~~ ☒ Yes If yes, briefly describe.

Targeted surveys will be undertaken for Mueller Daisy. The results of this assessment will be incorporated into the detailed flora and fauna assessment and advise future detailed design(SMEC 2022).

## Consultation program

**Has a consultation program conducted to date for the project?**

☐ No ☒ Yes If yes, outline the consultation activities and the stakeholder groups or organisations consulted.

- Indigo Shire Council
- North East Catchment Management Authority
- DELWP
- DELWP Hume (Natural Environments Program)
- Department of Agriculture, Water and Environment
- Parks Victoria
- Yorta Yorta Nationa Aboriginal Coporation
- Sunday Creek Irrigation Syndicate
- Goulburn Murray Water Connections Project
- Lake Moodemere Rowing Club
- Wahgunyah Rowing Club
- Lake Moodemere Water-ski Club
- Friends of Lake Moodemere
- Marine Safety Victoria
- Victorian Fisheries Authority
- VR Fish
- Broader community
- Wahgunyah Progress Association
- Sunday Creek Management Committee
- Poachers of Paradise Fishing Club

Please see attached stakeholder consultation record.

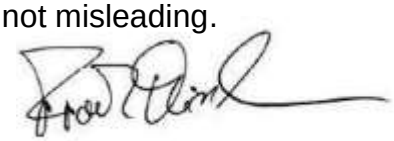
**Has a program for future consultation been developed?**

☒ NYD ~~☒ No~~ ~~☒ Yes If yes, briefly describe.~~

**Authorised person for proponent:**

I, Frank Fisseler,

Project Director, GMW Water Efficiency Project, confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature 

Date 10/08/2022

**Person who prepared this referral:**

I, Arthur William Nemet,

Ecologist for SMEC, confirm that the information contained in this form is, to my knowledge, true and not misleading.

Signature 

Date 09/08/2022