

## Title of proposal

# 2020/8771 - Gunbower National Park Floodplain Restoration Project

## Section 1

Summary of your proposed action

1.1 Project industry type

Water Management and Use

## 1.2 Provide a detailed description of the proposed action, including all proposed activities

The Gunbower National Park Floodplain Restoration Project aims to restore a more natural inundation regime by delivering water across approximately 704 ha of high-ecological-value Murray River floodplain, through the construction of new infrastructure and modification of existing infrastructure within the Murray River Reserve, the Gunbower National Park, private land and the National Channel (Attachment 1). Key project areas include:

- Upper Gunbower Forest, inundating 247 ha of wetlands containing Upper Camerons Creek, Camerons Creek Lagoon 1, 2, 3 and 4, Black Charlie Lagoon and Baggots Swamp

- Middle Gunbower Forest (upstream of Deep Creek), inundating 336 ha of wetlands and forest floodplain areas containing Deep Creek, Middle forest floodplain area, Pig Swamp and Emu Hole Lagoon

- Middle Gunbower Forest (downstream of Deep Creek), inundating 121 ha of wetlands and forest floodplain areas containing Broken Axle Creek, Spur Creek, and Red Rise Swamp

The project will enable managed inundation to a design water level using water from natural flood events and pumping from the Murray River and the National Channel. Utilising infrastructure to control inundation events will enable more efficient use of water and a more effective management regime. These areas have declined in condition following extended periods of drought as well as regulation of the River which, in the middle forest, has resulted in reduced frequency, extent and duration of natural inundation events. The upper forest has experienced constant high water levels in order to supply irrigation demand, resulting in overwatering and loss of variation critical forest ecology. Other threats include historic logging practices, construction of tracks, levees and irrigation channels which have altered the natural hydrology, pest and weed invasion, off-road driving and grazing.

The current design involves the construction of 12 small regulators, 1 fishway, 3 pipelines, 2 pump stations, associated power supply, 1 channel upgrade, 1 drop structure, 3 culvert crossings, 2 drainage outlets, access track upgrades, erosion control works and a series of containment banks to divert, retain and release water in Gunbower National Park (Attachment 1).

Infrastructure designs will be refined further as consultation continues and the process is finalised. These refinements would likely involve adjustments to the location of works or type and design of assets proposed in some areas to reduce impacts and to improve operational flexibility. The nature of any refinements would be generally consistent with the nature of the proposed works described below.

Upper Gunbower

- One Pump Station located on GMW's National Channel

- Power supply to new pump station.

- Three small regulators: Camerons Creek River Track Regulator, Camerons Mid Creek Regulator, Dry Tree Creek Outlet Regulator

- One Pipeline to deliver environmental water into Gunbower National Park. The pipeline will also include several irrigation and stock and domestic supply offtakes to replace existing customer supply points.

- Dry Tree Creek culvert

- Containment banks / levees adjacent to and supporting the Camerons Mid Creek Regulator
- One cone fishway: Camerons Mid Creek Fishway.
- One spillway located within Baggots Creek Track

- Levees: A proposed levee management strategy is currently being considered by VMFRP to confirm extent of works required on existing levees.

## Middle Gunbower (upstream Deep Creek)

- One Pump Station located on the bank of the Murray River and associated discharge pipeline at Brereton Road.

- Power supply to new pump station.

- Five small regulators: Pig Swamp Offtake Regulator, Emu Hole Lagoon Offtake Regulator, Middle Forest Offtake Regulator, Deep Creek River Return Regulator, Dalley Bend Inlet Regulator

- Emu Hole Lagoon offtake pipeline
- Middle Forest offtake pipeline (main discharge to OSCC)
- Old Straight Cut Channel minor upgrade works

- Road and car park works at Brereton Road and Riverside car parking area



- Containment banks / levees as required

- Levees: A proposed levee management strategy is currently being considered by VMFRP to confirm extent of works required on existing levees.

Middle Gunbower (downstream Deep Creek)

- Two spillways: Broken Axle Creek Regulator Spillway, Munroe Track Spillways x2

- Four regulators: Broken Axle Creek Regulator, Tickells Track Regulator, Spur Creek River Return Regulator, Spur Creek Forest Regulator

- One drop structure: Spur Creek Drop Structure at Murray River
- Three culverts: Broken Axle Creek Culvert/bridge, Munroe Track Culvert 1, Munroe Track Culvert 2
- Drainage Outlets within the containment banks x2.
- A series of containment banks on Munroe Track, Tickells Track and River Track as required.

- Levees: A proposed levee management strategy is currently being considered by VMFRP to confirm extent of works required on existing levees.

General works applicable to all areas include:

- Construction laydown: areas are included in the construction footprint and proposed to be within proximity to Camerons Mid Creek Regulator and Camerons Creek River Track Regulator in Upper Gunbower. The exact location of laydown areas in Middle Gunbower will be determined as design progresses. All locations are currently under review by VMFRP and it is proposed to move these laydown areas to private land outside of the forest to minimise and avoid impacts. Consultation with relevant landholders is currently being undertaken. Smaller, more localised laydown areas would also be provided at or within proximity to the other infrastructure sites which are within the construction footprint.

- Access tracks: access to project structures during construction and operation would be provided via existing tracks, including Tickells Track, River Track (near Camerons Creek), River Track (near Spur Creek), Munroe Track, Baggots Creek Track, Brereton Road and Straight Road. Tracks may need to be maintained or upgraded to facilitate safe access, the extent of which would be confirmed following outcomes from geotechnical investigations, cultural heritage assessments (as part of the Cultural Heritage Management Plan for this project) and condition ground truthing.

- Borrow Pits: VMFRP is in the process of identifying possible borrow pits to acquire clay/ rock material for construction. Locations will be selected close to the project area, on private land outside of the forest while avoiding and minimising impacts.

- Power: new and upgraded connections would be required to facilitate operation of both Pump Stations. The key design components include new poles, stays and overhead and underground cables. Within the National Park boundary, new cables would be directly buried (or bored depending on requirements), generally following the alignment of containment banks, levees or access tracks to minimise the area of impact. Upgrades to existing overhead cables within private property are required; along with new cables, both above ground and below ground, are proposed through private property. Consultation with relevant private landholders is currently being undertaken in relation to routes.

- Structures to be decommissioned: The existing Camerons Mid Creek Regulator and Camerons Creek River Track Regulator will be replaced with new regulators (as described above) and the existing regulators will be removed.

# 1.3 What is the extent and location of your proposed action?

See Appendix B

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland)

The project is located on the mid-Murray floodplain in Northern Victoria in the Murray Fans bioregion, mostly within the Gunbower National Park. The Gunbower National Park is Crown land, managed by Parks Victoria in accordance with the objectives of the National Parks Act 1975. Gunbower National Park forms a large part of the broader Gunbower Forest, which is bounded to the north by the Murray River and along its southern edge by private land and Gunbower Creek.

The project is located within the Gannawarra Shire and Campaspe Shire Local Government Areas (LGA) in Victoria, with the exception of a small portion of the construction footprint on the Murray River bank for the pump stations which extend into NSW (Murray River Council). The project is within the North Central Catchment Management Authority (North Central CMA) region and in the heart of the Goulburn Murray Water (GMW) managed Torrumbarry Irrigation Area. The regional water corporation is GMW.

# 1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

The action area in Section 1.3 shows the general location within which the project would occur.

The infrastructure footprint of structures in the current design is 6.9 ha. The proposed construction footprint (disturbance footprint which comprises the infrastructure footprint, tracks and buffer for construction activities) is within the area of investigation and is approximately 25 ha. This comprises around 13 ha for structures and containment banks and 12 ha for



access tracks. The construction footprint was used to assess impacts on native vegetation and habitat. Design of project infrastructure is being refined in response to environmental and heritage studies. To the extent practicable changes to the construction footprint would occur within the area of investigation. The exact location and size of borrow pits, power supply, existing levee works is yet to be determined. Where possible, these components would be located on private land.

The inundation area is around 704 ha.

## 1.7 Proposed action location

Address - Brereton Road, Gunbower, VIC, 3566, Australia

1.8 Primary jurisdiction	Victoria
1.9 Has the person proposing to take the	action received any Australian Government grant funding to undertake this project?
Yes 🗌 No	
1.0.1 Drevide detail	

## 1.9.1 Provide detail

The project is being delivered as part of the Victorian Murray Floodplain Restoration Project (VMFRP). VMFRP is a regional partnership model between Lower Murray Water (LMW), Goulburn Murray Water (GMW), the Mallee Catchment Management Authority (Mallee CMA), North Central Catchment Management Authority (North Central CMA) and Parks Victoria, set up to deliver the VMFRP works on behalf of the Department of Environment, Land, Water and Planning - Water (DELWP Water). LMW is the project proponent.

In early 2019, the VMFRP secured funding from the Australian Government via the Department of Agriculture to progress engagement with communities and the development of detailed designs and approvals for the following nine projects (listed in upstream to downstream order), which are designed to deliver Sustainable Diversion Limits offsets and reduce the requirement for water buybacks under the Murray-Darling Basin Plan:

- Gunbower National Park Floodplain Restoration Project
- Guttrum and Benwell Forests Floodplain Restoration Project
- Vinifera Floodplain Restoration Project
- Nyah Floodplain Restoration Project
- Burra Creek Floodplain Restoration Project
- Belsar-Yungera Islands Floodplain Restoration Project
- Hattah Lakes North Floodplain Restoration Project
- Wallpolla Island Floodplain Restoration Project
- Lindsay Island Floodplain Restoration Project

Australian Government funding of the project was granted following a staged assessment of the following proposals by the Sustainable Diversion Limits Adjustments Assessment Committee:

- Phase 1 Submission – Gunbower National Park Floodplain Management Project - Sustainable Diversion Limit Supply Measure Phase 1 submission – submitted by North Central CMA in 2013.

- Phase 2 Submission – Gunbower National Park Environmental Works Project – Sustainable Diversion Limit Adjustment. Supply Measure Business Case – submitted by North Central CMA in 2014.

1.10 Is the proposed action subject to local government planning approval?		
Yes No		
1.10.1 Is there a local government area and council contact for the proposal?		
🗹 Yes 🔲 No		
1.10.1.0 Council contact officer details		
1.10.1.1 Name of relevant council contact officer	Ally Wilkie, Campaspe Shire	
1.10.1.2 E-mail	a.wilkie@campaspe.vic.gov.au	
1.10.1.3 Telephone Number	(03) 5481 2817	
1.11 Provide an estimated start and estimated end date for the	Start Date 01/01/2023	
proposed action	End Date 30/06/2024	



## 1.12 Provide details of the context, planning framework and state and/or local Government requirements

## PLANNING FRAMEWORK

The project is predominantly situated in the Victorian LGAs of the Campaspe Shire Council and Gannawarra Shire Council, with the exception of a small area within NSW jurisdiction. The project is subject to the provisions of the Campaspe and Gannawarra Planning Schemes. The following zones and overlay apply to land in the project area under the Campaspe Planning Scheme:

- Public Conservation and Resource Zone (PCRZ)
- Farming Zone (FZ1)
- Environmental Significance Overlay (Schedule 1 Murray River Corridor) (ESO1)
- Floodway Overlay (FO)
- Land Subject to Inundation Overlay (LSIO)
- Bushfire Management Overlay (BMO)

The following zones and overlay apply to land in the project area under the Gannawarra Planning Scheme:

- Public Conservation and Resource Zone (PCRZ)
- Environmental Significance Overlay (Schedule 1 Waterway Environs)
- Land Subject to Inundation Overlay (LSIO)
- Bushfire Management Overlay (BMO)

The project would require planning approval under the Campaspe and Gannawarra Planning Schemes and the Victorian Planning and Environment Act 1987 in relation to: use, buildings and works (including earthworks), and the removal, destruction or lopping of native vegetation (including for the Gannawarra portions, any vegetation in ESO1).

A small part of the project area (associated with the Brereton Road Pump Station and the drop structure in the Murray River) would extend into the NSW LGA of Murray River Council. Construction of the pump stations within NSW would include excavation and construction of intake pipes near the edge of the bank profile. Works for the drop structure in NSW would involve modifying the existing outlet channel and extending the section of rock mattress erosion protection into the Murray River. The proposed works are defined as a 'water reticulation system' and would occur on land that is zoned W1 Natural Waterways under the Murray Local Environmental Plan 2011. No activities are permitted without development consent within the W1 zone.

A review of relevant environmental planning instruments has determined that the project is permissible with the consent of the Murray River Council pursuant to Clause 126A of the Infrastructure SEPP (NSW). A development application would need to be submitted to the Murray River Council and this would need to be supported by a Statement of Environmental Effects that addresses section 4.15 of the NSW EP&A Act.

## POTENTIAL APPROVAL REQUIREMENTS

In addition to the local government requirements discussed above, the following State and Commonwealth referrals, approvals and notifications are likely to be required for the project:

## COMMONWEALTH

- Notification of a 'future act' under the Native Title Act 1993 (Cth) for activities on Crown land that may affect native title rights and interests

- Notification of the MDBA of a proposal which may affect the flow, use, control or quality of any water in the upper River Murray under clause 49 of Schedule 1 of the Water Act 2007.

## VICTORIA

- Referral to the Minister for Planning (via DELWP) under the Environment Effects Act 1978 to determine whether or not an Environment Effects Statement is required for the project

- A planning scheme amendment or planning permit under the Campaspe and Gannawarra Planning Scheme, pursuant to the Planning and Environment Act 1987

- A Cultural Heritage Management Plan approved by the Yorta Yorta National Aboriginal Corporation (the Registered Aboriginal Party for the project area) under the Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2018 - Consent under Section 27 of the National Parks Act 1975

- License to take and use water (s51) and license to construct works (s67) to take water from Goulburn Murray Water under section 51 of the Water Act 1989

- Works on waterways permit from North Central CMA of the Water Act 1989

- Permit to take protected flora on Crown land from DELWP under the Flora and Fauna Guarantee Act 1988

- Potential need for a Work Plan and/or Work Authority under the Mineral Resources (Sustainable Development) Act 1990 for potential borrow sites – noting the location and therefore potential approval requirements for borrow/quarry sites are yet to be determined.



## NEW SOUTH WALES

- Development consent under Part 4 of the NSW EP&A Act from Murray River Council as the consent authority. The development application would need to be accompanied by a Statement of Environmental Effects.

- A licence to allow the use of Crown land under the Crown Lands Management Act 2016
- A permit for 'dredging' or 'reclamation' under section 201 of the Fisheries Management Act 1994 if not deemed exempt

## 1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders

The North Central CMA worked with key stakeholders, community groups and landowners to develop and refine the Sustainable Diversion Limits (SDL) Business Case for the Gunbower National Park project over a period from 2014 to early 2019.

The project was then rebranded and funded as the Victorian Murray Floodplain Restoration Project with additional engagement occurring from early 2019 to current. Consultation activities are ongoing and will continue throughout the duration of the project.

Government stakeholders and project partners are involved through participation in various project governance and technical review groups, or alternatively have been briefed directly about the project, including:

- A Project Control Group, consisting of members from Goulburn Murray Water (GMW), Lower Murray Water (LMW), Mallee CMA (MCMA), North Central CMA (NCCMA) and Parks Victoria;

- A Regulatory Approvals Group, consisting of members from the Victorian Department of Environment, Land, Water and Planning (DELWP), and Department of Premier and Cabinet, the Commonwealth Department of Agriculture, Water and the Environment, and Parks Victoria;

- An Asset Design Group, consisting of members from GMW, DELWP, Parks Victoria and the Murray Darling Basin Authority;

- Project briefings to Campaspe Shire Council, Gannawarra Shire Council and Murray River Council; and

- Via various direct consultation activities with local officers and key contacts e.g. project briefings and site tours.

Recent communication and engagement activities conducted with non-government stakeholders have been undertaken in accordance with VMFRP's Stakeholder Engagement and Communication Plan (for all sites) and have included:

- Face-to-face briefing sessions with all adjacent landowners providing project updates and discussing potential impacts and opportunities for private landowners;

- Presentations, onsite visits and information sharing with the Yorta Yorta Nations Aboriginal Corporation; and,

- Project briefings to other interested stakeholders including – VicForests, Murray River Trails, and the Gunbower Island Community Reference Committee (who contribute to the management of The Living Murray project area).

This engagement has been supported with tailored Gunbower National Park Floodplain Project documentation, including: - Fact sheets, media releases, electronic communication (website, emails, newsletters), brochures, correspondence and individual maps of landowner properties showing how project infrastructure interfaces with private properties.

This direct approach to engagement has helped capture the views and local knowledge of key stakeholders and community members to directly integrate these into the project designs, resulting in avoided or minimised impacts to private property and industry operations.

Broad community awareness of the project is further evidenced by the sustained interest in the proposal as illustrated by ongoing requests to provide briefings, presentations and updates as project designs further progress.

Information regarding the Gunbower National Park Floodplain Restoration Project is published on the VMFRP website: https://www.vmfrp.com.au/wp-content/uploads/2020/06/VMFRP-FactSheet-A4-Gunbower-TR-2019-044229-Edit-OJ-30062020.pdf

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project

A referral for the project has been submitted to the Victorian Minister for Planning (via DELWP) for a decision on whether or not an Environment Effects Statement is required for the project under the Victorian Environment Effects Act 1978.

A Statement of Environmental Effects would be prepared to support the development application for consent under Part 4 of the NSW EP&A Act.



 Australian Government

 Department of Agriculture, Water and the Environment



Section 2		
Matters of national environmental significance		
2.1 Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?		
□ Yes ☑ No		
2.2 Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?		
□ Yes ☑ No		
2.3 Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?		
Yes No		
Wetland		

Gunbower Forest Ramsar Site meets 4 Ramsar listing criteria (Hale & Butcher, 2011):

Criterion 1: It is part of the second largest River Red Gum forest in the Murray-Darling Basin. The size and intact nature of the forested floodplain makes it one of the best representations of freshwater tree-dominated wetlands in the bioregion. Criterion 2: It supports EPBC Act threatened species: Australasian Bittern, Murray Cod, Silver Perch, River Swamp Wallaby-grass. Winged Peppercress.

Criterion 4: It plays a role in supporting breeding of wetland birds, frogs, turtles and fish during periods of inundation. Criterion 8: It provides a migratory route between habitat in the Murray River, floodplains and Gunbower Creek for native fish. They utilise anabranch and flood runner channels when available and many species spawn on the floodplain. River Red Gum forests contribute to in-stream nutrient accumulation and productivity and provide important shelter (coarse woody debris, shaded water).

## Impact

Attachment 5 provides an assessment against the Limits of Acceptable Change (LAC) in the Ecological Character Description (Hale and Butcher, 2011). The project is expected to positively impact the ecological character, however there will be localised, short-term negative impacts to small areas associated with construction. Overall the project is not considered likely to affect the Ramsar listing or result in significant impacts to the ecological character of the site, because:

Negligible areas of the wetland would be destroyed or substantially modified:

The current Construction Footprint, which may be subjected to short-term impacts, comprises 25 ha (0.125% of the approximately 20,218 ha Gunbower Forest Ramsar site). The Development Footprint, i.e. permanent infrastructure remaining within the Ramsar site, is 6.9 ha (0.034%). The proposed inundation area that will benefit from the project is approximately 704 ha (3.5%).

No substantial and measurable (negative) change in the hydrological regime of the wetland is expected: The project aims to improve ecological values across 704 ha of the site by delivering environmental water to target sites across the Gunbower Forest. The modification to the site is expected to have benefits rather than impacts due to altered hydrology (NCCMA, 2014), including improved tree canopy condition, wetland and understorey vegetation condition, increased productivity and habitat for a range of floodplain species.

No substantial and measurable change in the water quality of the wetland is expected:

Parts of the project site may develop hypoxic blackwater following environmental water delivery, particularly where water pools and persists over summer. This is a natural process that often occurs in waterbodies with high organic loads, little circulation and warm temperatures and can impact fish and other water-dependent fauna. In the mid-forest site, resident fish populations are not expected to occur in wetlands, given the limited ability to enter wetlands and ephemeral nature of these wetlands. At the Camerons Creek site, water quality will be monitored and managed by providing freshening flows if required to maintain health of small-bodied native fish populations.

Water quality risks to groundwater dependant ecosystems and surface water sources have been assessed to be low and manageable. Managed floodplain inundation events, temporary drawdown of groundwater levels during construction (dewatering excavations), and the risk of increased salinity levels will be managed and mitigated by measures such as



groundwater and salinity monitoring and adaptive management. Soil erosion control measures and sediment management approaches will be implemented to reduce the risk of localised water quality impacts to wet areas (NC CMA, 2014a; NC CMA, 2014e, R8, 2020a).

The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependant upon the wetland are not expected to be seriously impacted:

The habitat and lifecycle of a range of native species is expected to benefit from the delivery of environmental water including River Red Gum trees and understory, wetland plants, aquatic fauna, macroinvertebrates, frogs and turtles, waterbirds and terrestrial fauna including woodland birds (NCCMA, 2014).

Some expected localised, temporary and negligible impacts to habitat, from construction works, include:

- Physical disturbance (e.g. removal of up to 19.6 ha of vegetation) and possible short-term water quality impacts

- Entrapment, restriction of passage or temporary loss of habitat (cofferdam), dewatering works and sediment/contaminant runoff into wet areas.

- Transport or spread of invasive weeds

- Potential risk of disruption to turtle breeding if works along river banks occur in spring to summer (R8, 2020a)

These localised impacts will be mitigated through a Construction Environmental Management Plan (CEMP) (refer Section 4), which will include an aquatic fauna management plan for works around waterways including wetlands.

It is not expected that an invasive species that is harmful to the ecological character of the wetland will become established (or an existing invasive species be spread) in the wetland

Transport or proliferation of invasive weeds that may impact on the health of wetland and floodplain vegetation communities is a potential risk of construction and will be managed through a CEMP (refer Section 4).

Invasive pest species, such as carp and other pest fish and terrestrial pests such as pigs and foxes, may be spread or increased as a result of environmental water delivery. However, these will be managed through design and operating measures and complementary activities (e.g. fish screens on regulators and pumps, planned drying and carp reduction, pig and fox control activities in collaboration with DEWLP / Parks Victoria).

## Wetland

Ramsar sites downstream and / or within 500 km

Ramsar Wetlands downstream of the project include:

- NSW Central Murray Forests This site is adjacent to the Project Area on the opposite bank of the Murray River
- (Koondrook-Perricoota State Forests) and approximately 50 km downstream (Campbells Island State Forest).

- Hattah-Kulkyne Lakes – approximately >300 km downstream

## Impact

- No areas of the downstream Ramsar sites are within the Area of Investigation or Inundation Area of the project and therefore will not be destroyed or substantially modified due to the project.

- Return flows from the project area are expected to re-enter the Murray River only under the Forest floodplain watering scenario and the volumes are small (maximum of 1,540 ML at approximately 20 ML/day) compared with the magnitude of flow in the Murray River (between 1,365 and 55,900 ML/day daily average between 1974-2020 over Torrumbarry Weir). It is not expected that return flows would cause a substantial or measurable change in the hydrological regime of the wetland within the adjacent NSW Central Murray Forests Ramsar site or at Hattah-Kulkyne Lakes.

- A semi-quantitative assessment of the potential salinity impacts of environmental watering activities at Gunbower National Park was undertaken and the estimated salinity impact at Morgan under the operating scenarios was found to be negligible (<0.01 S/cm EC) (Jacobs 2014).

- Due to the small volume of return flow expected to re-enter the Murray River as a result of managed inundation of the Gunbower National Park floodplain, substantial and measurable water quality impacts to adjacent/downstream Ramsar sites via the Murray River are not expected to occur as a result of the project.

- Further water quality modelling will be undertaken by the MDBA when the full package of adjustment measures is agreed to by Basin governments (NCCMA, 2014). This will identify any cumulative impacts that may occur downstream from the full package of works.

- No area of habitat or lifecycle of native species (including invertebrate fauna and fish species) within adjacent or downstream Ramsar sites is expected to be impacted as a result of the project as the area of investigation and the Inundation Area are not within these Ramsar sites.

- No changes to invasive species occupancy are expected through establishment or spread of weeds at any adjacent or



downstream Ramsar site due to the project. The area of investigation and the Inundation Area are not within these Ramsar sites, and environmental controls during construction are expected to monitor and control any potential spread of weeds and pests.

## 2.3.2 Do you consider this impact to be significant?

🗌 Yes 🗹 No

2.4 Is the proposed action likely to have any direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

🗹 Yes 🗌 No

## Species or threatened ecological community

Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern EPBC Act – Endangered

## Impact

This TEC is known to occur in the construction footprint and inundation area. Justification for why it is not likely to be significantly impacted is discussed below.

The PMST report indicates that this community is likely to occur within 10 km of the project area.

The Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia ecological community exists in the transition between temperate woodlands and forests of the lower slopes and tablelands of south-eastern Australia, and the semi-arid communities further inland (DEWHA, 2010). A tree canopy of Grey Box is typically present and dominant, possibly interspersed with a range of other associated tree species. The understorey usually comprises a sparse shrub layer and a species-rich ground layer that must include native grasses and a varying proportion of herbs, and chenopods / shrubs particularly in drier parts of the range (DEWHA, 2010; DSEWPaC, 2012e). This TEC predominantly occurs on the drier edge of the temperate grassy eucalypt woodland belt (375-700 mm rainfall) ranging from central NSW through northern and central Victoria into SA. Patches that are away from the main belt of the ecological community occur to the south of the Great Dividing Range in Vic, around Melton and Sunbury to the west of Melbourne and also to the west of the Murray River coastal plain in SA, and around the southern Flinders and Mount Lofty Ranges near Adelaide (DSEWPaC, 2012e).

This TEC was identified in the project area by recent ecological assessments of the project area (Attachment 3), North Central CMA 2012b, Bennetts 2014a, Seran BL&A 2018). Approximately 1300 ha occurs within the Gunbower Forest (North Central CMA, 2012b). In the project area it occurs in continuous areas of woodland primarily on the upper terraces adjacent to the Murray River. It is found in Upper Gunbower at Cameron's Creek Bridge and along River Track, and Middle Gunbower (upstream of Deep Creek) adjacent the Brereton Road Pump Station. It is also expected to occur in areas mapped as Plains Woodland (EVC 803) in Middle Gunbower (downstream of Deep Creek, Bennetts, 2014). A total of 4.18 ha of this community was identified in the construction footprint (2.50 ha confirmed during field assessment and 1.68 ha predicted to occur based on EVC mapping) and may potentially be impacted by the project.

The project will likely result in the permanent loss of up to 1.71 ha of the TEC in the development footprint. The anticipated removal of 1.71 ha of the community accounts for 0.13% of the community extent within the Gunbower Forest (1,300 ha) and will be minimised wherever possible. A further 2.47 ha along access tracks will largely be avoided by restricting vehicle access to tracks, with limited lopping of overhanging vegetation allowed only to permit access for larger vehicles. 0.98 ha is predicted to occur within the inundation area. Managed inundation will benefit the vegetation communities adjacent to the TEC and lead to positive biodiversity outcomes for the ecotonal areas between the community and the lower-lying, more frequently inundated woodland systems. Over the long-term, the understorey species composition of some of these areas may become more aquatic. However, it is not considered that the level of inundation would result in detrimental impact that would lead to areas of the community no longer meeting the classification criteria for the community.

To minimise potential impact, the following mitigation measures will be applied:

- Avoid areas of the TEC where possible
- Apply EPA standards for erosion and sediment controls
- Implement standard vehicle hygiene measures to prevent the spread and introduction of weed and diseases.

Given there is approximately 1,300 ha of the TEC in the wider Gunbower Forest, the loss of 1.71 ha of Grey Box Grassy Woodland is considered a negligible reduction in the extent of the TEC that also occurs elsewhere (i.e. central NSW through northern and central Victoria into SA). It is considered that the small amount of clearance proposed is not likely to significantly reduce the extent of the TEC, will not significantly fragment or increase fragmentation of the TEC, but rather the proposed



inundation regime may enhance the quality and composition of the ecotonal communities adjacent the TEC at the site. Similarly, the project will not adversely affect critical habitat, modify or destroy abiotic factors or interfere with recovery of the TEC. The CEMP will require vegetation clearance to be minimised where possible and will contain controls to limit the introduction and spread of invasive species and diseases to the project area, hence minimising impacts to TEC quality.

Based on the above limited proposed impact to the TEC within the project area, and given the mitigation measures proposed, the proposed action is not likely to have a significant impact on this TEC during construction or operation.

## Species or threatened ecological community

River Swamp Wallaby-grass (Amphibromus fluitans) EPBC Act – Vulnerable FFG Act – Not Listed Victorian Advisory List – Not Listed

#### Impact

River Swamp Wallaby-grass is known to occur in the investigation area, has potential to occur in the construction footprint and is present in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST indicates that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

River Swamp Wallaby-grass is a cryptic slender aquatic or semi-aquatic perennial grass that inhabits natural and manmade water bodies, including swamps, lagoons, billabongs and dams (DEWHA, 2008a). The species is threatened by grazing and trampling by hard-hooved animals such as cattle, particularly late in the season as swamps dry and become accessible (DAWE, 2020a).

No important populations are mapped for this species, and no Recovery Plan has been commenced (DAWE, 2020a). The species is largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca. It is uncommon to rare in the south (e.g. Casterton, Moe, Yarram) due to historic drainage of wetlands (RBGV, 2016). The species is cryptic, responds to inundation events and occurs in low lying areas. It has been recorded in dry Riverine Swamp Forest in the area of investigation, but not close to the construction footprint. Occurrence is considered possible in Middle Gunbower Forest (downstream of Deep Creek). Given the species is a flood responder, it is considered likely to occur once the proposed inundation regime is reinstated.

VBA records suggest this species is largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca (south-east of the project area) (Attachment 3). It is considered uncommon to rare in the south of Victoria (e.g. Casterton, Moe, Yarram), but relatively common in small areas of remaining habitat in northern Victoria near the Murray River and its tributaries between Kerang and Tallangatta (NSW OEH 2018). No previous VBA records exists for this species in the project area. However, the species and / or potential habitat was recorded in the project area by previous ecological surveys (Bennetts, Jolly and Osler, 2012; Biosis, 2014; Bennetts and Cook, 2020; Bennetts and Jolly, 2020), and highlighted in previous assessments (GHD, 2017; Seran BL&A, 2018) (Attachment 3). This species was also recorded during the 2019 survey in the area of investigation in the far western extent of the Baggot's creek overflow in Upper Gunbower Forest, approximately 1.75 km from the nearest construction footprint at Dry Creek Outlet. The individuals recorded in the project area are not considered to be part of a key source population (necessary for genetic diversity).

The vegetation clearance required for this project is predominantly located on higher ground away from the semi-permanent wetlands and floodways considered potential habitat for this species and avoids the locations where this species was previously recorded. The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is 19.6 ha (6.74 ha of which is associated previously disturbed access tracks), which is 0.2% of the total area of the Gunbower National Park (9,330 ha). This clearance is considered negligible when compared to the 704 ha that will benefit from the proposed inundation regime. Given the species requires inundation, the project is expected to benefit the species.

The project is unlikely to adversely impact habitat that is critical to the survival of this species, disrupt the reproductive cycle, result in the decline of the species, or impact the recovery of the species. Similarly, the project is not likely to lead to a long-term decrease in the size of an important population (currently unmapped, but also not detected during previous assessment of the project area), or fragment or reduce the area of occupancy of an important population. The inundation phase of this project is more likely to benefit River Swamp Wallaby-grass, with the proposed inundation regime likely to enhance the quality of suitable habitat available for future recolonization, rather than modify or decrease the availability of quality habitat.



The CEMP will require vegetation clearance to be minimised where possible, fencing of areas where this species was previously recorded as no-go zones, and will include controls to limit the introduction and spread of invasive species and diseases. Based on the above the project is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Mueller Daisy (Brachyscome muelleroides) EPBC Act – Vulnerable FFG Act –Listed Victorian Advisory List – Endangered

## Impact

Mueller Daisy is not considered likely to occur in the construction footprint. It may occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The Mueller Daisy occurs in seasonally damp situations such as shallow depressions and around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland, grassy woodland and open forest habitats, growing in association with various grasses and seasonal aquatic plants such as Marsilea species (Lucas, 2010).

The species is endemic to south-eastern Australia where it is restricted to the floodplains of the Murray and Murrumbidgee Rivers and their tributaries in northern Victoria and southern New South Wales, in the Riverina and South Western Slopes. The species is considered to be inconspicuous by nature and likely to have reliance on environmental factors such as periodic flooding to grow each year (Lucas, 2010).

There is little known about the current status of the species, with only eight known locations since 1990, and a lack of survey effort. The most important population is considered to be Morundah Station in NSW. This property is managed by the Department of Defence. At Barmah State Forest in Victoria the species occurs at three dispersed areas in the forest (Lucas, 2010).

Key threats outlined in the National Recovery Plan include altered hydrological regimes, invasive weeds and grazing. Key recovery actions include monitoring and surveying for more accurate information about the species (Lucas, 2010).

Previous ecological studies have not identified or highlighted this species, or suitable vegetation communities on sandy loam soils in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). There are no historic VBA records occurring within 10 km of the project area. Thera are also no ALA records within 50 km of the project area, the majority of records are east of the project area with the nearest cluster around Barmah National Park and Murray Valley National Park. There is limited suitable habitat available in the inundation area, given the species tolerates inundation and drying, the species may benefit from the project.

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is 19.6 ha (6.74 ha of which is associated previously disturbed access tracks), which is 0.2% of the total area of the Gunbower National Park (9,330 ha). This clearance is considered negligible when compared to the 704 ha that will benefit from the proposed inundation regime. Given the species can tolerate seasonally damp environments, the project may benefit the species.

As there is limited suitable habitat for the species or known populations in or near the project area, the project is not likely to lead to a long-term decrease in the size of a population, or fragment an existing important population or reduce the area of occupancy of an important population of this species. Similarly, the project is unlikely to impact habitat that is critical to this species, disrupt the reproductive cycle of an important population, result in the decline of the species or substantially interfere with the recovery of the species. Regardless, the project CEMP will include measures to minimise vegetation clearance wherever possible and will require implementation of controls to limit the introduction and spread of invasive species and diseases to the project area. If present, the species has potential to benefit from the proposed inundation regime.

Based on the lack of known occurrence of Mueller Daisy within the project area, an absence of suitable habitat, and proposed mitigation measures to be implemented, the proposed action is not likely to have a significant impact on this species during construction or operation.



## Species or threatened ecological community

Winged Pepper-cress (Lepidium monoplocoides) EPBC Act – Endangered FFG Act – Listed Victorian Advisory List – Endangered

## Impact

Winged Pepper-cress has the potential to occur in the construction footprint/inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

Winged Pepper-cress is associated with grasslands, wetlands and floodplain woodlands dominated by Black Box and Coolibah (E. coolabah) and chenopod shrublands (understorey dominated by Atriplex, Maireana and /or Nitraria species). In the southern edged of its range it has also been recorded with Samphire (Tecticornia), Grey Box (Eucalyptus microcarpa) and Buloke (Allocasuarina luehmannii) communities. Key habitats of the species include sparsely vegetated sites in a range of habitats on heavy clay or clay-loam soils that are seasonally flooded or prone to waterlogging. The species is widely distributed on the inland plains of south-eastern Australia, occurring from northern New South Wales to western Victoria, with an old record from south-eastern South Australia. In Victoria the species occurs in the Hattah-Kulkyne National Park, on the Murray River floodplain in Barmah National Park and in the Gunbower Forest (mostly around Reedy Lagoon and Black Swamp in the lower forest), as well as other locations near Sealake and north-west of Horsham (Mavromihalis, 2010a).

The Threatened Species Recovery Plan (Mavromihalis, 2010a) details 13 known locations of which six are within Victoria and seven are in NSW. A known population (750-1800 plants) occurs in Gunbower Island Reserve, downstream of the project area. Winged Peppercress has declined where loss of exposure to flooding events and the impact of hard-hooved stock have reduced the occurrence of the species. Other key threats include increases in salinity, weed invasion, vehicle impacts and drought and climate change (Mavromihalis, 2010a). The recovery plan highlights key threats to the Gunbower Island Reserve population (< 1 ha) as weed invasion (Horehound, Marrubium vulgare), vehicle disturbance and rising salinity levels.

This species and suitable habitat was highlighted in previous ecological assessments as having potential to occur (Bennetts, Jolly and Osler, 2012; Biosis 2014, Seran BL&A, 2018,), but has not be located within the project area to date, including targeted surveys in 2019 (Attachment 3). There is one historical (1983) VBA record for this species in the project area, and potential habitat present in the outer areas of forest where Black Box chenopod vegetation occurs. There are ALA records scattered across southern NSW and north central Victoria, with records west of Kerang Lakes (ALA, 2020). There are also records of the species downstream of the project area in

Gunbower State Forest and one record upstream in riverine habitat close to the Murray River (from 1983 just outside the 10 km buffer). It is considered that the species has potential to occur and is likely to benefit from the proposed inundation regime.

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Given the species can tolerate inundation, the restoration of a natural flooding regime may enhance the quality of suitable habitat available for this species to recolonise.

Whilst there are no records of Winged Pepper-cress and known populations in the project area, it is noted that the species has potential to occur and that there is a population downstream in the Gunbower Island Reserve. Given the nature and habitat of the species, the project will likely benefit the species. The project is not likely to lead to a long-term decrease in the size of a population, or fragment or reduce the area of occupancy of this species, but rather may improve the range of available habitat for the species in the region. Similarly, the project is unlikely to impact habitat that is critical to this species, disrupt the reproductive cycle, result in the decline of the species or interfere with the recovery of the species, but rather align with recovery actions. In addition, the CEMP for the project will include measures to minimise vegetation clearance, particularly Black Box Chenopod shrubland wherever possible and will contain controls to limit the introduction and spread of invasive species and diseases to the project area.

Based on the above and the proposed mitigation measures to be implemented, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Ridged Water-milfoil (Myriophyllum porcatum)



EPBC Act – Vulnerable FFG Act –Listed Victorian Advisory List – Vulnerable

#### Impact

Ridged Water-milfoil is considered possible to occur in both the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Ridged Water-milfoil is an aquatic herb which has both submerged and emergent components. It is endemic to Victoria, where it is widely but patchily distributed across the north and north-west of the state (Murphy, 2006). The majority of the 15 known widely separated populations occur in central north Victoria on private land, wetlands, parks, swamps, farm dams and temporary waterholes (TSSC, 2016g). Habitat for the species range from shallow, ephemeral and seasonal wetlands, including lakes, swamps, rock pools in granite outcrops, waterholes in claypans to highly modified habitats such as farm dams and drainage lines. Key growth occurs following autumn and winter inundation (TSSC, 2016g).

Key threats for the species include habitat loss and modification from rural development and agriculture, invasive species, competition with introduced species, trampling by livestock, altered seasonality / climate change and vehicle impacts. These threats are the focus of the National Recovery Plan for the species (Murphy, 2006).

Recent and previous ecological assessments have not highlighted this species in the project area, (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). There were no VBA records within 10 km of the project area. There is however suitable habitat in the project area in wetland environments. In addition, it is noted that due to the prevailing drought conditions, the response of many ephemeral species has been muted, and absence during the 2019 targeted surveys does not necessarily imply that the species is not present – it may still reside in the soil as underground tubers, rootstock or seed, waiting for appropriate moisture to trigger germination. At least one known population occurs 25-30 km south of the project area in Terrick Terrick National Park (TSSC, 2016g; ALA, 2020). There are also regular recent records (2004-2010) south west of the project area (south west of Kow Swamp) and another cluster west of Echuca (ALA, 2020). Whilst the species has not been identified at the site to date, suitable habitat would occur in the semi-permanent and permanent wetland areas, and it is likely the species would benefit from the proposed inundation regime.

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Given the species is an aquatic plant and requires inundation and drying out, the project will likely benefit the species, if present.

Given the lack of recent and historic records of Ridged Water-milfoil and known important populations in the project area, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact habitat that is critical to this species, disrupt the reproductive cycle, result in the decline of the species or substantially impact the recovery of the species. In addition, the CEMP for the project will include measures to minimise vegetation clearance where possible and will contain controls to limit the introduction and spread of invasive species and diseases.

Based on the lack of known occurrence of Ridged-water Milfoil within the project area, an absence of suitable habitat and the proposed mitigation measures to be implemented, the proposed action is not likely to have a significant impact on this species during construction or operation.

#### Species or threatened ecological community

Stiff Groundsel (Senecio behrianus) EPBC Act – Endangered FFG Act –Listed Victorian Advisory List – Endangered

## Impact

Stiff Groundsel is considered to possibly occur in both the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:



The PMST report suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Stiff Groundsel is a small shrub that is endemic to south-eastern Australia, where it once occurred in South Australia, New South Wales and Victoria. The species has apparently suffered a widespread decline in distribution and abundance. It is presumed extinct in South Australia and New South Wales, and is now known only from five wild and two reintroduced populations in Victoria; four at Corop (in the Riverina and Murray-Darling Depression bioregions sensu DEH 2000) and one near Ballarat (in the Victorian Midlands bioregion sensu DEH 2000) (Nevill & Camilleri, 2010).

Remaining populations grow on poorly-drained sedimentary grey clays or sandy clays on or close to floodplains, and on basalt-derived grey cracking clays in periodically flooded depressions. Native plants that grow in association with Stiff Groundsel at Corop include Typha species (Cumbungi), Lignum (Duma florulenta) Common Nardoo (Marsilea drummondii), Grey Gernander (Teucrium racemosum) and Blue Devil (Eryngium ovinum) (Nevill & Camilleri 2010). The seven known populations occur in wetland reserves (Ballarat), wildlife reserves, Two Tree Swamp and Wallenjoe Swamp, roadside reserves and private land. Key threats include weed invasion, altered hydrology of existing habitats, grazing and trampling, inappropriate fire regimes, low population size and road / channel maintenance (Nevill & Camilleri, 2010).

Previous ecological studies have not highlighted this species, or suitable habitat in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A 2018). There are three VBA records (from 2008) within 10 km of the project area. The species is considered possible in the inundation area, given it is known from a few locations around Gunbower Forest, including along McGillivray Road (50 m from project area). Occurrence is also considered possible in Middle Gunbower Forest (downstream). Impacts are considered unlikely, with the species likely to benefit from the proposed inundation regime and increase area of potential occupancy.

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Given the species can tolerate inundation, the project may benefit the species, if present.

Given there are few records for the Stiff Groundsel within the project area and a lack of known populations within the project area, and the potential benefit of the proposed inundation regime, the project is not likely to lead to a long-term decrease in the size of a population, or fragment or reduce the area of occupancy of the species. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the reproductive cycle, result in the decline of the species or interfere with the recovery of the species. In addition, the CEMP for the project will include measures to minimise vegetation clearance wherever possible and will contain controls to limit the introduction and spread of invasive species and diseases. Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Slender Darling-pea (Swainsona murrayana) EPBC Act – Vulnerable FFG Act –Listed Victorian Advisory List – Endangered

## Impact

Slender Darling-pea is considered to possibly occur in the construction footprint and the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Slender Darling-pea occurs in grassland, herbland, and open Black Box Woodland, often in depressions, on heavy grey or brown clay, loam, or red cracking clays (DEWHA, 2008c). It is often associated with low chenopod shrubs (Maireana spp.), wallaby-grasses (Austrodanthonia spp.), and spear grasses (Austrostipa spp.).

The Slender Darling-pea occurs from South Australia through south-west Victoria and central NSW to south-east Queensland (DEWHA, 2008c). In Victoria, records are scattered from the south-west through to the central north of the state, including the Echuca area south-east of the project area and most notably known populations on lake margins in the Kerang region, across the Patho Plains and in Terrick Terrick National Park, south of the project area (DEWHA, 2008c). Important populations are not yet mapped for this species, but the identification of populations of high conservation priority is a regional



priority (DEWHA, 2008c). A Recovery Plan is not required for this species, with sufficient guidance provided by the approved Conservation Advice (DEWHA, 2008c).

The species is considered to possibly occur in the project area, particularly given populations are limited in Victoria to the Riverina in seasonally inundated flats and grasslands. Whilst not recorded in the project area during previous surveys, the species may have missed detection, given the optimal window is early spring. The species is not known to occur in the Gunbower Forest but there are many records in the Patho Plains and Terrick Terrick region within 10 km of the project area (Seran BL&A 2018, VBA, ALA, 2020). Limited potential habitat is present within the construction footprint due to existing disturbance along access tracks, but occurrence is possible. The operational phase of the project is likely to improve habitat quality and the potential for the species to occur in the project area. Given the species is a flood responder, if present it will benefit from the project (Attachment 3).

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Given the species can tolerate inundation, the project may benefit the species, if present.

Given a lack of records for the Slender Darling-pea in the project area and a lack of suitable habitat, as well as limited records within 10 km, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the reproductive cycle, result in the decline of the species or substantially interfere with the recovery of the species. In addition, the CEMP for the project will include measures to minimise vegetation clearance wherever possible and will contain controls to limit the introduction and spread of invasive species and diseases. Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Floodplain Rustyhood (Pterostylis cheraphila) EPBC Act listed Vulnerable FFG Act – Listed Victorian Advisory List – Vulnerable

## Impact

Floodplain Rustyhood is considered to possibly occur in the construction footprint and the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST output did not suggest that this species or suitable habitat to support this species, may occur within 10 km of the project area, but there are VBA records for the species within 10 km.

The Floodplain Rustyhood is a small, terrestrial deciduous herb that is Summer-dormant and emerges annually from a spherical subterranean tuber (Duncan et. al. 2009). Following Autumn rains the tubers produce stem-encircling, ground-hugging, oval-shaped leaves that grow to 40 mm long (Duncan et. al. 2009). Previous records of the species are from the Wimmera River floodplain region over 200 km away, however the species has been recently recorded in 2015 on Spur Island in Gunbower Forest and has been monitored annually since (Bennetts and Cook 2020).

The species is endemic to Victoria where localised and known only from the Little Desert area and near Murtoa in riverine Eucalyptus largiflorens (Black Box) woodland, growing amongst ephemerals on sandy loam or cracking silty soils. It has been ecorded in Plains Woodland/Semi-arid Woodland in Gunbower Forest (Walsh and Entwisle 1994).

At Gunbower Forest, the Floodplain Rustyhood occurs in terrestrial Box Woodland and Semi-arid Woodland vegetation dominated by Grey Box. Despite extensive surveys and suitable Box Woodland habitat within Gunbower National Park and the broader Gunbower region (Bennetts et al. 2012, Bennetts and Jolly 2020), no populations of this species have been recorded in these areas. It is likely the species historically occurred within the Gunbower Forests, and if a population does exist within Gunbower National Park it is likely to benefit from a restored natural flooding regime.

Floodplain Rustyhood is considered to possibly occur within the project area as it was recently recorded in 2015 on Spur Island in Middle Gunbower (outside the project area) (Bennetts and Cook 2020). Targeted surveys did not record the species within the area of investigation (refer Attachment 3). Due to the prevailing drought conditions, the response of many ephemeral species has been muted, and absence during the 2019 targeted surveys does not necessarily imply that the species is not present – it may still reside in the soil as underground tubers, rootstock or seed, waiting for appropriate moisture to trigger germination.



Whilst the species has potential to occur in the inundation area, given a lack of known important population in the project area, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the reproductive cycle, result in the decline of the species or substantially interfere with the recovery of the species. In addition, the CEMP for the project will include measures to minimise vegetation clearance wherever possible, targeted surveys would be undertaken in areas not previously surveyed and the CEMP will contain controls to limit the introduction and spread of invasive species and diseases. Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Silver Perch (Bidyanus bidyanus) EPBC Act – Critically Endangered FFG Act – Listed Victorian Advisory List – Vulnerable

## Impact

Silver Perch may occur in the construction footprint but is unlikely to occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below:

The PMST output indicates that this species or suitable habitat to support this species, is known to occur within 10 km of the project area.

Silver Perch is a medium bodied fish / main channel specialist that is endemic to the Murray-Darling system, utilising a diversity of habitats but with a preference for faster-flowing water including rapids and races, and more open sections of a river (DoE, 2013a, Stuart, 2020).

A Recovery Plan has not yet been developed for this species. Threats to the Silver Perch include river regulation (e.g. dams and weirs preventing movement), increased frequency of blackwater events, habitat degradation, alien pathogens and competition from exotic fish species (DoE, 2013a). Eleven exotic fish species are now established in the Murray-Darling River system, with Carp (Cyprinus Carpio), Redfin Perch (Perca Fluviatilis), Goldfish (Carassius Auratus) and Eastern Gambusia (Gambusia Holbrooki) the most widespread (NMCRT, 2010). These exotic species are well established in the vicinity of the project area.

In the wider study area suitable habitat is limited to the Murray River and Gunbower Creek. Recent surveys detected Silver Perch in low abundances during annual monitoring of the Murray River adjacent to Gunbower Forest (2008-2017) (Bloink et. al. 2018). Silver Perch have also been detected in low numbers in surveys on the Gunbower Creek (Rehwinkel & Sharpe, 2009). The Murray River is mapped as possible habitat by NSW Fisheries. There are recent ALA records in the Murray River between Gunbower and Pericoota forests (ALA, 2020). Silver Perch may enter the waterways and wetlands of Gunbower National Park during inundation events, but forest wetlands do not provide suitable long-term habitat. Presence in the Murray River and National Channel is assumed.

Works would be undertaken in predominantly dry areas of the floodplain adjacent the River, which will not remove any critical habitat or adversely affect habitat critical to the survival of this species. Some works will occur within the Murray River associated with temporary coffer dams to enable construction of drop structures and inlet pipes. The area potentially impacted is small relative to available habitat in the wider area. Coffer dams would not extend across the river so fish passage is maintained. A CEMP will be developed and applied to all works around waterways, including strategies to minimise construction footprints and manage potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. An Aquatic Fauna Management Plan (AFMP) will be developed as part of the CEMP, containing requirements for monitoring and translocating of any fish trapped in coffer dams. Any capture, handling or translocation of fish that is required (e.g. during construction works) will be carried out by a qualified aquatic ecologist in accordance with the requirements of the Fisheries Act 1995.

During operations, the project area will receive water via pumping. Fine fish screens will be fitted to pipe inlets used to water the floodplain to prevent entrainment of fish on the floodplain. Fish may enter the floodplain during natural and hybrid flood events. Fish passage has been considered in all current designs and a risk assessment and management options are being undertaken concurrently through the development of the project Operating Plan.

The risks to this species associated with low quality return water from the floodplain to the Murray River (e.g. low dissolved



oxygen or elevated salinity) is low due to return flow volumes being small (approximately 20 ML/d) compared with passing flows in the Murray River (1,300 - 59,905 ML/day between 1974-2020). Low quality return flows will also be managed through water quality monitoring, undertaking a blackwater risk assessment prior to inundation and adaptively managing releases to ensure that suitable dilution occurs within the Murray River if water quality in return flows is low.

This project is unlikely to fragment an existing population, or modify, destroy, remove isolate or decrease the availability or quality of habitat to the extent that the species could decline. The project is also unlikely to lead to a long-term decrease in the size of a population, impact habitat that is critical to this species, disrupt the breeding cycle or interfere with the recovery of the species. As such, and with implementation of proposed mitigation measures, the project is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Murray Cod (Maccullochella peelii) EPBC Act – Vulnerable FFG Act –Listed Victorian Advisory List – Vulnerable

## Impact

The Murray Cod may occur in the construction footprint but is unlikely to occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is known to occur within 10 km of the project area.

Murray Cod occurs naturally in the waterways of the Murray-Darling Basin and is known to live in a wide range of warm water habitats from clear rocky streams to slow flowing turbid rivers and billabongs (TSSC, 2003). Suitable habitat within proximity of the project is limited to the Murray River and Gunbower Creek where the species has been frequently recorded (Stuart, 2020). Presence in the Murray River and National Channel at the project site is assumed. There is one historical VBA record for Murray Cod within the project area. There are more recent ALA records in the region, from Gunbower State Forest (2018) and Murray River / Pericoota State Forest (2005).

Major threats to the Murray Cod are habitat degradation due to physical fragmentation, cold water discharged from dams, de-snagging of waterways (dependent on instream woody structures for habitat), river regulation (e.g. dams and weirs) preventing movement, and recreational fishing (National Murray Cod Recovery Team, 2010). There is no approved Conservation Advice for this species. The national population is inferred from the annual commercial catch in NSW and SA, where the majority of the species range occurs (TSSC, 2003). There is no overall Murray Cod population monitoring programme within Victoria (National Murray Cod Recovery Team, 2010).

Main channel specialists / large bodied fish such as Murray Cod prefer flowing and deeper water habitats, and as such, suitable habitat in or adjacent the project area is limited to the Murray River and National Channel (Gunbower Creek) where pump stations will be constructed. The Murray Cod may enter forest areas of the project area during inundation events, but it is noted that forest wetlands do not provide suitable long-term habitat.

Construction work would be undertaken in predominantly dry areas of the floodplain and small coffer dams within the Murray River which will not remove or adversely affect habitat critical to the survival of this species, though localised impacts are possible with the construction and dewatering of coffer dams. A CEMP will be developed and applied to all works around waterways, including measures to minimise construction footprints and manage potential sediment runoff from the site to mitigate possible water quality impacts. Coffer dams would not extend across the full width of the waterway and where possible habitat within the construction zone would be relocated within the reach. A construction specific aquatic fauna management plan will also be developed, governing monitoring and translocating of any fish trapped in coffer dams prior to dewatering. Any required capture, handling or translocation of fish (e.g. during construction works) would be carried out by a qualified aquatic ecologist in accordance with the requirements of the Fisheries Act 1995.

During operations, the project area will receive water via pumping. Fine fish screens will be fitted to pipe inlets used to water the floodplain, to prevent entrainment of fish on the floodplain. Fish may enter the floodplain during natural and hybrid flood events. Fish passage has been considered in all current designs and a risk assessment and management options is being undertaken concurrently through the development of the Operating Plan.

The risks to this species associated with low quality return water from the floodplain to the Murray River (e.g. low dissolved



oxygen or elevated salinity) is low due to return flow volumes being small (approximately 20 ML/d) compared with passing flows in the Murray River (1,300 - 59,905 ML/day between 1974-2020). Low quality return flows will also be managed through water quality monitoring, undertaking a blackwater risk assessment prior to inundation and adaptively managing releases to ensure that suitable dilution occurs within the Murray River if water quality in return flows is low.

Murray Cod are unlikely to be present within the project area aside from the small area temporarily impacted by a coffer dam. Given the temporary small area of potential impact, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the breeding cycle, result in the decline of the species or substantially interfere with the recovery of the species. With proposed mitigation measures in place, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Trout Cod (Maccullochella macquariensis) EPBC Act – Endangered FFG Act –Listed Victorian Advisory List – Critically Endangered

## Impact

Trout Cod may occur in the construction footprint but is unlikely to occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

While not identified by the PMST, this species is considered potentially present.

The Trout Cod is a riverine species, inhabiting a variety of flowing waters in the mid to upper reaches of rivers and streams with cover in the form of woody debris or boulders. The species is endemic to the Murray-Darling River system in southeastern Australia, with records from the Murray River, Murrumbidgee River, Macquarie River and the Goulburn, Broken, Campaspe, Ovens, King, Buffalo and Mitta Mitta Rivers (Trout Cod Recovery Team (2008a).Trout Cod have been detected in the Murray River downstream of Yarrawonga Weir in the vicinity of large woody debris, branch piles and steep clay banks, usually in areas of fast flowing current (DSE, 2008). Trout Cod have also been recorded in Gunbower Creek (Mallen-Cooper et. al. 2014) and in the Torrumbarry Weir Pool (Stuart, 2020). Presence in the Murray River and National Channel at the project site is assumed.

Specific threats affecting Trout Cod include fishing, removal of large woody debris and poor water quality. Other welldocumented threats in the Murray-Darling River system (e.g. reduced flooding and flows, alteration to temperatures, barriers to movement, competition) and affecting many native fish species, may also be impacting on Trout Cod, contributing to the substantial decline in range and abundance (Trout Cod Recovery Plan, 2008a).

Main channel specialists / large to medium bodied fish, such as Trout Cod, prefer flowing and deeper water habitats present in the project area, such as the Murray River and the National Channel where pump stations will be constructed. Suitable habitat is limited to the Murray River and National Channel (Gunbower Creek) in or adjacent the project area. The Trout Cod may enter forest areas of the project area during inundation events, but it is noted that forest wetlands do not provide suitable long-term habitat.

Construction activities on the Murray River and National Channel (Gunbower Creek) will be restricted to localised areas of bank. Construction involves the isolation of the works area with a coffer dam, excavation of bank material, installation of pump inlet pipes, rectification of banks and removal of coffer dams. Construction activities have the potential to result in habitat loss (e.g. removal of large woody debris or other habitat on the banks), mobilisation of sediment, accidental spills, interruptions to fish movement, trapping of individual fish within the coffer dam areas.

Construction will not remove or adversely affect habitat critical to the survival of this species. Localised impacts to Trout Cod are possible with the construction and dewatering of coffer dams within the Murray River. A CEMP will be developed and applied to all works around waterways, including strategies that seek to minimise construction footprints and manage potential sediment runoff from the site to mitigate possible water quality impacts. Coffer dams would not extend across the full width of the waterway and where possible habitat within the construction zone would be relocated within the reach. A construction specific Aquatic Fauna Management Plan will also be developed, governing monitoring and translocating of any fish trapped in coffer dams prior to dewatering.

During operations, the project area will receive water via pumping. Fine fish screens will be fitted to pipe inlets used to water



the floodplain, to prevent entrainment of fish on the floodplain. Fish may enter the floodplain during natural and hybrid flood events. Fish passage has been considered in all current designs and a risk assessment and management options is being undertaken concurrently through the development of the Operating Plan.

Risk associated with low quality return water from the floodplain to the Murray River is low due to return flow volumes being small (approx 20 ML/d) compared with passing flows in the Murray River (1,300 - 59,905 ML/d). Adaptive management of releases will ensure that suitable dilution occurs within the Murray River if water quality in return flows is low.

Trout Cod are unlikely to be present within the project area aside from the small area temporarily impacted by a coffer dam. Given the temporary small area of potential impact, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the breeding cycle, result in the decline of the species or impact the recovery of the species. The proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Sloane's Froglet (Crinia sloanei) EPBC Act – Endangered FFG Act – not currently Listed Victorian Advisory List – not currently listed

## Impact

Sloane's Froglet is considered not likely to occur in the construction footprint but may occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests the Sloan's Froglet may occur within 10km of the project area. The species was listed under the EPBC Act in 2019.

Sloan's Froglet is endemic to the Murray-Darling Basin, recorded at widely scattered locations in north-central Victoria and central-western NSW from the Victorian to the Queensland border. The majority of records (75%) are from the Riverina Bioregion and 18% of records are from north of Dubbo within the NSW South Western Slopes, however there may be some errors in these records, related to misidentification (TSSC, 2019a).

Recent extensive surveys have located the species at a few general locations, in ponds and depressions of peri-urban or rural residential areas in the Albury-Wodonga region. These areas have been considered strongholds since 2000, where persistence may be related to the permanence of the ponds and dams, lower impact agricultural practices and greater proportion of remnant wetland habitat present (TSSC, 2019a).

The preferred habitat of the species is periodically inundated areas of grassland, woodland and disturbed habitats across its range; threatened by land use and high rates of clearing. Often associated with EPBC TECs; Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Grey Box Grassy Woodlands and the Derived Native Grasslands of South-eastern Australia. They will live and breed in temporary and permanent waterbodies (e.g. oxbows, dams, large and small natural wetlands, constructed frog ponds, puddles). Aquatic vegetation essential for breeding includes medium height grasses and reeds with narrow stems (e.g. Couch; Watercouch, Common Spikerush). They have also been recorded in Gilgais, depressions on clay plains, and temporary ponds up to 8 km from large rivers. Connection between breeding and refuge habitats is also key to the species survival, often using roadside drains, table drains, irrigation channels and inundated grasslands to move across the landscape (TSSC, 2019a).

There is no recovery plan for the species. Key conservation actions relate to identifying further extant populations and ensuring suitable habitat is maintained and restored (TSSC, 2019a).

The project area contains suitable habitat near permanent waterways and there are three previous VBA records (1993) that indicate the species was once and may still be present in low densities. Given the recent EPBC listing and low numbers of records, significant targeted surveys to determine its presence within Gunbower National Park have not been undertaken. Further surveys are proposed in spring 2020.

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal associated with the construction footprint is considered negligible when



compared to the hectares that will benefit from the proposed inundation regime.

Whilst the project area provides suitable habitat, given limited records and the lack of known population within the project area, the species is unlikely to be significantly impacted by the project. The project is not likely to lead to a long-term decrease in the size of the population, or fragment or reduce the area of occupancy of the species.

Similarly, the project is unlikely to impact core habitat critical to the species, disrupt the breeding cycle, result in species decline or interfere with species recovery. The aim of the project aligns with the recovery objectives of the species.

Indirect impacts from the proposed works may include the introduction or spread of the fungus Batrachochytrium dendrobatidis. The CEMP will be applied to all works around waterways, including strategies to manage the potential introduction of pathogens and weeds, and potential sediment / contaminant runoff to mitigate possible water quality impacts. As part of this, the AFMP hygiene protocols for Chytrid Fungus will align with Murray (et al. 2011) and there will be guidance on the appropriate froglet handling / relocation (if required, during construction) by a suitably qualified ecologist with correct permitting. Hence the project is not likely to result in an invasive species becoming established in habitat important to the species.

Given the limited records, lack of disturbance to core habitat and the mitigation measures proposed (and potential benefits to the species) the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Growling Grass Frog (Litoria raniformis) EPBC Act – Vulnerable FFG Act – Listed Victorian Advisory List – Endangered

## Impact

The Growling Grass Frog is not considered likely to occur in the construction footprint but may occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Growling Grass Frog (Litoria raniformis) inhabits areas within or on the edges of permanent water, such as slow-flowing streams, swamps, lagoons and lakes (Clemann & Gillespie, 2012), but also farm dams, irrigation channels, irrigated rice crops and disused quarries. Favoured sites have a large proportion of emergent, submerged and floating vegetation. Breeding is triggered by flooding of ephemeral waterbodies during spring or summer, with the larval period as short as two months (Schultz, 2008). The range of the Growling Grass Frog has declined markedly, with loss of populations resulting a high level of fragmented and a disjunct distribution (Clemann & Gillespie, 2012).

There is no Conservation Advice for this species, but an approved Recovery Plan that guides conservation management initiatives exists. Threats listed by the Recovery Plan include habitat loss and degradation (including loss of ephemeral wetlands due to increasing River regulation), barriers to movement, predation, disease and exposure to biocides (Clemann & Gillespie, 2012). All viable populations of this species are considered important populations, with a viable population defined as one that is not isolated from other populations or waterbodies (Clemann & Gillespie, 2012). A viable population of Growling Grass Frog is not currently known from the project area. However, the species is considered possibly present given suitable habitat exists along permanent waterways within the project area (e.g. Camerons Creek, Deep Creek, Black Charlie Lagoon). No VBA records exists for the species within 10 km of the project area. There are however historical ALA records in the region, from 1982 (Gunbower State Forest, Hird Swamp, Johnson Swamp) and some other very old records closer to Gunbower National Park. The species was also highlighted as potential to occur in recent ecological assessments (refer Attachment 3, Biosis 2014, Seran BL&A 2018).

Targeted surveys in late winter (Sloane's Froglet) and early summer (Growling Grass Frog) in 2020 are proposed to assess habitat quality and determine presence/absence for the species within areas of the construction footprint. Overall, despite the long absence of records of this species, the presence of seasonally-suitable habitat, and the ability of this species to recolonise areas suggest that it has potential to occur in the area, and a reintroduction of more suitable ecological watering regimes may help facilitate this. Significant impacts to Growling Grass Frog are unlikely, but localised impacts in wet areas may occur.

Whilst the project area does provide suitable habitat, given limited records and the lack of known populations within the



project area, an assessment against the significant impact criteria considers that the species is unlikely to be significantly impacted by the project (refer R8, 2020). The project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the breeding cycle, result in species decline or substantially interfere with species recovery. The aims of the project will align with the recovery objectives for this vulnerable species.

Indirect impacts from the proposed works may include the introduction or spread of the fungus Batrachochytrium dendrobatidis, commonly known as Chytrid Fungus or Chytridiomycosis. Strict vehicle hygiene protocols for Chytrid Fungus that align with Murray (et al. 2011) will be included in the Aquatic Fauna Management Plan (AFMP) as part of the site CEMP. Furthermore, the AFMP will provide guidance on the appropriate handling of frogs for relocation purposes (if required, during construction) by a suitably qualified and experienced ecologist with correct permitting.

The CEMP will be applied to all works around waterways, including strategies that seek to minimise construction footprints, the potential introduction of pathogens and weeds, and potential sediment / contaminant runoff to mitigate possible water quality impacts. Hence the project is not likely to result in an invasive species that is harmful to the froglet becoming established in habitat important to the species. Given the limited records, lack of disturbance to core habitat and the mitigation measures proposed, combined with potential benefits for the species, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

South-eastern Long-eared Bat / Corben's Long-eared Bat (Nyctophilus corbeni) EPBC Act – Vulnerable FFG Act – Listed Victorian Advisory List – Endangered

## Impact

The South-eastern Long-eared Bat possibly occurs in the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The South-eastern Long-eared Bat (Nyctophilus corbeni) was formally described in 2009, having been split from the Greater Long-eared Bat (Nyctophilus timoriensis) complex. In Victoria, most records are from Eucalyptus gracilis Mallee, Buloke and Black Box Woodlands (Lumsden, 1994), however it has been recorded across a broader range of woodland types including River Red Gum Forest. Old-growth, dense vegetation appears to be a critical habitat factor determining species distribution, however there is still limited information regarding current population numbers and structure (TSSC, 2015). The core population is in Pilliga Scrub, NSW, over 900 km from the study area (TSSC, 2015).

Bat surveys using Harp Traps and Anabat recording have not detected this species previously in the project area (GHD, 2017). The closest record for this species is more than 50 km southeast, upstream near Echuca, from 2013 (ALA, 2020). Given the widespread suitable roosting and foraging habitat identified across the riparian environment in which this project area is located, the South-eastern Long-eared bat has potential to occur. Particularly, given the limited survey effort across the landscape for this species in general. However, it is noted that core habitats and roosting sites occur in the Piliga scrub in NSW (TSSC, 2015). The project site is also towards the southern extent of the majority of records for the species (ALA, 2020).

The project has been designed to minimise the removal or potential impact to large tree offering potential roosting habitat. The CEMP will require an on-site ecologist, with Management Authorisation under the Wildlife Act 1975, to be present during large tree removal and to complete pre-clearance surveys and assist with relocation if necessary. The CEMP would also include measures to minimise introduction of pest plants and animals and invasive diseases that may impact the species. Any impacts to populations or individuals would be short-term, particularly given this species is known to nest solitarily or in small groups and nest sites are only used for a single night / nomadic habits (TSSC, 2015). It is acknowledged that by reinstating a more regular inundation regime, this project is likely to benefit the South-eastern Long-eared bat through expanding the quality and condition of available foraging and roosting habitat.

The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. In addition, while 58 large trees are proposed to be impacted (e.g. removal or lopping or TPZ impacts) within the construction footprint, and additional large trees may be impacted in the areas yet to be surveyed (e.g. downstream of Deep Creek, Camerons Creek pump station and pipeline), but over 1,000 large trees will remain in the broader area of investigation. Given the limited records for this species within the project area, which is



over 900 km from the known core population, and the minimal amount of clearance of suitable habitat that is widespread in the area and the region, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the breeding cycle, result in the decline of the species or substantially interfere with the recovery of the species. Based on this and given the mitigation measures proposed, particularly regarding large tree removal and fauna management, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Australasian Bittern (Botaurus poiciloptilus) EPBC Act – Endangered FFG Act – Listed Victorian Advisory List – Endangered

#### Impact

The Australasian Bittern is not likely to occur in the construction footprint but may occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is known to occur within 10 km of the project area.

The Australasian Bittern is a highly mobile species with a narrow range of habitat preferences, preferring shallow, densely vegetated permanent freshwater or brackish swamps and wetlands. In Victoria, it is recorded mostly in the southern coastal areas and in the Murray River region of central northern Victoria, and the species known range includes most of central and western Victoria and eastern NSW (Pizzey & Knight 2012; Menkhorst et al. 2017; TSSC, 2019b).

The species favours permanent and seasonal freshwater habitats dominated by tall, dense sedges, rushes and reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or Cutting Grass (Gahnia spp.) growing over a muddy or peaty substrate where it forages in still, shallow water up to 0.3 m deep (Marchant & Higgins 1993). They prefer swamps which are interspersed with pools or areas of short sedge to aid foraging and stalking of prey (e.g. frogs, eels, crayfish). This is a cryptic species that occurs in small numbers (1-12), but usually solitary or nesting in pairs and is active at night (Menkhorst et al. 2017; TSSC, 2019b). Reinstating an inundation regime which in some ways replicates natural conditions is likely to benefit the species by increasing the quality and quantity of available wetland habitat (the decline of which is a significant threat to the species).

There is one VBA record for Australasian Bittern from 1993 within 10 km of the project area. Records for the species are generally common in the broader region, particularly along the Murray River and other riverine environments. Several records for this species are in the project area, and nearby swamps (Johnson Swamp, Hird Swamp, Kow Swamp), with some recent records from 2005 - 2019 (ALA, 2020).

There is no adopted recovery plan for the species, but one is recommended given it occurs across multiple state boundaries and requires a complex suite of threat abatement actions. Key threats include loss of wetland habitat through diversion of wetland water away from wetlands; drainage of swamps and land clearance for urban development. Degradation of habitats related to reduction in water quality, weed invasion, grazing impacts, reduction in water flows and climate changes are also thought to impact the survival and breeding success of the Australasian Bittern. Given the small numbers of the species that remain and cryptic nature, all potential suitable habitat, and areas where they are known or likely to occur (including the semipermanent wetlands and swamps of the project area) are considered critical to the survival of the species. Similarly, all populations of the species are considered important (TSSC, 2019b).

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on the aquatic areas. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Whilst suitable habitat occurs in the project area, and all swamp habitat is considered critical the proposed clearance is negligible, when compared with the 704 ha inundation area (7.5% of the National Park) that will be improved by the project. The project will not remove or adversely affect habitat critical to the survival of this species or fragment or reduce the area of occupancy of a known population, rather the project is designed to increase the potential area of occupancy through the proposed inundation regime. Similarly, the project is unlikely disrupt the breeding cycle of a population, or result in the decline of the species or interfere with the recovery of the species, but rather contribute to recovery by increasing available habitat with suitable hydrological regimes that will provide habitat for the Australian Bittern and its prey.

A CEMP will be developed and applied to all works around waterways, including strategies that seek to minimise



construction footprints, the potential introduction of pathogens and weeds, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. Hence the project will not result in an invasive species that is harmful to the species becoming established in habitat important to the species. Based on the above and the mitigation measures proposed, combined with significant potential benefits for the species, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Species or threatened ecological community

Painted Honeyeater (Grantiella picta) EPBC Act – Vulnerable FFG Act – Listed Victorian Advisory List – Vulnerable

## Impact

Painted Honeyeater possibly occurs in the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Painted Honeyeater is a specialist feeder on the fruits of mistletoe, but also nectar from flowering mistletoe (particularly Amyema spp.) and Eucalypts, and arthropods, foraging across large areas (DoE, 2015c; Menkhorst et al. 2017). This species is nomadic and sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory, with strongholds for the species concentrated on the inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (DoE, 2015c; Menkhorst et al. 2017). The species is usually present in the northern areas of its range during winter. Key habitats include Boree / Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. Nests in drooping eucalypt species, she-oak, paperbark or mistletoes (OEH, 2019).

Previous ecological studies have not highlighted this species as likely to occur in the project area (refer Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018) and there are no records within 10 km of the project area (VBA, and ALA, 2020). There are records for the species throughout its range in central Victoria with clusters of records in the region of the project at Kerang, Murray Valley National Park, Barmah National Park and Shepparton. Suitable habitat is located within the woodlands of the riverine environment in the project area. Given the presence of suitable habitat and records in the wider region, the species has potential to occur. The project area does not represent core habitat, critical breeding habitat, and is not known to support an important population for this species. It is noted that the proposed inundation regime may improve the quality of potential foraging habitat available to the Painted Honeyeater.

There is no adopted national recovery plan for this species. However, Victoria and NSW have identified management actions for the species, with habitat loss (clearance and degradation of woodland habitat) considered a key threat (DAWE, 2020j).

The proposed removal of native vegetation for construction of the project represents relatively small, isolated and discrete areas of degraded, but potentially suitable marginal habitat within an extensive area of suitable habitat for this highly mobile, nomadic species. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation. In addition, whilst 58 large trees are proposed to be impacted within the construction footprint, and additional large trees may be impacted in the areas yet to be surveyed, over 1,000 large trees will remain in the broader area of investigation.

Given the limited records for this species within the project area, and specific habitat preferences, the project is highly unlikely to lead to a long-term decrease in the size of an important population of this species, reduce the area of occupancy or fragment an existing population of the species. The project is also highly unlikely to adversely affect the habitat of the species, disrupt the breeding cycle or substantially interfere with the recovery of this species.

The CEMP will include mitigation measures such as minimising the extent of native vegetation removal, avoiding removal of large old eucalypt trees where practicable, flagging no-go zones, and implementing contingency measures to manage species removal and relocation if detected during pre-clearance surveys and / or construction.

Based on the above and given the highly mobile and nomadic nature of the species and the mitigation measures proposed, the proposed action is not likely to have a significant impact on this species during construction or operation.



## Species or threatened ecological community

Superb Parrot (Polytelis swainsonii) EPBC Act – Vulnerable FFG Act – Listed Victorian Advisory List – Endangered

## Impact

Superb Parrot possibly occurs in the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Superb Parrot prefers large, living or dead trees with many hollow branches within the Riverina environment, typically near a watercourse (TSSC, 2016f). Away from the Riverina on inland slopes they are known to use at least six different species of eucalypt within box-woodlands, the most critical of which is Blakely's Red Gum (Eucalyptus blakelyi) which is not present within the project area) (TSSC, 2016f). Nesting generally occurs in large trees near water. In the Riverina key nesting trees include River Red Gum, Blakely's Red Gum, Grey Box, Red Box and Inland Red Box. Key foraging habitats include scattered Borree (Acacia pendula) woodlands between the Murrumbidgee and Murray Rivers (Baker-Gabb, 2011).

The core range of the species is west of the Great Dividing Range in New South Wales from Canberra (ACT), Goulburn and as far west as Nyngan (NSW) and Swan Hill (Victoria), but absent from large parts of the Riverina and northern Victoria which is climatically optimal (TSSC, 2016f, Manning et al. 2005). The species is considered to be a partial migrant, with many birds travelling to north-central NSW in the winter (Menkhorst et al. 2017). In Victoria the species mainly occurs between Cobram and Echuca and is largely confined to Barmah forest (~30 km west of the project area), with only few sightings near Shepparton and between Wangaratta and Corryong along the Murray River (Baker-Gabb, 2011). Important populations and breeding areas are located in NSW, with the exception of Barmah State Forest located in Victoria.

There is a National Recovery Plan for the species. Key threats include loss and degradation of habitat, altered irrigation regime impacts to remnant trees (foraging and roosting sites), firewood collection and timber production, human disturbance, poaching, road kill, nest site competition and poisoning (grain for rabbit and galahs) (Baker-Gabb, 2011).

Previous ecological studies have not highlighted this species, or preferred habitat required to support this species in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A 2018). There is one VBA record from 1996, two ALA records from 1961 and 2015 within 10 km of the project area (Gunbower Forest, Gunbower National Park), with the majority of regional records across the river in NSW (ALA, 2020). It is considered possible that large trees within the project area could provide habitat for this species, although it is noted that the project area lies outside of the current mapped known populations in Victoria.

The proposed removal of native vegetation for construction of the project represents relatively small, isolated and discrete areas of degraded, but potentially suitable marginal habitat within an extensive area of suitable foraging habitat for this mobile species. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the area that will benefit from the proposed inundation regime. In addition, whilst 58 large trees are proposed to be impacted within the construction footprint, and additional large trees may be impacted in the areas yet to be surveyed, over 1,000 large trees will remain in the broader area of investigation. The proposed inundation regime is likely to benefit the quality, condition and extent of available foraging and roosting habitat in the area.

The project has been designed to limit potential impact to large trees within the project area. The CEMP will require an onsite ecologist, with Management Authorisation under the Wildlife Act 1975, to be present during tree removal and to complete pre-clearance surveys and assist with relocation if necessary. The CEMP will also include controls for the potential spread and introduction of invasive species and diseases.

Given the limited records for the species within the project area, which is 30 km from the known closest known core population, and the minimal amount of clearance of suitable habitat that is widespread in the area, the project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to impact core habitat that is critical to the species, disrupt the breeding cycle, result in the decline of the species or substantially interfere with the recovery of the species. Based on this and given the mitigation measures proposed, the proposed action is not likely to have a significant impact on this species during construction or operation.



## Species or threatened ecological community

Australian Painted Snipe (Rostratula australis) EPBC Act – Endangered FFG Act – Listed Victorian Advisory List – Critically Endangered

## Impact

Australian Painted Snipe is not considered likely to occur in the construction but may occur in the inundation area following watering. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Australian Painted Snipe is a nomadic secretive marsh-dwelling species, occurring in freshwater (occasionally brackish) wetlands, both ephemeral and permanent, lakes, swamps, claypans, inundated or waterlogged grassland / saltmarsh, dams, rice crops, sewage farms and bore drains, generally with a good cover of grasses, rushes and reeds, low scrub, lignum, open timber or samphire (Marchant & Higgins, 2003; Geering et al. 2008; Menkhorst et al. 2017). Breeding occurs temporary freshwater wetlands. The species exploits productivity booms following flooding and the disperses widely when not breeding (Menkhorst et al. 2017).

A Recovery Plan has not yet been developed for this species. The main threats to Australian Painted Snipe are the loss and degradation of wetlands, through drainage and the diversion of water for agriculture and reservoirs (DSEWPaC, 2013). Key recovery actions include stopping the decline and supporting the recovery of this species.

The Murray-Darling Basin, particularly the Riverina of Victoria and New South Wales, is thought to be an important area for this species but evidence over the last 20 years suggests the Australian Painted Snipe occurs more widely and frequently in the remote arid and tropical regions of Australia than previously though (DSEWPaC, 2013). This species is now known to disperse widely when not breeding and occur in small numbers, and as such may only be an infrequent, highly mobile and visitor to the project area. They generally favour sites with a combination of exposed mud, shallow water and low dense fringing vegetation. They are active at dawn, dusk and night and are often secretive and difficult to detect (Menkhorst et al. 2017).

Semi-permanent wetlands are present within the project area, but with a current lack of regular inundation would not be considered habitat critical to the survival of this species. There are no VBA records within 10 km of the project area, but there are several historical records ALA records in the region (Gunbower State Forest, Cohuna, Hird Swamp (ALA, 2020). Given the species' secretive and nomadic nature, this is not necessarily a reflection on presence. Whilst the project area does not currently provide suitable habitat, the proposed inundation regime will improve and extend suitable foraging and possibly breeding habitat for this species in the project area.

The proposed construction works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on the semi-permanent wetland areas that would provide habitat for this species following flooding. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime, including potential suitable habitat for the Painted Snipe.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints and manage potential sediment / contaminant runoff from the site to mitigate possible water quality impacts, and limit the introduction and spread of invasive species and diseases to the project area. The project will not remove or adversely affect habitat critical to the survival of this species. The project is not likely to lead to a long-term decrease in the size of an important population, or fragment or reduce the area of occupancy of an important population. Similarly, the project is unlikely to disrupt the breeding cycle, result in the decline of the species or substantially interfere with the recovery of the species (noting that the reintroduction of a regular inundation regime may be of benefit to the species by extending potential foraging and breeding habitat).

Based on the above and given the mitigation measures proposed, the proposed action is not likely to have a significant impact on this species during construction or operation.

#### Species or threatened ecological community

Ecological communities: Buloke (Allocasuarina luehmannii) Woodlands of the Riverina and Murray-Darling Depression Bioregions, Natural Grasslands of the Murray Valley Plains, Weeping Myall Woodlands, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Australia, Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains



Flora: Spear-grass (Austrostipa wakoolica), Rigid Spider-orchid / Greencomb Spider Orchid (Caladenia tensa), Chariot Wheels (Maireana cheelii), Plains Rice-flower / Spiny Rice-flower (Pimelea spinescens subsp. spinescens), Turnip Copperburr (Sclerolaena napiformis), Red Swainson-pea (Swainsona plagiotropis).

Fauna:Murray Hardyhead (Craterocephalus fluviatilis), Flat-headed Galaxias (Galaxias rostratus), Macquarie Perch (Macquaria australasica), Striped Legless Lizard (Delma impar), Koala (Phascolarctos cinereus), Malleefowl (Leipoa ocellata), Plains-wanderer (Pedionomus torquatus), Night Parrot (Pezoporus occidentalis).

## Impact

These threatened ecological communities and species are considered unlikely to occur in either the construction footprint or inundation area. Justification for this assessment and why these communities and species are not likely to be significantly impacted is provided in Attachment 4.

The exception to this is the Curlew Sandpiper (Calidris ferruginea) and White-throated Needletail (Hirundapus caudactus), which are listed as threatened and migratory, these two species are have potential to occur and are discussed in Section 2.5 below.

# 2.4.2 Do you consider this impact to be significant?

🗌 Yes 🗹 No

2.5 Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?

🗹 Yes 🗌 No

## **Migratory species**

Fork-tailed Swift (Apus pacificus) EPBC Act - Marine, Migratory FFG Act – Not Listed Victorian Advisory List – Not Listed

## Impact

It is possible that Fork-Tailed Swift could fly-over the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is likely occur to within 10 km of the project area.

The Fork-tailed Swift is a highly mobile, almost entirely aerial insectivore species, flying < 1 m to 1000 m above the ground – seldom recorded on the ground (Pizzey and Knight 2012, DoTE 2015g). The species is a non-breeding visitor from northeast Asia to Australia in summer, occurring aerially over a wide range of habitats, which vary from rainforests to treeless plains, from the coast to inland (DotE, 2015g). It is usually seen in large high flying foraging flocks, generally 100s of m above ground or canopy, but can occur closer to the ground under certain weather conditions, if insect prey are close to the ground (Simpson and Day, 2010; Menkhorst et al, 2017). The species regular occurrence range covers most of Australia (Menkhorst et al, 2017), including the investigation area. In Victoria the species is widespread, but scattered in all regions, mainly in the west and north and along the coast (DotE, 2015g). As such, it is a possible 'fly-over' visitor to the project area.

The Fork-tailed Swift has not been recorded by recent ecological assessments (Attachment 3, Seran BL&A 2018, GHD 2017). A review of VBA records also did not reveal any recent records within 10 km of the project area, however a review of ALA records located two very old records (1950's and 1960's) and two recent 2018 record from adjacent /and or immediately downstream of Gunbower Forest.

Given the aerial and highly mobile nature of Fork-tailed Swift, the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species that breeds offshore, feeds aerially, and rarely rest on land.

Nonetheless, the project CEMP will still include measures to limit the potential introduction and spread of invasive weeds, pathogens and pest species that could predate this species (and other migratory species) in the unlikely event that it lands in the project area. The operation phase of this project is unlikely to significantly change the behaviour of Fork-tailed Swift.

The proposed action is not likely to have a significant impact on this migratory species during construction or operation.



## Migratory species

White-throated Needletail (Hirundapus caudactus) EPBC Act – Vulnerable, Migratory FFG Act – Listed Victorian Advisory List – Vulnerable

## Impact

White-throated Needletail is considered to possibly occur in both the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output indicates that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The White-throated Needletail is an aerial insectivore that breeds in northeast Asia and migrates to eastern Australia between December and April, but can arrive in October (DoE, 2015g; Menkhorst et al, 2017). There are also occasional occurrences in Winter. The core range in Australia is from coastal northern Queensland through to eastern NSW, most of Victoria (excluding northwest) and the lower southeast in South Australia. Whilst the species is aerial by nature they occur over many habitats including forests, hills and coastal cliffs with updrafts. They usually occur in large flocks mostly flying high, sometimes 1.8 km above ground, but will also fly low when preying on ant swarms. Whilst they have rarely been observed perching, they will sometimes roost in the outer foliage of tall trees as night approaches (Menkhorst et al, 2017).

There is no recovery plan for the species. Management actions are being undertaken and international, national, state and local levels. There are few threats for the species when in Australia, the main one being collision with overhead wires, windows and lighthouses. However these threats only affect individuals and do not affect the species as a whole (DAWE, 2020k).

The White-throated Needtail is widespread in eastern and south-eastern Australia, with the area of occupancy estimated to be 126,000 km2. It is widespread in Victoria, but more so on and south of the Great Divide (DAWE, 2020k). There was one VBA record from 1980 within 10 km for the project area. There are numerous ALA records in the wider region, including records in proximity to the project area at Cohuna, Kow Swamp, Gunbower Creek (2000), River Murray Reserve (ALA, 2020). Whilst the White-throated Needletail has rarely been recorded within the Gunbower National Park, they are considered to have the potential to use forest and woodland habitat within the project area. Impacts are considered unlikely as they are highly mobile species that may infrequently utilise the project area and are expected to benefit from environmental watering.

The proposed removal of native vegetation for construction of the project represents relatively small, isolated and discrete areas of degraded, but potentially suitable marginal habitat within an extensive area of suitable habitat for this highly mobile, aerial migratory species. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation. In addition, whilst 58 large trees are proposed to be impacted within the construction footprint, and additional large trees may be impacted in the areas yet to be surveyed, over 1,000 large trees will remain in the broader area of investigation.

Given the limited records for this species within the project area, the project is highly unlikely to lead to a long-term decrease in the size of an important population of this species, reduce the area of occupancy or fragment an existing population of the species. The project is also highly unlikely to adversely affect the habitat of the species, disrupt the breeding cycle (given they breed in Asia) or substantially interfere with the recovery of this species.

The CEMP will include mitigation measures such as minimising the extent of native vegetation removal, avoiding removal of large old eucalypt trees where practicable, flagging no-go zones, and implementing contingency measures to manage species removal and relocation if detected during pre-clearance surveys and / or construction.

Based on the above and given the highly mobile and aerial nature of this migratory and threatened species and the mitigation measures proposed, the proposed action is not likely to have a significant impact on this species during construction or operation.

## **Migratory species**

Yellow Wagtail (Motacilla flava) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Not Listed



## Impact

Yellow Wagtail is not considered likely to occur in either the construction footprint or inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

There is taxonomic dispute regarding Yellow Wagtail (Motacilla flava) and subspecies that visit Australia (M. tschutschensis and M. taivana). Regardless the species is considered to be a regular wet season visitor to Australia, and regular summer visitor to the Hunter Region in NSW (Dote 2015f, g). The species is considered a vagrant to coastal areas of Victoria, South Australia and southern Western Australia (DotE, 2015g). Preferred habitats are highly variable, but typically include open grassy flats near water, as well as open areas with low vegetation, ranging from airstrips and pastures to wetlands, irrigated farmland and sometimes tidal mudflats near mangroves (DotE, 2015g). As such the project area may provide non-core habitat that is common to the riverine environment of this region for this potentially infrequent visitor. There is no approved Conservation Advice or Recovery Plan for the Yellow Wagtail. It is noted that the reinstatement of a regular inundation regime may improve and extend suitable foraging habitat available to this species.

No historic records of this species were raised by the VBA search within 10 km of the project area (Attachment 3). The closest record (from 2007) is located approximately 60 km south of the project area within the Greater Bendigo National Park (ALA, 2020). Yellow Wagtail was not highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018).

The Yellow Wagtail is described as an extremely uncommon migrant to Australia, with the numbers of individuals at any one site here so small relative to global populations that no small group is likely to be significant for either the species in Australia or the ecological attributes of a site (DotE, 2015g). Thus, the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species. The proposed works would be undertaken in predominantly dry areas of the floodplain during dry periods, with negligible impact on the semi-permanent wetlands present. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction and spread of pathogens, weeds, and pest species, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## **Migratory species**

Satin Flycatcher (Myiagra cyanoleuca) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Not Listed

## Impact

Satin Flycatcher has potential to occur in both the construction footprint and inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST report suggests that this species or suitable habitat to support this species, is known to occur within 10 km of the project area.

The Satin Flycatcher is found sparsely but widespread in eastern Australia, inhabiting vegetated gullies in eucalyptdominated forests and taller woodlands, often near watercourses. Populations of the Satin Flycatcher are thought to have been reduced by clearing and logging of forests in south-eastern Australia, and particularly the loss of mature forests (Blakers et al. 1984). The species shows a north-south migration throughout its range. Breeding occurs in Australia mostly in October through January, with the species nesting preferentially in wet gullies of heavy eucalypt forest, in the south-east NSW and Victoria and Tasmania (Dote, 2015b; Menkhorst etal. 2017). The core range of this species is on the east coast of Australia and east coast of Tasmania (Menkhorst et al. 2017), distant from the project area. The Satin Flycatcher spends a lot of its time aerially in the mid to upper levels of the forest feeding on flying insects from perches in the canopy around the same level. There is no approved Conservation Advice or Recovery Plan for this species. Invasive species harmful to this the Satin Flycatcher is listed as Black Rat (Rattus rattus) and invasive vines of the riparian habitat (DotE, 2015g).

A search of the VBA database did not reveal any historic records for this species within 10km of the project area, and the



species was not highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). However, there are ALA records from 1987 and 2015 within Gunbower Forest and National Park (ALA, 2020). Given the records, and suitable habitat the species has potential to occasionally occur, noting that the species is aerial by nature.

The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime, and will potentially benefit the species.

Whilst the highly mobile and aerial species has potential to occur in the project area, it is not considered core range or core habitat for the species. Therefore the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species, with its core habitat located along the eastern seaboard of Australia and distant from the project area. A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential removal of large old trees (providing taller woodland) and manage the possible introduction and spread of weeds, pathogens and pest fauna.

Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Migratory species

Rufous Fantail (Rhipidura rufifrons) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Not Listed

## Impact

Rufous Fantail is considered to possibly occur in both the construction footprint and inundation area. Justification why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is known to occur within 10 km of the project area.

Three subspecies of Rufous Fantail (Rhipidura rufifrons) are recognized in Australia. The main subspecies (R. r. rufifrons) occurs in south-eastern mainland Australia, from approximately Brisbane, through NSW and Victoria and across to the eastern side of the Adelaide Hills. This sub-species primarily breeds in NSW and Victorian in forests within 300 km of the coast, and migrates northwards during non-breeding periods (Menkhorst et al, 2017, DotE 2015g). This sub-species is one of the most precisely predictable migratory species in Australia with birds known to arrive in Victoria in the third week of October and depart in the first week of April (DotE, 2015g).

The species spends winter on Cape York, Island of Torres Strait and the trans-fly region of southern New Guinea (Menkhorst et al. 2017).

Preferred habitats for the species include dense moist shaded understorey of wetter eucalypt forests, gullies, vine thickets and mangroves, but will occasionally occur in coastal saltmarsh and urban areas (Menkhorst et al. 2017).

When the species is in Australia the population is considered to be stable and there are no recognized important populations. In Victoria known to occur further west into North central District, Pyrenees (approximately 160 km south of the project area), Otway Ranges and forests of the far south-west (DotE, 2015g). There is no approved Conservation Advice or Recovery Plan for the Rufous Fantail. It is noted that the reinstatement of a more frequent inundation regime may improve and extend suitable foraging habitat available to this species

A search of the VBA database did not reveal any historic records for this species within 10km of the project area. There however are few ALA records in the region of the project area, with 2 ALA record from 2008 immediately south of Gunbower National Park (ALA, 2020). ALA record strongholds are from southern coastal areas to eastern coastal areas, and scattered inland from the Grampians to Bendigo and Albury. There are also scattered records upstream around Echuca, Barmah and Deniliquin (ALA, 2020).

Whilst suitable habitat occurs in the project area, the habitat is widespread and it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime, and will potentially benefit the species.



The project will not substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species. A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction of pathogens and weeds, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. Hence the project will not result in an invasive species that is harmful to the species becoming established in an area that is important to the species. Based on the above, therefore, the proposed action is not likely to have a significant impact on this species during construction or operation.

## **Migratory species**

Common Sandpiper (Actitis hypoleucos) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Vulnerable

#### Impact

Common Sandpiper is not considered likely to occur in the construction footprint but may occasionally occur in the inundation area following watering. Justification for this and why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The Common Sandpiper is wader / shorebird migrating to Australia in summer for its non-breeding period. the species breeds in a variety of habitats near water in Eurasia. When in Australia, the species is more common in the northern half of Australia (Geering et al. 2008), this species is widespread in small numbers and has been recorded in a variety of habitats including steep sided sewage ponds and dams, feeding in the shallow edges of inland wetlands, farm dams and lakes. With a preference for environments with standing water, it is noted that the proposed inundation regime will potentially improve and extend suitable foraging habitat for this species.

The Common Sandpiper has not been highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018), and there are no VBA records within a 10 km radius of the project area. Scattered ALA records for this species more broadly within the region are associated with larger and smaller inland lakes and marshes (e.g. Kangaroo Lake, First Marsh, Salt Lake).

The proposed works would be undertaken in predominantly dry areas of the floodplain during dry periods, when the species is less likely to occur, with negligible impact on the semi-permanent wetlands present. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Whilst suitable habitat occurs in the project area, and the species has the potential to occur following inundation events, when present in Australia, the habitat is widespread and not core habitat or breeding habitat for the species. The project is more likely to benefit the species through extension of more regularly inundated foraging habitat. Regardless, it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. The project will not substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species. A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction of pathogens and weeds, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts.

Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Migratory species

Sharp-tailed Sandpiper (Calidris acuminata) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Not Listed

#### Impact

Sharp-tailed Sandpiper is not considered likely to occur in the construction footprint, but may occasionally occur in the



inundation area following watering. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The Sharp-tailed Sandpiper is a migratory wader / shorebird, found across coastal and inland areas of Australia during nonbreeding visits to Australia (Geering et al. 2008, Simpson and Day 2010). They breed in the high arctic tundra of Siberia (Geering et al. 2008). When they are in Australia they are considered to be one of the most numerous migratory shorebirds to occur in fresh to saline inland wetlands of Australia (Menkhorst et al. 2017). The species range includes all coastal areas of Australia, as well as inland areas of WA, NT, SA, all of Qld and NSW and central and southern Victoria (Menkhorst et al. 2017). Key global threats include direct and indirect habitat loss, particularly core staging areas (coastal mudflats) used during migration through eastern Asia, as well as reduction in water quality of rivers in China, anthropogenic disturbances and global warming. Key threats in Australia include habitat loss that reduces the availably of foraging and roosting sites, which affects efficient energy stores for migration. Key habitats include marine or estuarine vegetation, intertidal mudflats and direct mortality around migration pathways and roosting or foraging sites (DAWE, 2020b). There is no approved Conservation Advice or Recovery Plan for this species.

The Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish coastal and inland wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. They will also use flooded paddocks, farm dam edges, sedgelands and other ephemeral wetlands, but leave when they are dry. Coastal populations will prefer sheltered tidal flats. It is noted that they are unlikely to be present within the project area which is not currently subject to regular inundation, but that the reinstatement of frequent inundation will improve and extend potential foraging habitat for this species when they are in Australia.

The Sharp-tailed Sandpiper has not been highlighted by any recent ecological assessments of the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A 2018). However, whilst there are no VBA records for the species within 10 km of the project area, there are numerous ALA records in the region, and several within 10 km (ALA, 2020). Records are concentrated around inland lakes (e.g. Cullens Lake Wildlife Reserve, Duck Lake, Salt Lake, Lake Elizabeth Wildlife Reserve, Fosseys Swamp, Mc Donald Swamp Wildlife Reserve). This species will also utilise farm dams and inundated grasslands.

Suitable non-core foraging habitat could exist within the project area, particularly once a regular inundation regime is reinstated. However, the proposed works would be undertaken in predominantly dry areas of the floodplain during dry periods, with negligible impact on the semi-permanent wetlands present. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime.

Whilst suitable habitat occurs in the project area, and the species has the potential to occur following inundation events, when present in Australia, the habitat is widespread and not core habitat or breeding habitat for the species. The project is more likely to benefit the species through extensions of more regularly inundated foraging habitat. Regardless, it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. The project will not substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species. A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction of pathogens and weeds, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. Hence the project will not result in an invasive species that is harmful to the species becoming established in an area that is important to the species.

Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Migratory species

Pectoral Sandpiper (Calidris melanotos) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Near Threatened

## Impact

Pectoral Sandpiper is not considered likely to occur in the construction footprint, but may rarely or occasionally occur in the inundation area following watering. Justification for why this species is not likely to be significantly impacted is discussed



## below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The Pectoral Sandpiper is a migratory shorebird which breeds in the high arctic tundra of North America and eastern Siberia, and small numbers regularly migrate to south-east Australia (Geering et al. 2008; Menkhorst et al. 2017). When in Australia the species occurs solitarily or in small flocks in shallow or grassy edges of freshwater wetlands. The species will also use brackish wetlands, when no freshwater is available. Rarely forages on coastal tidal flats, prefers freshwater wetlands when in near coastal locations (Menkhorst et al. 2017). The species also occurs at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species prefers wetlands that have open fringing mudflats and fringing vegetation, but has also been recorded in overgrown swamps with lignum (DAWE, 2020c).

There is no approved Conservation Advice or Recovery Plan for this species. Key threats in Australia include loss of important roosting and foraging habitats, which then lead to a decrease in energy stores for migration, impacts to marine or estuarine vegetation, impacts to mudflats, water pollution and changes to hydrological regimes in key foraging environments (DAWE, 2020c).

Potential foraging habitat would exist in the project area, particularly following inundation, core habitats include widespread freshwater wetlands in near coastal and inland locations throughout south eastern Australia. With concentrations of records around St Kilda the Coorong in South Australia and Port Phillip Bay in Victoria, as well as scattered inland records, including the valley of the Murray River between Kerang and Piangil (ALA, 2020; DAWE 2020c). The Pectoral Sandpiper has not been highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). Whilst there are no VBA records within 10 km, there are ALA records in the region. ALA records are concentrated around inland lakes to the northwest of the project area (Cullens Lake Wildlife Reserve, First Marsh) and few scattered records closer to the project area (Mc Donald Swamp Wildlife Reserve, Hird Swamp Wildlife Reserve) (ALA, 2020). The Pectoral Sandpiper, with a preference for freshwater wetlands, may be an uncommon visitor to the site, but may occur inundation areas following water events, when in Australia.

The proposed works would be undertaken in predominantly dry areas of the floodplain during dry periods, with negligible impact on the semi-permanent wetland areas present. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Whilst suitable habitat occurs in the project area, and the species has the potential to occur at scattered freshwater locations following inundation events, when present in Australia, the habitat is widespread. The project is more likely to benefit the species through extensions of more regularly inundated inland foraging habitats. Regardless, it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. As such, the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of this species, with its core habitats located in freshwater to saline wetlands of coastal and near coastal areas.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction and spread of pathogens, weeds and pest species, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts.

Based on the above, the proposed action is not likely to have a significant impact on this species during construction or operation.

## Migratory species

Osprey (Pandion haliaetus) EPBC Act – Migratory FFG Act – Not Listed Victorian Advisory List – Not Listed

#### Impact

Osprey is not considered likely to occur in the construction footprint, but possibly occurs in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the



## project area.

The Osprey is a raptor that mainly feeds on fish and prefers open water foraging habitat and tall woodland nesting habitat. They nest in trees (often dead or with dead tops) primarily on rocky coastlines and can also nest on artificial structures such as telecommunication structures, but primarily near water habitats (DoE, 2015f, g). They mostly occur in coastal habitats but will travel inland patrolling major rivers and large streams, mainly in northern Australia (DoE, 2015f; Menkhorst et al. 2017). The Osprey require extensive areas of open fresh or saline water for foraging (DAWE, 2020d). The species is more common in northern Australian coastal areas, rare to uncommon in south western Australia, occurs in low numbers in South Australia and NSW (DAWE, 2020d). The majority of records in Victoria are coastal or offshore (ALA, 2020).

There is no approved Conservation Advice or Recovery Plan for this species. Key threats include habitat loss or degradation, particularly in coastal environments. A number of recovery actions have been implemented for the species, which include a management plan for the NSW population, regular surveys of the South Australian populations, and erection of artificial nesting platforms (DAWE, 2020d).

The Osprey has not been highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). There are no VBA or ALA records within 10 km, there are a few older ALA records in the wider Murray River region (Murray Valley National Park and Lake Mulwala) (ALA, 2020). The species, with a preference for open water habitats, may be an uncommon visitor to the site, and may occur in the Murray River and inundation areas following water events. The project is more likely to benefit the species through extensions of more naturally inundated inland foraging habitats.

Whilst the project occurs in water habitats, it avoids direct and indirect impacts to open water habitats which may represent occasional foraging for this species. The majority of Osprey pairs breed in coastal locations, which will not be influenced by this proposed action. As such, the action will not substantially modify, destroy or isolate an area of important habitat for this migratory species.

The proposed action is not located in an area where a known ecologically significant proportion of a population of this migratory species exists. Clearance of potential foraging habitat will be avoided. The proposed action will not seriously disrupt the life cycle of an ecologically significant proportion of the populations of this migratory species, particularly given breeding occurs in coastal locations, and few are known from Victoria.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction and spread of pathogens, weeds and pest species, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. Based on the above, the proposed action is not likely to have a significant impact on the species during construction or operation.

## Migratory species

Common Greenshank (Tringa nebularia) EPBC Act – Migratory Marine FFG Act – Not Listed Victorian Advisory List – Vulnerable

## Impact

Common Greenshank is not considered likely to occur in the construction footprint but possibly occurs in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, is likely to occur within 10 km of the project area.

The Common Greenshank is a wader / shorebird, migrating to Australia in summer during its non-breeding season. The species is not globally threatened and is considered secure due to its extensive breeding range. This species has been recorded singly or in small to large flocks (sometimes hundreds) in Australia in a variety of coastal and inland wetlands of varying salinity (Geering et al. 2008; DAWE 2020e). Feeding habitats include edges of wetlands, mudflats, channels, shallows and edges of mangroves or saltmarsh, coastal and inland fresh or saltwater wetlands. Roosting habitats include wetland edges, shallow pools or puddles, elevated rocks, sandbanks or muddy islets (DAWE, 2020e). In Victoria, the Common Greenshank is widespread in coastal regions, mainly between Gippsland Lakes and Port Phillip Bay, but is also known from the west of Victoria and in the River Murray Valley, in which the project area is located. The Common Greenshank is vulnerable to loss/modification of habitat, silt, pollution, weeds or pest invasion and disturbance threats. It is not described by specific Conservation Advice or a Recovery Plan, but is included under the Wildlife Conservation Plan for Migratory



Shorebirds (Commonwealth of Australia, 2015).

The Greenshank has not been highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). Whilst there are no VBA within 10 km of the project area, there are numerous ALA records in the wider Murray River region, including some in the vicinity of the project area (Mc Donald Swamp, Johnson Swamp, Hird Swamp, Gunbower Creek, Cohuna Airport artificial ponds). Potential habitat would exist in the project area when the semipermanent wetlands are flooded, and potentially along the edge of the River Murray bordering the project area. The project is more likely to benefit the species through extensions of more regularly inundated inland foraging habitats.

The proposed works would be undertaken in predominantly dry areas of the floodplain during dry periods, with negligible impact on the semi-permanent wetland areas present. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Regardless, it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. As such, the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species, with its core breeding habitat located outside Australia and core foraging habitats primarily in coastal areas.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction and spread of pathogens, weeds and pest species, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. With implementation of mitigation measures, the proposed action is not likely to have a significant impact on this species during construction or operation.

## **Migratory species**

Glossy Ibis (Plegadis falcinellus) EPBC Act – Marine, Migratory FFG Act – Not Listed

#### Impact

Glossy Ibis is unlikely to occur in the construction footprint, but is considered to possibly occur in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output did not suggest that this species or suitable habitat to support this species, may occur within 10 km of the project area, but there are VBA records for the species within 10 km.

The Glossy Ibis is the smallest ibis known in Australia, inhabiting well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats and occasionally dry grasslands or estuarine waters. (Pizzey & Knight 2012; Menkhorst et al. 2017). The species has global representation, occurring in North America, Europe, Russia, Siberia, through central Asia, Africa, India, Pakistan, Philippines, Papua New Guinea and Indonesia (DAWE, 2020f). Within Australia, the Glossy Ibis is generally located east of the Kimberleys in Western Australia, but has a range which extends from south eastern and northern Western Australia, across the Northern Territory, all of Queensland, most of NSW and most of central Victoria (Menkhorst et al. 2017, ALA, 2020). The species is considered to be migratory and nomadic globally, and when in Australia expands its range in response to good rainfall. Core breeding areas occupied in Australia during spring and summer are within the Murray-Darling Basin region of NSW and Victoria, the Macquarie Marshes in NSW and in southern Queensland (DAWE, 2020f).

Breeding habitat types in the Murray-Darling Basin include Cooba (Acacia stenophylla), Eucalyptus/lignum swamps (Muehlenbeckia florulenta) (DAWE, 2020f).

There is no approved Conservation Advice or Recovery Plan for this species. Key threats include wetland destruction or degradation, alteration to hydrological regimes, anthropogenic disturbances (DAWE, 2020f).

The species was not suggested in the PMST output, but has been highlighted in other ecological assessments for the project (Attachment 3, Seran BL&A, 2018). The species is considered to be one of several migratory bird species known to respond to environmental watering (Cook et al. 2011 and Wood et al. 2018 cited in R8, 2020) and have been observed at other nearby riverine sites (e.g. Guttrum Benwell Forests). There is one VBA record (1992) within 10 km of the project area and few ALA records within 10 km, but records scattered throughout the Murray River region and adjacent water habitats (e.g. Know Swamp, Johnson Swamp, McDonald Swamp, Gunbower State Forest, Cohuna Airport artificial ponds).

The project area, located within the riverine environment contains suitable habitat for the Glossy Ibis, which is widespread along the whole River Murray corridor and in other watercourses, lakes, wetland and swamps of the region. Given the project



involves implementation of an inundation regime, which targeted ecological objectives, the outcomes will likely improve and extend suitable foraging, breeding and refuge habitat for this species within the project area.

The proposed works would be undertaken in predominantly dry areas of the floodplain during dry periods, with negligible impact on the semi-permanent wetland areas present. Noting that Glossy Ibis have the potential to be present in spring and summer for breeding, where they nest in aquatic vegetation above the water, however no breeding colonies or rookeries have been recorded in the project area to date. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Regardless, it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. As such, the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population of this species. Post construction, this project is likely to improve the habitat available to support core species functions and may potentially attract larger numbers of Glossy Ibis back into the region.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction and spread of pathogens, weeds and pest species, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. As such, the proposed action is not likely to have a significant impact on this species during construction or operation.

## **Migratory species**

Latham's Snipe (Gallinago hardwickii) EPBC Act – Migratory FFG Act – Nominated Victorian Advisory List – Near Threatened

## Impact

Latham's Snipe is unlikely to occur in the construction footprint, but possibly occurs in the inundation area. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

Latham's Snipe is a non-breeding regular visitor to south-eastern Australia (Higgins & Davies 1996), seen singly or in small groups. They breed in northern Japan, Sakhaliln and Ussuriland, migrating to Australia and occasionally New Zealand (Geering et al. 2008). They inhabit the shallows or grassy edges of freshwater wetlands with low dense vegetation, brackish wetlands with saltmarsh fringes, swamps, marshes, flooded grasslands or heathlands, and the edges of bogs and other water bodies (Geering et al. 2008; Menkhorst et al.2017). The species is cryptic, mainly feeding in muddy areas at dawn, dusk or night (Geering et al. 2008; Menkhorst et al. 2008). Latham's Snipe usually occurs singly or in small, loose groups (Menkhorst et al. 2017). They are considered to be dispersive in response to rainfall, and highly mobile during the non-breeding season when in Australia (DAWE, 2020h).

There is no Specific Conservation advice or Recovery Plan for this species. The current major threat to Latham's Snipe appears to be the ongoing modification and loss of wetland habitat. It is likely that the proposed inundation regime will improve and extend potential foraging habitat for this species.

Latham's Snipe was not highlighted by recent ecological assessments in the project area (Attachment 3, Biosis 2014, GHD 2017, Seran BL&A, 2018). There are no VBA within 10 km, there are ALA records in the wider Murray River region, and within 10-20km of the project area from sites such as Gunbower State Forest, Know Swamp, Hird Swamp, small swamps near Gunbower Creek, Johnson Swamp (ALA, 2020). Sites that are considered important in Victoria include Shepparton (>180 km southwest of project area) and the near coastal regions of Sale, Wonthaggi, Port Philip Bay and Warnambool (DAWE, 2020).

Potential habitat would only exist in the project area when the semi-permanent wetlands are flooded, and along the edges of the River Murray. The area of vegetation removal associated with the construction footprint is 19.57 ha (6.74 ha of which is associated previously disturbed access tracks), which is 0.2% of the total area of the Gunbower National Park. The area of vegetation removal associated with the construction footprint is considered negligible when compared to the hectares that will benefit from the proposed inundation regime. Regardless, it is not considered that the project area supports an ecologically significant proportion of the population, habitat that is critical to the species survival, habitat that is at the limit of the species range or habitat that is in an area where the species is declining. As such, the project is not likely to substantially modify, destroy or isolate an area of important habitat for this species, or seriously disrupt the lifecycle of a significant proportion of the population, this project is likely to improve the habitat available to support core species



functions and may potentially attract larger numbers of Latham Snipe back into the region. In addition, key regions in Victoria considered important to the species do not occur in the project area and the breeding occurs outside Australia.

A CEMP will be developed and applied to all works, including strategies that seek to minimise construction footprints, the potential introduction and spread of pathogens, weeds and pest species, and potential sediment / contaminant runoff from the site to mitigate possible water quality impacts. With implementation of mitigation measures, the proposed action is not likely to have a significant impact on this species during construction or operation.

## **Migratory species**

Curlew Sandpiper (Calidris ferruginea) EPBC Act – Critically Endangered, Migratory FFG Act – Listed Victorian Advisory List – Endangered

## Impact

Curlew Sandpiper is not considered likely to occur in the construction footprint, but has potential to occur in the inundation area following watering. Justification for why this species is not likely to be significantly impacted is discussed below.

The PMST output suggests that this species or suitable habitat to support this species, may occur within 10 km of the project area.

The Curlew Sandpiper (Calidris ferruginea) is a migratory shorebird with global representation, breeding outside of Australia in the coastal tundra of Siberia (Geering et al. 2008). When in Australia habitats they prefer include exposed tidal flat systems, but they will also use inland freshwater and brackish wetlands (Geering et al. 2008; Menkhorst et al. 2017). Other known habitats include intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also occasionally recorded inland, around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. Their range in Australia includes all coastal areas, but they are also widespread inland (Menkhorst et al. 2017; DoE 2015b). They occur in all states during the non-breeding period, but also during the breeding season when many non-breeding birds remain in Australia. In Victoria, core populations are widespread in coastal bays and inlets, and they occur intermittently on inland wetlands (e.g. in the Kerang area, Mildura and western districts (DoE, 2015b).

In Australia, 115,000 individuals were thought to visit during the non-breeding period, but numbers have subsequently declined (Garnett et al. 2011). The area of occupancy is considered to be 6,800 km2. The approved Conservation Advice (DoE, 2015b) for the species provides direction to implement priority actions and mitigate against threats.

There are no VBA records within 10 km of the project area, however there are numerous records 10-20km from the project area in the Kerang region (ALA, 2020). Sites they have been recorded at in the region include Cullens Lake, Duck Lake, Kerang Wildlife Reserve, Hird Swamp (ALA, 2020). While not core habitat, it is noted that the extent and quality of suitable inland freshwater habitats will be enhanced with the proposed inundation regime restoring the semi-permanent wetlands of the project area.

The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on the semipermanent wetland areas that are present. The area of vegetation removal associated with the construction footprint is 19.57 ha (6.74 ha of which is associated previously disturbed access tracks), which is 0.2% of the total area of the Gunbower National Park (9,330 ha). Impacts to vegetation are primarily terrestrial vegetation and considered negligible compared with the 704 ha of vegetation that will benefit from the proposed inundation regime.

The project will not remove or adversely affect habitat critical to the survival of this species, which is primarily in international breeding grounds or coastal and subcoastal areas. Given the project area includes habitats that would only be considered occasional, and not optimal until the inundation regime is restored, the project is unlikely to fragment an existing population or significantly reduce the area of occupancy of a population of this species. The project is also highly unlikely to lead to a long-term decrease in the size of an important population of this species or affect the recovery of this species.

A CEMP will be developed and applied to all works including strategies that seek to minimise construction footprints and manage potential sediment / contaminant runoff from the site to mitigate possible water quality impacts and will include controls to limit the potential spread and introduction of invasive species and diseases.

Given the highly mobile nature of the Curlew Sandpiper, a lack of core habitat and important populations, along with the mitigation measures proposed, the proposed action is not likely to have a significant impact on this species during construction



or operation.

## **Migratory species**

Eastern Curlew (Numenius madagascariensis) EPBC Act – Critically Endangered FFG Act –Listed Victorian Advisory List – Vulnerable

## Impact

Species addressed in Attachment 4, as low likelihood of occurrence in project area.

2.5.2	Do yo	ou conside	er this	impact to be significant?
	Yes	S	No	
2.6 Is	s the p	proposed a	oction	to be undertaken in a marine environment (outside Commonwealth marine areas)?
	Yes	S	No	
2.7 Is	s the p	proposed a	oction	likely to be taken on or near Commonwealth land?
	Yes	$\mathbf{\nabla}$	No	
2.8 Is	s the p	proposed a	ction	taking place in the Great Barrier Reef Marine Park?
	Yes	S	No	
2.9 Is minir	s the p ng dev	proposed a velopment	iction ?	likely to have any direct or indirect impact on a water resource from coal seam gas or large coal
	Yes	$\mathbf{\nabla}$	No	
2.10	Is the	proposed	actio	n a nuclear action?
	Yes	$\mathbf{\nabla}$	No	
2.11	Is the	proposed	actio	n to be taken by a Commonwealth agency?
	Yes	S	No	
2.12	Is the	proposed	actio	n to be undertaken in a Commonwealth Heritage place overseas?
	Yes	S	No	
2.13 Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?				
	Yes	S	No	



## **Section 3**

## Description of the project area

#### 3.1 Describe the flora and fauna relevant to the project area

The Gunbower National Park provides important ecological values in the Murray-Darling Basin. Covering 9,330 ha and part of the broader Gunbower Forest Ramsar site, it includes large areas of floodplain forest supporting stands of River Red Gum, Black and Grey Box. The forest features permanent wetlands, temporary wetlands, River Red Gum forest and Black and Grey Box woodlands. The area supports water-dependent communities and species, many of conservation significance under state and national legislation. Important waterbird and woodland bird habitat is present in the wider Gunbower Forest, providing regionally significant breeding sites for colonial nesting species. The permanent wetlands also provide drought refuge habitat for small-bodied native fish communities.

Existing information was reviewed to identify native vegetation and listed flora and fauna species with potential to occur in the project area (Attachment 3), including:

- ARI (2020b), Upper Gunbower Creek Fish Management Plan. Report for North Central CMA. Arthur Rylah Institute for Environmental Research, DELWP.

- Seran BL&A (2018), Screening of potential impacts on threatened species and communities associated with the construction and operation of Victoria's nine Basin Plan environmental works projects.

- GHD (2017), Gunbower National Park Flora and Fauna Assessment. Report for NC CMA.

- North Central CMA (2015), Camerons Creek Vegetation survey, mapping and analysis.

- Sharpe (2014, 2015), Fish surveys of Camerons Creek.

- Biosis (2014a), Flora and fauna assessment of the Gunbower National Park and Guttrum and Benwell State Forests. Report for NC CMA.

- Bennetts (2014a), Vegetation Mapping in Upper Gunbower Forest. Report for the NC CMA

- North Central CMA (2012), Mapping Grey Box (Eucalyptus microcarpa) Grassy Woodland within Gunbower Forest. Unpublished report for GMW.

- Bennetts and Jolly (2005-2020). Wetland and Understorey Vegetation Condition Monitoring Gunbower Forest Autumn 2005-2019. Technical Reports for the NC CMA.

Attachment 3 also provides the outcomes of surveys in October and December 2019 targeting threatened flora and fauna under the Commonwealth EPBC Act and/or FFG Act.

## LISTED THREATENED FLORA SPECIES

Desktop searches (VBA, PMST, recent monitoring) identified 13 EPBC listed flora species and 12 FFG listed threatened flora species that have been recorded or may possibly occur within 10 km of the project area. Six EPBC listed flora species are considered likely to occur (River Swamp Wallaby-grass Amphibromus fluitans, Stiff Groundsel Senecio behrianus, Winged Peppercress Lepidium monoplocoides, Slender Darling-pea Swainsona murrayana, Ridged Water-milfoil Myriophyllum porcatum and Floodplain Rustyhood Pterostylis cheraphila. Only River Swamp Wallaby-grass was recorded in the project area during the 2019 survey. Stiff Groundsel, Winged Peppercress and Floodplain Rustyhood are known to occur close to the project area in similar habitat and have the potential to recolonise once inundation is reinstated. Slender Darling-pea is also considered to possibly occur in the inundation area. Refer Section 2.4 for detail.

## LISTED THREATENED FAUNA & MIGRATORY SPECIES

Desktop searches (VBA and PMST) identified 20 EPBC listed threatened fauna species and 33 FFG Act listed fauna species that have been recorded or may possibly occur within 10 km of the project area. Twelve EPBC listed threatened fauna were either recorded or are considered likely to occur in the project area; Australasian Bittern Botaurus poiciloptilus, Painted Honeyeater Grantiella picta, White-throated Needletail Hirundapus caudacutus, Superb Parrot Polytelis swainsonii, Curlew Sandpiper Calidris ferruginea, Australian Painted Snipe Rostratula australis, Sloan's Froglet Crinia sloanei, Growling Grass Frog Litoria raniformis, Silver Perch Bidyanus bidyanus, Trout Cod Maccullochella macquariensis, Murray Cod Maccullochella peelii peelii and South-eastern Long-eared Bat Nyctophilus corbeni. These species are discussed in Section 2.4.

Thirteen species listed as migratory under the EPBC Act are predicted to occur or were historically recorded from a desktop search (VBA and PMST) within 10 km of the project area, and these are discussed in Section 2.4. None of these species are likely to occur in the construction footprint with a lack of recent records and or suitable habitat. The Glossy Ibis, not highlighted by the PMST but with previous records identified nearby, may occur in the inundation footprint is also discussed in Section 2.4.

## THREATENED ECOLOGICAL COMMUNITIES

The site also includes 2.5 ha of Grey Box Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, three FFG Act listed communities; Victorian Temperate Woodland Bird Community, EVC 803 Plains Woodland, and Lowlands Riverine Fish Community of Southern Murray-Darling Basin and one Lower Murray River aquatic ecological community (NSW endangered ecological community).



 Australian Government

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## 3.2 Describe the hydrology relevant to the project area (including water flows)

Gunbower Forest, including Gunbower National Park, occurs in the Victorian Murray River catchment downstream of Torrumbarry Weir, between the Campaspe and Loddon Rivers. The forest is a Murray River floodplain system located on the southern bank of the river between Torrumbarry and Koondrook. The northern bank of the river is occupied by the Koondrook-Perricoota Forest (NSW). Flows in the Murray River under regulated flow conditions are sourced from Hume Reservoir and Lake Eildon and other tributary inflows. Hume Dam releases water to Yarrawonga Weir and to the Murray River downstream (Cooling & SKM, 2012). The project supports the inundation of 704 ha of floodplain across the Gunbower National Park, and consists of three Wetland Management Areas (WMA). Upper Gunbower Forest WMA contains Upper Camerons Creek, Camerons Creek Lagoon 1, 2, 3 and 4, Black Charlie Lagoon and Baggots Swamp. Middle Gunbower Forest (upstream of Deep Creek) WMA includes Deep Creek, Middle forest floodplain area, Pig Swamp and Emu Hole Lagoon, while Middle Gunbower Forest (downstream of Deep Creek) WMA includes Broken Axle Creek, Spur Creek, and Red Rise Swamp – upper and lower. The dominant flow path through the project area is in a north-westerly direction.

The hydrology of the local floodplain has been extensively modified by regulation of the Murray River and instream and floodplain works. Modelling works (e.g. Gippel, 2014 and DHI, 2014) indicate that natural flow diversions from the Murray River into the Gunbower forest commences at about 17,000 ML/day, with flow diversions increasing substantially as flow in the Murray River rises above 30,000 ML/day. When flows reach 40,000 – 50,000 ML/day and above, the highest elevations in the upper Gunbower Forest are inundated, flooding a large component of the Black Box and Grey Box communities. Under current conditions the modelling indicates that as flow rates increase the frequency in which the flows occur tends to decline significantly compared with natural conditions. For example, events of 15,000 ML/d at Torrumbarry now occur in 80% of years, as opposed to annually under pre-European conditions. Flows in excess of 25,000 ML/d now occur in less than 50% of years under current conditions, compared to an estimated 94% of years under natural conditions. Events exceeding 40,000 ML/d now occur in 38% of years, which is just over half the natural frequency (Gippel, 2014).

Under the Basin Plan 2750 GL scenario, there would be an increase in flood frequency, however the desired frequency of and duration of inundation events still falls short of the environmental water requirements of Gunbower National Park, compared to baseline conditions. Increasing the frequency of mid to high flow events is critical, enabling widespread inundation from lower-lying wetlands into the surrounding flood tolerant communities on higher ground.

Modelling of the hydrological impact on Murray River flows as a result of return flows entering the river from Gunbower Forest National Park floodplain is required to be undertaken to assess the potential for hydrological and water quality impacts to downstream Ramsar and DIWA wetlands. Early estimates of return flow rates from the Middle Gunbower Forest are in the order of 20 ML/ d and would only occur in Middle Gunbower Forest during the River Red Gum and full forest watering events. The volume of return flows is small in relation to daily flows down the Murray River, which have ranged between 1,365 – 59,905 ML/d downstream of the Torrumbarry weir during the period 1974 – 2020.Therefore, downstream impacts from the Gunbower National Park Floodplain Restoration Project in isolation are expected to be small.

Attachment 6 reviews local groundwater underlying the project area, which appears to be of varying salinity and at between 5 and 10 m depth below the surface. Regional groundwater flow is to the north-west, parallel to the course of the Murray River, with some localised flow towards the River. Groundwater salinity in the water table aquifer across the project area has measured relatively high although may be fresher close to the surface of the water table. State-wide mapping of salinity shows salinity of the water table between 7,000 – 13,000 mg/L across Middle Gunbower (upstream of Deep Creek) and the eastern half of Upper Gunbower inundation extent. Elsewhere in the Gunbower National Park, groundwater salinity is expected to range between 13,000 to 35,000 mg/L. With the nature of the regional aquifer, proximity to fresh water from the Murray River, and limited access to floodplain aquifers by private landowners, there are no licenced groundwater users within 1 km of the project inundation area. The closest bore accessing the shallow aquifer beneath the project area is over 5 km away. The risk of salt mobilisation from the project area is low.

## 3.3 Describe the soil and vegetation characteristics relevant to the project area

The Gunbower National Park project areas sit in the Riverine Plains area of the Murray Geological Basin. The site geology consists of alluvial, fluvial and lacustrine deposits within the Murray River floodplain and covers depositional periods from recent to Tertiary age (inclusive of the Coonambidgal and Shepparton formations) (URS, 2015).

Feasibility stage geotechnical investigations were undertaken by URS in 2014, followed by subsequent investigations as part of the advanced concept design (URS, 2015) and found that the materials encountered at the site were generally consistent with the published geology for the area. The investigations highlighted that fine-grained clays (sandy clay and clay) were the dominant soil types encountered. Sands and clayed sands were interbedded layers and at several sites where the deeper boreholes were terminated with sands (URS, 2015). Additional onsite geotechnical Investigations are currently being undertaken as part of the design phase, including boreholes and test pits at key asset sites such as the pump stations.

The natural soil profile across Gunbower National Park is characteristic of the alluvial riverine soil deposits, with textures of



loam, clay loam and light clay surface soils generally overlying light to medium clay, medium clay and heavy clay subsoils (Wrigley Dillon, 2007). River Red Gum and Black Box are dominant on heavy soils but also extend across lighter soils. Section 3.5 describes vegetation characteristics in more detail.

A review of CSIRO's Australian Soil Resource Information System (ASRIS) mapping identified that the project is located generally within an area of 'extremely low probably of occurrence' of potential acid sulfate soil (PASS), however with a very low level (A4) of confidence (provisional classification, inferred from surrogate data with no ground verification) (CSIRO, 2020).

The Murray-Darling Basin Authority has undertaken a regional hazard assessment of PASS throughout the Murray-Darling Basin (MDBA, 2011). The results of this assessment in the region closest to the area of investigation indicate that floodplain sediments in the Victorian northern flowing rivers region have a high to moderate potential of exhibiting an ASS hazard. More specifically hazard assessments for Ramsar wetlands suggested that Gunbower Forest was low for acidification and metal release hazard, but high for deoxygenation hazard (MDBA, 2011).

Site-specific ASS investigations have been undertaken for the project as part of groundwater and geotechnical investigations (URS, 2015). Field screening for ASS detected a number of selected sites where the soils were classified as ASS. Affected sites included Camerons creek, Old Cohuna Main Channel and ephemeral creeks. The soils classified as ASS were found to be the soft to firm and saturated recent alluvium at Camerons Creek, the silt infill within Old Cohuna Main Channel and the soils within inverts of ephemeral creeks within the forests. Given the low level of acidity, the presence of these ASS was not expected to pose a significant issue (URS, 2015).

Re-wetting of dried soils (lowering then raising of water tables) or excavation works / soil disturbance within areas of potential ASS could result in the formation of actual ASS. Prior to commencement of construction, the contractor would be required to undertake an ASS investigation and if potential ASS is identified and disturbance cannot be avoided, an ASS management plan would be developed to minimise potential effects.

## 3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area

The project presents an opportunity to protect and enhance an environmentally significant area that is critically important to the biodiversity of the central Murray floodplain in Northern Victoria. The Gunbower National Park is managed by Parks Victoria and the land abutting the Murray River (Murray River Reserve) is managed by Parks Victoria. At a local (site-specific) level, the Gunbower Forest is critical to support water-dependent values, including but not limited to: food production for a range of biota from zooplankton and macroinvertebrates to higher order consumers; provision of shade and shelter, the forest's, ephemeral wetlands and shallow mudflats provide drought refuge, and feeding and breeding habitat for native waterbirds, frogs and turtles; provision of water for consumption for all biota to enhance growth and development, survival and reproduction (North Central CMA, 2014a). The project area forms part of a wider regional ecosystem within the Gunbower-Koondrook-Perricoota Forest, and Campbells Island and Guttrum and Benwell Forests immediately downstream.

The floodplain of the Murray River has significant cultural heritage values for the Yorta Yorta indigenous community. It is well recognised as a traditional meeting place providing water, food and materials for medicines, shelter, clothing and tools. The area contains numerous scar trees, middens, mounds, burial sites, surface scatters and other artefacts (North Central CMA, 2014a).

The area of the project adjacent to the Murray River is located within an Environmental Significance Overlay (ESO1). The ESO1 affects public and private land in non-urban areas and covers the length of the Murray River on land immediately adjoining the River. Some proposed works associated with construction banks, proposed regulators, temporary pump hardstands, and some access tracks will occur within the ESO1.

The ESO1 recognises the importance of the Murray River and its environs, being of local, regional, state, national and international significance and notes that the Murray River is an important water supply, tourism, recreation, landscape, cultural and environmental asset.

The environmental objectives of the ESO1 seek to, amongst other things, protect the visual and environmental qualities of waterways, wetlands and lakes, restricting the use and development of land in these areas to maintain these qualities.

## 3.5 Describe the status of native vegetation relevant to the project area

## Construction footprint

Up to 19.57 ha of native vegetation will be removed, including for proposed infrastructure and access tracks. 58 large trees (River Red Gum, Black Box) will be impacted. Additional trees may be identified following field survey of Camerons Creek pump station and pipeline. This estimate does not include clearance associated with power supply or levee works, which are subject to further risk assessment. Vegetation to be impacted is within existing disturbed areas or is adjacent to vehicle tracks



and areas of previous disturbance, representing inferior areas of habitat. The construction footprint represents small areas within a large intact area of high-quality native vegetation (20,218 ha of the Gunbower Forest Ramsar site, DEPI 2013). The area of loss includes the following Victorian Ecological Vegetation Communities (EVC):

- 7.62 ha Riverine Swampy Woodland EVC 815 Vulnerable
- 4.19 ha Plains Woodland EVC 803 Endangered (EN)
- 4.04 ha Riverine Chenopod Woodland EVC 103 EN
- 2.37 ha Sedgy Riverine Forest EVC 816 Depleted (D)
- 0.73 ha Riverine Swamp Forest EVC 814 D
- 0.22 ha Floodplain Riparian Woodland EVC 56 D
- 0.19 ha Grassy Riverine Forest EVC 106 D
- 0.17 ha Riverine Grassy Woodland EVC 295 VU
- 0.06 ha Tall Marsh EVC 821 Least Concern (LC)

Breakdown of vegetation impacts include:

Up to 12.83 ha removed for construction of infrastructure; based on a buffer around the development footprint (6.9 ha).
Up to 6.74 ha removed for access tracks. This is based on a buffer along all tracks as works are yet to be confirmed. In some instances works will be limited to maintenance upgrades and only require lopping rather than removal.

Inundation area

- The following EVCs occur in the inundation area:
- 316.37 ha Riverine Swampy Woodland EVC 815 VU
- 85.95 ha Grassy Riverine Forest Riverine Swamp Forest EVC 812 Not classified (NC)
- 76.31 ha Riverine Chenopod Woodland EVC 103 EN
- 56.75 ha Grassy Riverine Forest EVC 106 D
- 42.14 ha Sedgy Riverine Forest Tall Marsh Complex EVC 1071 NC
- 12.84 ha Billabong Wetland Aggregate EVC 334 NC
- 10.77 ha Riverine Swampy Woodland EVC 815 VU
- 9.96 ha Tall Marsh EVC 821 LC
- 9.17 ha Drainage Line Aggregate EVC 168 NC
- 8.92 ha Lignum Swampy Woodland EVC 823 VU
- 3.94 ha Sedgy Riverine Forest EVC 816 D
- 1.26 ha Riverine Swamp Forest Floodway Pond Herbland EVC 954 NC
- 0.98 ha Plains Woodland EVC 803 EN

68.74 ha of inundation area has not been recently modelled/mapped. DELWP mapping from 2005 was used for these areas. Further assessments to inform approvals, offsetting and design will be undertaken in spring 2020 to assess this area. Most EVCs in the inundation area are swampy or riverine communities that require or are tolerant of inundation. The condition of EVCs will benefit from targeted delivery of water at regular intervals. The small area of non-wetland EVC; 0.98 ha of EVC 803 Plains Woodland, may be impacted over the long-term; understorey species composition may become more aquatic. However, the proposed level of inundation would not cause detrimental impact such that it would no longer meet the criteria for the EVC (refer Attachment 3).

Threatened Ecology Communities (TECs)

The PMST identified six EPBC Act listed TECs with potential to occur within 10 km of the project area:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions Endangered
- Grey Box Grassy Woodlands and Derived Native Grasslands of South-eastern Australia Endangered
- Natural Grasslands of the Murray Valley Plains Critically Endangered
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains Critically Endangered
- Weeping Myall Woodlands Endangered

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Australia – Critically Endangered

One TEC was identified in the project footprint; Grey Box Grassy Woodlands and Derived Native Grasslands of Southeastern Australia. 4.18 ha of this community was identified in the construction footprint (2.50 ha confirmed during field assessment and 1.68 ha predicted to occur based on EVC mapping only) and may potentially be impacted by the project. This figure may be a conservative estimate, given that some areas of EVC 803 potentially do not meet the required TEC criteria. This will be assessed during field survey in spring. The project will likely result in the permanent loss of up to 1.71 ha of the TEC in the development footprint. The removal of 1.71 ha of the community accounts for 0.13% of the community extent within the Gunbower Forest (1,300 ha) and will be minimised wherever possible. A further 2.47 ha of this TEC along access tracks will largely be avoided by restricting vehicle access to tracks, with limited lopping of overhanging vegetation allowed only to permit access for larger vehicles.



## 3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area

The project area, predominantly located within Gunbower National Park, is characterised by wetlands in low-lying areas surrounded by broad areas of River Red Gum forest at a slightly higher elevation on the floodplain, and Black Box and Grey Box woodland communities on the highest areas. The highest elevations in the upper forest fall away to the middle and lower sections of the forest. The area is described as a flat to gently undulating landscape on recent, unconsolidated sediments with evidence of former stream channels, braided old river meanders and paleochannels, and broad floodplains areas associated with major river systems and prior streams (DPI, 2009).

The topography has a regional east-west slope of 0.2 m / km and elevations ranging from 80 mAHD near Torrumbarry Weir to 72 mAHD near Koondrook Weir. The Yarran Creek banks are higher than the surrounding land and form a hydraulic barrier across the floodplain (Water Technology, 2009). There is an area in the mid forest (downstream of Spur Creek) that is characterised by a network of channels, some of which are deeply incised. The north-western (downstream) areas of the site are at the lowest elevation where larger depressional floodplain wetland complexes occur (Water Technology, 2009 cited in Hale & Butcher, 2011).

## 3.7 Describe the current condition of the environment relevant to the project area

## ECOLOGICAL CONDITION

The forests and woodlands of the Murray River floodplain have been rapidly declining in condition over the past two decades, due to increased regulation of the Murray River and extended periods of drought (Cunningham et al. 2011). Current inundation patterns across Gunbower floodplain are not sufficient to meet the ecological requirements, resulting in impacts to native fish populations, birds and other fauna (Ecological Associates, 2014, North Central CMA, 2014e, North Central CMA, 2016).

The ecosystem communities influenced by the wetlands and creek systems include native fish, frogs, and a range of protected and/or migratory fauna as well as other fauna of interest. However, there has been a shift from the communities that would be expected under a more natural inundation regime, the most significant change being the terrestrialisation (colonisation of land) by non-water-dependent vegetation communities. Changes include increased tree density, closing of the canopy and alterations in understorey species composition, including significant loss of floristic diversity and high levels of weed invasion (Australian Ecosystems, 2009). The extent of habitat available to aquatic understorey plants and water-dependent fauna has significantly declined (Ecological Associates, 2014). Large trees are also exhibiting stress, with dieback and mortality evident in many. This decline in condition reduces the suitability of the forests for many dependent flora and fauna (North Central CMA, 2014a).

## PAST AND CURRENT WATER MANAGEMENT MEASURES

For over ten years prior to 2010-11, dry climatic conditions during the Millennium drought resulted in below average inflows and therefore low water availability for regulated environmental flows. During this period, environmental water was only delivered to small areas of Gunbower Forest that had not been inundated since 2001. Small volumes of environmental water were delivered to permanent and semi-permanent wetlands to create critical refuge areas in the landscape to maintain wetland vegetation communities and provide drought refuge for waterbirds and other wetland-dependent fauna. However, River Red Gum communities remained largely dry throughout the forest (North Central CMA, 2014c).

Since 2011, environmental water has been delivered under The Living Murray Program to support ecological objectives in the lower Gunbower Forest, outside of the VMFRP project area. For example, in spring 2011, colonial waterbirds (Great Egrets and Cormorants) began breeding in Little Gunbower Wetland complex in response to the widespread natural (unregulated) flooding across the forest, and between December 2011 and February 2012, environmental water was delivered to maintain sufficient water levels under the colony until the breeding event was complete (North Central CMA, 2012). In 2014 and 2018, environmental water was delivered to RRG forest areas and wetlands, and targeted wetland fills and top-ups have been delivered in other years. Environmental water was also delivered to Pig Swamp, within the project area, in 2016 as part of pumping trial.

Multiple Environmental Water Management Plans (EWMP) have been developed over time for the Gunbower National Park and Forest (MDBA, 2012, North Central CMA, 2014d, North Central CMA 2015), recognising the requirement to better manage the inundation regime. Ecological objectives were developed for the project Business Case as part of the Ecological Objectives and Hydrological Requirements Justification Papers (Ecological Associates, 2014, North Central CMA, 2014e and 2016). These ecological objectives and targets have been revised as part of the VMFRP MER Plan (ARI, 2020) and will be further refined and adopted for the Gunbower National Park Floodplain Restoration Project.

## PAST AND CURRENT LAND USE

Various land use practices have contributed to a decline in the health of the floodplain and river ecosystems. Historically, the project area has been used for timber harvesting, cattle grazing, apiary licences and firewood collection. Sand quarries, enclosed by flood levees, are also present within the project area (North Central CMA, 2014a). There are 14 active apiary



licences within the area of investigation; six of the apiary sites could be impacted by the project works and inundation, with two sites located less than 100 m from the construction footprint and another two sites less than 50 m from the area of inundation. The region also supports recreational activities such as fishing, camping, canoeing, bird and wildlife watching, photography, horse riding and trail-bike riding. The area forms part of the Murray River Trail for tourism and recreation purposes and provides access to the Murray River for water-based activities and river camping or caravanning.

Discussion on flora and fauna present within the project area is provided in Section 3.1 and 3.5. Discussion on soils and erosion is provided in Section 3.3.

## 3.8 Describe any Commonwealth Heritage places or other places recognised as having heritage values relevant to the project

No places currently listed on the Victorian Heritage Register (VHR), Victorian Heritage Inventory (VHI), Gannawarra or Campaspe Planning Scheme Heritage Overlay, World Heritage List, National Heritage List or Commonwealth Heritage List are located within or adjacent to area of investigation. While not currently registered on any heritage register, the Cohuna and Gannawarra Pumps historical heritage place is nominated for listing on the VHR by Kaufman and Ballinger (2014), but its heritage status has not been confirmed with Heritage Victoria (HV).

The nearest historical heritage place to the area of investigation at Gunbower comprises Torrumbarry Weir Lock Chamber, Steam Boiler and Steam Winch Complex (H0993/Campaspe HO202/RNE 101506), which is situated on the Murray River. It is approximately 266 m to the north of the Upper Gunbower Forest area of investigation, and approximately 1 km east of the Upper Gunbower Forest inundation area.

There is moderate-high potential for previously unidentified historical heritage items to be present within the project area, given the background historical use of the area (Refer Section 3.7). Site types most likely to be identified in the project area would be heritage places or archaeological sites associated with early agricultural or pastoral activities, logging, and water management practices. The presence of unregistered historic archaeological sites within the project area would be further assessed and managed in accordance with the Heritage Act 2017.

## 3.9 Describe any Indigenous heritage values relevant to the project area

The floodplain of the Murray River has significant cultural heritage values for the Yorta Yorta indigenous communities. It is well recognised as a traditional meeting place providing water, food and materials for medicines, shelter, clothing and tools. The area contains numerous scar trees, middens, mounds, burial sites, surface scatters and other artefacts (North Central CMA, 2014a).

An initial desktop cultural heritage assessment was undertaken by R8 in October 2019 to determine the requirement for a Cultural Heritage Management Plan (CHMP) for the project under the Victorian Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2018, and to inform preparation of the CHMP. This assessment determined that a CHMP is required as the project is a high impact activity (utility installation) within an area of cultural heritage sensitivity. A Notice of Intent (NOI) to prepare a CHMP (No. 16904) was lodged with Aboriginal Victoria on 24 October 2019. The Yorta Yorta National Aboriginal Corporation is the Registered Aboriginal Party (RAP) for the project area and would be consulted with during preparation of the CHMP, and prior to submission of the CHMP to Aboriginal Victoria for approval.

A search of the Victorian Aboriginal Heritage Register (VAHR) identified 30 registered cultural heritage places (Aboriginal Places) containing a total of 36 individual components, located within 50 m of the project area, and of these 13 Aboriginal Places with 15 components are located within the project area. As such, there is a moderate-high potential for further undiscovered Aboriginal heritage to be present in the activity area.

This assessment was based on the activity area associated with the current design for the project. As the design process progresses, further assessment will be undertaken for any locations not contained within the current activity area. This assessment will be included as part of the development of the CHMP.

The CHMP currently being prepared for the project is the mechanism for managing impacts to Aboriginal cultural heritage within both the construction footprint and inundation area. As a part of the CHMP process, consultation with the traditional owner groups is ongoing. The CHMP will include a desktop assessment, standard assessment (field survey) and complex assessment (sub-surface testing).

The CHMP currently being prepared for the project will identify the impact on the Aboriginal heritage places identified above and others found during the standard and complex investigations.

A search of the National Native Title Tribunal (NNTT) online register and maps shows:

- Native title Determination VID6001/1995 under the Native Title Act 1993 applies to the area of investigation. The claim was lodged by the Members of the Yorta Yorta Aboriginal Community. A determination was given on 9/10/2019 determining



that Native Title does not exist on the land.

- There are no current native title claims lodged under the Native Title Act 1993 in relation to land within or adjacent to the area of investigation.

- No Indigenous Land Use Agreements cover the area of investigation.

A search of the Victorian Department of Justice and Community Safety website indicates that no current applications or registered agreements under the Traditional Owner Settlement Act 2010 (Vic) apply over land within or adjacent to the area of investigation (DoJCS, 2020).

## 3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area

The construction footprint occurs within Crown land and freehold land in Victoria and a small portion of NSW. Management as follows: Crown land (in Gunbower National Park) by Parks Victoria; Camerons Creek Pump Station and section of the Camerons Creek pipeline (within Crown land) by DELWP; a section of Camerons Creek pipeline, section of access track by Campaspe Shire Council. Intake pipes associated with the Brereton Pump Station will be located within the Murray River in NSW (Crown waterway). Several other land parcels intersected by the project are privately owned. Works on freehold land include an outlet and associated pipelines, Camerons Creek pipeline, access tracks and potential levee works.

The proposed inundation area is located predominantly on Crown land, with a small number of freehold properties possibly subject to minor inundation within Upper Gunbower Forest. No inundation on these properties will occur without prior consent and agreement (see 3.11).

## 3.11 Describe any existing or any proposed uses relevant to the project area

The majority of the land is reserved as 'Permanent National Park' associated with Gunbower Forest National Park. A number of parcels are reserved as 'Temporary Forest' and the remainder of the Crown land is reserved as 'Permanent Public Purpose' for uses such as camping grounds, parks and other public purposes.

The region supports a range of recreational activities such as fishing, camping, boating, canoeing, bird and wildlife watching, photography, motor biking and four-wheel driving. The area also forms part of the Murray River Trail for tourism and recreation purposes and provides direct access to the Murray River for water-based activities and river camping or caravanning.

The region is also located within the Torrumbarry Irrigation Area (TIA). The TIA lies directly to the west of the project inundation area and is part of the largest irrigation system in Victoria – the Goulburn-Murray Irrigation District (GMID) managed by Goulburn Murray Water. The GMID accounts for more than 70% of water storages and some 90% of water used in irrigation across the state. Approximately 2,000 landowners rely on this system for farming within the area.

Current public data indicates the location of 14 apiary sites located across the area of investigation. The buffer areas of six of the sites lie within the area of investigation and inundation with two apiary sites located less than 100 m from the construction footprint and another two sites located less than 50 m (one site less than 20 m) from the area of inundation. The hives are part of annual licence agreements that are dependent on seasonal flowering of eucalypt forests. Bees rely on adequate water source to thrive, and it is expected that the objectives of the project will increase the regularity and reliability of flowering. Apiary licence holders will be consulted, in conjunction with Parks Victoria and DELWP as the public land manager, to identify opportunities to minimise disruption to apiary activities during managed inundation events.

The majority of the inundation area falls within Crown land, however the modelled inundation area indicates that a small number of freehold properties may be subject to minor inundation within Upper Gunbower Forest (all used for general rural farming (livestock and cropping), in some cases due to the location of the existing forest perimeter levees being outside the National Park boundary. VMFRP are currently in consultation with these potentially affected private landowners to discuss planned environmental watering events, and no inundation on private land will occur without prior consent and agreement from landowners. Options to manage water include levee bank works and maintenance, purchasing private properties, creating flood easements for the inundation extent, or a combination of approaches with agreements obtained prior to commencing operations that would inundate these properties.



## Section 4

## Measures to avoid or reduce impacts

## 4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action

A draft Environmental Management Framework (EMF, Attachment 7) describes the mitigation measures applied for all VMFRP projects, including this project. Specific measures to avoid or reduce impacts to MNES relevant to this project are below. The project has undergone a comprehensive design process, with many design options considered (Attachment 8). Measures to minimize environmental and heritage impacts have been integrated in the design.

## CONSTRUCTION

Measures to avoid and minimise direct and indirect impact to native vegetation will also reduce potential impacts to EPBC listed flora and fauna species with the potential to occur in the area:

- Follow the avoid and minimise protocol for determining the construction works footprint at each site (i.e. to avoid threatened flora species loss as a high priority)

- Areas of remnant native vegetation to be retained will be delineated from those areas to be removed as 'no-go zones'

- Use existing disturbed areas or areas of non-native vegetation preferentially

- Vehicles and plant will only operate on existing tracks and in areas marked as parking areas or construction zones

For the protection of threatened flora:

- Species listed under the FFG and EPBC Acts that are not permitted to be removed must be fenced off, with fencing checked weekly and protected populations monitored monthly

- Staff awareness through inductions and / or signage

- If new threatened species are identified within the construction area, the project ecologist will be notified. The number and location of individuals will be recorded and DELWP will be advised

- Minimise and manage the removal of hollow-bearing trees where construction may impact habitat trees of native fauna, particularly FFG Act listed fauna species / communities

- Avoiding breeding season of hollow-dependent species (spring to summer), however if not practical, pre-clearance surveys would be undertaken by a qualified ecologist. A protocol for tree removal will be developed prior to and implemented during construction

- Where clearing is proposed outside the breeding season, complete pre-clearance surveys for any remnant hollow-bearing trees to be removed prior to (within 24 hours) the trees being removed. Fauna may not be able to be removed immediately and a staged tree removal may follow, enabling time for the species to either finish using the habitat or be relocated to a suitable alternate location. Actions to be defined in a Flora and Fauna Management Plan for the project

- Manage noise and light pollution for fauna during construction. Where night-time works are unavoidable, measures must be implemented to limit noise and lighting impacts to nocturnal fauna

- If the capture, handling or translocation of fish is required (e.g. during dewatering), persons undertaking these activities will hold a permit or license under the Fisheries Act 1995

- Vehicle hygiene measures implemented to prevent the spread and introduction of weed species, and spread or transmission of Chytrid Fungus as per Murray et al. (2011)

- CEMP for the construction phase, including measures to avoid or minimise indirect impacts such as erosion, sedimentation and accidental spill of oils or other chemicals. Protocols for minimising impacts in ecologically sensitive areas such as creek lines included. Implementation will be audited

- Flora and Fauna Management Plan that contains requirements to avoid, mitigate and manage impacts to flora and fauna values and particularly threatened species and describing habitat pre-clearance and clearance processes

- Aquatic Fauna Management Plan to manage aquatic values, with emphasis on threatened fish and frog species that may be present in the vicinity of construction sites

- On completion of works, temporary construction areas to be rehabilitated to the satisfaction of Parks Victoria or the relevant landowner/manager

## OPERATION

Measures to avoid and minimise direct and indirect impacts to EPBC listed species with the potential to occur in the area include:

- Vehicle hygiene measures implemented to prevent the spread and introduction of weed species, and spread or transmission of Chytrid Fungus

- Timing water manipulations to minimise seedlings, growth, germination and seed set of weed species, and promote native species

- Water quality monitoring before, during and after watering events to inform adaptive management strategies and real-time operational decision making

- Monitoring, evaluation and reporting to inform adaptive management of environmental watering events as per the Environmental Water Management Plans, Draft Operating Plan and VMFRP Monitoring Evaluation and Reporting (MER) Plan (Institute, 2020)



Complementary works and measures will also be undertaken in the National Park with relevant land managers and partner agencies (DELWP / Parks Victoria) to achieve avoidance or reduction of impacts from the proposed project, such as pest plant and animal control.

# 4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved

The project aims to deliver environmental water across approximately 704 ha of high ecological value Murray River floodplain across Gunbower Forest to improve ecological condition. Four water regime classes, comprising multiple EVCs, have been specifically identified for restoration through this project as described by Ecological Associates (2014a) and North Central CMA (2014a);

- Permanent wetlands
- Temporary wetlands
- River Red Gum with flood-dependent understorey
- Box woodlands

The vision for the management of the Gunbower National Park is to maintain and restore healthy floodplain communities, to ensure that indigenous plant and animal species and communities survive and flourish (North Central CMA, 2014a). Specifically, the water management objectives of the project are to deliver an inundation regime that protects and enhances the ecological values within the Gunbower National Park. These are outlined in the Ecological Objectives and Hydrological Requirements Justification Papers (Gunbower) for Gunbower Forest (Ecological Associated, 2014; North Central CMA, 2014 e, (Attachment 9).

The ecological objectives of the project are to:

- Restore the health of River Red Gum and temporary wetlands
- Restore the health of River Red Gum Flood-dependent understory

- Restore healthy wetland bird community, through improved access to food and habitat that promotes breeding and recruitment

- Provide reliable drought refuge habitat for fauna (particularly small-bodied native fish communities) in Black Charlie Lagoon (Permanent Wetland)

- Enhance River Murray native fish populations by increasing access to productive floodplain outflows (North Central CMA, 2014a)

Rather than being likely to have a significant adverse impact on any of the listed threatened species or listed migratory species identified as potentially present, the project is more likely to provide an overall benefit to these species as reflected through the ecological objectives. Terrestrial fauna including birds (Australasian Bittern, Australian Painted Snipe, Painted Honeyeater, White-throated Needletail, Superb Parrot), frogs (Growling Grass Frog, Sloane's Froglet), fish (Silver Perch, Murray Cod, Trout Cod) and the South-eastern Long-eared Bat, are likely to benefit through the proposed inundation regime to the target floodplains, and associated improvements in the health and condition of floodplain vegetation communities, which provide potential foraging, roosting and nesting habitat for these species. Aquatic fauna are also likely to benefit through the proposed inundation regime to the Gunbower floodplains, through the expansion and improvement of short-term foraging habitat in floodplain wetlands likely to be created during inundation events.

To achieve the ecological objectives noted above, specific targets have been defined for the project to measure progress towards achieving the ecological objectives. Initially developed by North Central CMA (Ecological Associates 2014, North Central CMA 2014e), these targets are currently being refined by ARI as part of the development of the VMFRP MER Framework (ARI, 2020), to provide more specific ecological targets against which progress can be measured and to support quantification of the degree of environmental benefit expected from the project. The timeframes specified in these ecological targets would apply from the actual commissioning date in the final Gunbower EWMPs and Operating Plans that would be submitted for approval by the Murray-Darling Basin Authority (MDBA) prior to environmental watering being undertaken.



Section 5			
Conclusion on the likelihood of significant impacts			
5.1 You indicated the below ticked items to be of significant impact and therefore you consider the action to be a controlled			
action			
World Heritage properties			
National Heritage places			
Wetlands of international importance (declared Ramsar wetlands)			
Listed threatened species or any threatened ecological community			
Listed migratory species			
Marine environment outside Commonwealth marine areas			
Protection of the environment from actions involving Commonwealth land			
Great Barrier Reef Marine Park			
A water resource, in relation to coal seam gas development and large coal mining development			
Protection of the environment from nuclear actions			
Protection of the environment from Commonwealth actions			
Commonwealth Heritage places overseas			
Commonwealth marine areas			
5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action			
WETLANDS OF INTERNATIONAL IMPORTANCE			
The current construction footprint is around 25 ha within the 20,218 ha Gunbower Forest Ramsar site. The proposed inundation area that will benefit from the project is around 704 ha. Negligible areas of the Ramsar site will be substantially modified or experience substantial negative change in hydrological regime. Substantial changes in water quality, and introduction or spread of disease and pests is not expected. The habitat or lifecycle of native species, including invertebrate and fish species, dependant upon the wetland are not expected to be significantly impacted, but rather benefit from the project. Overall the project is expected to have a positive impact on the Ecological Character of the Gunbower Forest Ramsar site.			
Ramsar sites downstream (Hattah-Kulkyne Lakes) or adjacent and immediately downstream of the project area (NSW Central Murray Forests Ramsar site) are not expected to experience change as a result of the project.			
LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES			
There is approximately 1,300 ha of the Grey Box Grassy TEC in the wider Gunbower Forest. With the loss of 1.71 ha of this TEC, a negligible (0.13%) reduction in the extent of the TEC would occur from the Gunbower Forest. The TEC also occurs more broadly across Victoria, NSW and SA. Impact to 2.47 ha associated with access tracks will be largely avoided by restricting vehicle access and limiting disturbance to lopping overhanging vegetation. The 1.68 ha of Grey Box Woodlands that occurs in the inundation footprint on the upper terraces adjacent the Murray River may benefit from the proposed inundation. Based on the above, significant impacts to the TEC are not expected.			
Six EPBC Act listed flora species are known to occur or possibly occur in the project area. River Swamp Wallaby-grass was located during field assessments, and four others (Stiff Groundsel, Winged Peppercress, Ridged Water-milfoil and Floodplain Rustyhood) are known to occur close to the project area in similar habitat. Slender Darling-pea is considered to possibly occur in the inundation area given presence of Black Box Woodland habitat. No significant impacts to these species are expected, but rather they are likely to benefit from the reinstated more frequent inundation regime.			
Twelve EPBC Act listed threatened fauna species are known to occur or possibly occur in the project area: South-eastern Long-eared Bat, Australasian Bittern, Australian Painted Snipe, Painted Honeyeater, White-throated Needletail, Superb Parrot, Curlew Sandpiper, Growling Grass Frog, Sloane's Froglet, Silver Perch, Murray Cod and Trout Cod, with suitable habitat for the fish, bittern, sandpiper and snipe only potentially present in inundation area. No significant impacts to these species are expected, but rather they are likely to benefit from the proposed inundation regime.			
The proposed works would be undertaken in predominantly dry areas of the floodplain, with negligible impact on aquatic areas or TECs. The area of vegetation removal (0.2% of the total area of the Gunbower National Park) is considered negligible when compared to the 704 ha that will benefit from the proposed inundation regime.			

The proposed project disturbance is proportionately a very small area of potential habitat of known national distributions for relevant species discussed within. As such, most fauna are considered only occasional visitors to the project area at best and are unlikely to be impacted by the project during the construction phase. The proposed inundation during the operations phase



will further facilitate improvement in condition of floodplain vegetation communities, improving and expanding opportunities for species to recolonise or use habitat for foraging, roosting / refuge and breeding. Floodplain habitats will become more productive and structurally and floristically diverse, while the influence of dominant drought-tolerant species will be reduced.

With CEMP conditions implemented, no EPBC Act threatened fauna or flora species are likely to be impacted by this project.

## LISTED MIGRATORY SPECIES

The project will not modify, destroy or isolated important habitat, introduce invasive species that may be harmful, or seriously disrupt the lifecycles of the any listed migratory species populations.



## **Section 6**

## Environmental record of the person proposing to take the action

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Explain in further detail

Lower Murray Urban and Rural Water Corporation (LMW) is an urban and rural water authority operating in north-west Victoria in accordance with its function and powers established under the Victorian Water Act 1989. LMW oversees a substantial capital works program additional to the ongoing operations and maintenance of their urban and rural water networks. As detailed further in Section 6.2, LMW does not have any past or present proceedings under law for any capital works programs delivered in the rural water sector.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application

Pollution Abatement Notice (PAN) 90007586 – revoked on 3 March 2017. No other past or present proceedings are known at this time.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

## 🗹 Yes 🗌 No

6.3.1 If the person taking the action is a corporation, provide details of the corporation's environmental policy and planning framework

Due to the scale and complexity of VMFRP, LMW has developed a project-specific Environmental Management Plan (EMP) that reflects the principles of ISO 14001 to guide delivery of the VMFRP projects.

The VMFRP EMP describes the principles and process for environmental management to be applied during the delivery of detailed design and approvals for the VMFRP projects, and will be amended following approvals of the projects to address environmental management requirements during construction and commissioning of the projects.

Specifically, the purpose of the current VMFRP EMP is to detail the methods for achieving the key environmental objectives of the projects, including:

- Establishing and implementing management strategies that address the environmental risks, safeguards and issues

- Managing the design to comply with relevant Victorian, New South Wales, Commonwealth and Local Government requirements, statutory approvals/licences and project requirements

- Implementing environmental planning procedures and practices as required.

To complement the VMFRP EMP and to support referrals for the projects under the Victorian Environment Effects Act 1978 and Commonwealth Environment Protection Biodiversity and Conservation Act 1999, a draft Environmental Management Framework (Draft EMF) has been prepared. The Draft EMF provides an overview of the governance framework, processes and procedures that will be applied to manage environmental risks and impacts during construction and operation of VMFRP, including specific environmental management documentation to be prepared for construction and operation of the VMFRP.

The Draft EMF (see Attachment 7) is a 'live' document and will be updated throughout the design and approvals phase of the program to:

- Incorporate findings from technical studies and design
- Capture statutory requirements and approval conditions
- Reflect environmental values and continuously improve protection measures through adaptive management
- Address the needs and expectations of interested parties (including stakeholders, regulators and the community).

The Draft EMF contains general mitigation measures for the construction phase of the VMFRP.

The primary environmental management documentation for managing environmental and heritage risks and impacts during construction of the project will be:

- Construction Environmental Management Plan
- Cultural Heritage Management Plan.

The primary environmental management documentation for managing environmental risks and maximising environmental benefits during operation of the project will be:

- Environmental Water Management Plan (EWMP)

- Operating Plan.



The Environmental Watering Plan for Gunbower (MDBA, 2012) will be updated to include the project once the project is approved. The Gunbower Operating Plan is under development.

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

🗹 Yes 🗌 No

## 6.4.1 EPBC Act No and/or Name of Proposal

2020/8647 – Lower Murray Urban and Rural Water Corporation/Water Management and Use/Nyah-Vinifera Park, Vinifera, Victoria, 3594, Australia/Victoria/Vinifera Floodplain Restoration Project

2020/8632 – Lower Murray Urban and Rural Water Corporation/Water Management and Use/Kulkyne Way, Red Cliffs/Victoria/Hattah Lakes North Floodplain Restoration Project

2020/8648 - Lower Murray Urban and Rural Water Corporation/Water Management and Use/Nyah-Vinifera Park/Victoria/Nyah Floodplain Restoration Project

2020/8686 – Lower Murray Urban and Rural Water Corporation/Water Management and Use/Murray River anabranch near Natya, Nyah, Swan Hill and Robinvale/Victoria/Burra Creek Floodplain Restoration Project

2002/693 - Lower Murray Water/Waste Management (sewerage)/Lake Boga/Victoria/Construction of wastewater treatment lagoons at Lake Boga, Victoria.

In addition to the above, LMW has submitted EPBC Act referrals for the following projects, which are currently being processed through the gateway review:

- 2020/8754 - Guttrum and Benwell Floodplain Restoration Project.

- 2020/8744 - Belsar-Yungera Floodplain Restoration Project

- 2020/8750 - Wallpolla Island Floodplain Restoration Project



Section 7	
Information sources	
Beference source	

Arthur Rylah Institute for Environmental Research (ARI) (2020). Victorian Murray Floodplain Restoration Project Ecological Monitoring, Evaluation and Reporting Plan. Unpublished Client Report for Mallee and North Central Catchment Management Authorities and VMFRP. Authors: Sparrow A, Jones C, Bennetts K, Bush A, Harrow S, Lumsden L, Menkhorst P, Nelson J, Papas P, Scroggie M, Sinclair S and White M. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria.

## Reliability

Prepared by research institute

## Uncertainties

Research paper based on information current at time of preparation.

## **Reference source**

Atlas of Living Australia (ALA) Species search results. Accessed online at: https://bie.ala.org.au/

## Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Australian Ecosystems (2009), Gunbower Forest summer Floristic Survey, report prepared for North Central Catchment Management Authority, Huntly.

## Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

#### **Reference source**

Baker-Gabb, D. and Hurley, V.G.(2011). National Recovery Plan for the Regent Parrot (eastern subspecies) Polytelis anthopeplus monarchoides. Department of Sustainability and Environment, Melbourne.

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

#### Reference source

Bennetts K (2014a), Vegetation mapping in Upper Gunbower Forest.

Bennetts K and Cook (2020) Threatened Flora Monitoring Gunbower Forest Ramsar Site Spring 2019. Report prepared for the North Central Catchment Management Authority

Bennetts K and Jolly (2005-2020). Wetland and Understorey Vegetation Condition Monitoring Gunbower Forest Autumn 2005-2019. Technical Reports for the North Central CMA.

## Reliability

Prepared by consultant



## Uncertainties

Consultant report based on information current at time of preparation.

#### **Reference source**

Biosis (2014), Flora and fauna assessment of the Gunbower National Park and Guttrum and Benwell State Forests. Report prepared for the North Central CMA. Authors: Steer, R, Thomas, G & Howells, B. Biosis Pty Ltd, Wangaratta. Project no. 18342.

#### Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

#### **Reference source**

Blakers, M., S.J.J.F. Davies & P.N. Reilly (1984). The Atlas of Australian Birds. Melbourne, Victoria: Melbourne University Press.

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Clemann, N. and Gillespie, G. R. (2012). National Recovery Plan for the Southern Bell Frog Litoria hrygia. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-southern-bell-frog-litoria-raniformis

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### Reference source

Commonwealth of Australia (2015). Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/publications/wildlife-conservation-plan-migratory-shorebirds-2016. In effect under the EPBC Act from 15-Jan-2016

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

## Reference source

Cooling MP and SKM (2012), Environmental Water Delivery: Gunbower Forest. Prepared by Ecological Associates and SKM for Commonwealth Environmental Water, Department of Sustainability, Environment, Water, Population and Communities, Canberra.

#### Reliability

Prepared by consultant



## Uncertainties

Consultant report based on information current at time of preparation.

## **Reference source**

CSIRO (2020) Australian Soil Resource Information System, viewed June 2020 at: https://www.asris.csiro. au/themes/AcidSulfateSoils.html

## Reliability

Prepared by research institute

## Uncertainties

Based on research information current at time of preparation.

#### **Reference source**

Cunningham S.C., Griffioen P., White M., and MacNally R. (2011). Mapping the condition of river red gum (Eucalyptus camaldulensis) and black box (Eucalyptus largiflorens) stands in The Living Murray Icon Sites. Stand condition report 2010. Canberra: Murray-Darling Basin Authority, 2011.

## Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

## **Reference source**

Department of Agriculture, Water and the Environment (DAWE). (2020a) Amphibromus fluitans in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Fri, 14 Aug 2020 11:10:28 +1000

DAWE. (2020b). Calidris acuminata — Sharp-tailed Sandpiper. Species Profile and Threats Database. Commonwealth of Australia. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\_id=874

DAWE (2020d). Pandion haliaetus — Osprey. Commonwealth of Australia. Available from: http://www.environment.gov. au/cgi-bin/sprat/public/publicspecies.pl?taxon\_id=952

DAWE (2020e). Tringa nebularia — Common Greenshank, Greenshank. Available: http://www.environment.gov.au/cgibin/sprat/public/publicspecies.pl?taxon\_id=832

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

## Reference source

Department of Agriculture, Water and the Environment (DAWE) (2020f). Plegadis falcinellus — Glossy Ibis. CoA. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\_id=991

DAWE (2020h). Gallinago hardwickii — Latham's Snipe, Japanese Snipe. Available: http://www.environment.gov.au/cgibin/sprat/public/publicspecies.pl?taxon\_id=863

DAWE (2020j). Grantiella picta — Painted Honeyeater. Available: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\_id=470

Department of Agriculture, Water and the Environment (DAWE). (2020k). Hirundapus caudacutus --- White-throated



#### Needletail. Available:

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\_id=682

DAWE (2020m). Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains SPRAT Profile. Available: http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=97

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation

#### **Reference source**

DSEWPaC (2012d). A guide to the identification, assessment and management of a nationally threatened ecological community EPBC Act Policy Statement. From:

http://environment.gov.au/biodiversity/threatened/publications/grey-box-eucalyptus-microcarpa-grassy-woodlands-and-derived-native-grasslands-south-eastern

DSEWPaC (2013). Approved Conservation Advice for Rostratula australis (Australian painted snipe). Canberra, ACT. From: http://www.environment.gov.au/biodiversity/threatened/species/pubs/77037-conservation-advice.pdf

## Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

## Reference source

Department of the Environment (DoE) (2013a). Conservation Advice Bidyanus bidyanus (Silver Perch). At: http://www.environment.gov.au/biodiversity/threatened/species/pubs/76155-conservation-advice.pdf

DoE (2015b). Conservation Advice Calidris ferruginea Curlew Sandpiper. At: http://www.environment.gov. au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf

DoE (2015c). Conservation Advice Grantiella picta Painted Honeyeater. At: http://www.environment.gov. au/biodiversity/threatened/species/pubs/470-conservation-advice.pdf

DoE (2015f). Draft referral guideline for 14 birds listed as migratory species under the EPBC Act, CoA. At: http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

## **Reference source**

DoE (2015g). Appendix A: supporting information for each of the 14 migratory listed birds (for Draft referral guideline for 14 birds listed as migratory species under the EPBC Act). At: http://www.environment.gov.au/system/files/resources/c05f5b87-0a99-4998-897e-7072c236cf83/files/appendixa-migratory-birds.pdf

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.



## Reference source

Department of the Environment, Water, Heritage and the Arts (DEWHA). (2008a). Approved Conservation Advice for Amphibromus fluitans (River Swamp Wallaby-grass). Canberra. Available from: http://www.environment.gov. au/biodiversity/threatened/species/pubs/19215-conservation-advice.pdf

DEWHA (2008b). Approved Conservation Advice for Austrostipa metatoris. Canberra: Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/66704-conservation-advice.pdf

DEWHA (2008c). Approved Conservation Advice for Swainsona murrayana (Slender Darling-pea). Canberra: DEWHA. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/6765-conservation-advice.pdf

DEWHA (2010). Approved Conservation Advice for the Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-east Australia. Canberra: DEWHA. Available from: http://www.environment.gov. au/biodiversity/threatened/communities/pubs/86-conservation-advice.pdf

## Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation

## **Reference source**

DHI (2014). NCCMA SDL Modelling for Murray Wetland Forests. Operational water scenario modelling. Final Report. Report prepared for the North Central Catchment Management Authority.

#### Reliability

Prepared by consultant

## Uncertainties

Consultant report based on information current at time of preparation.

## **Reference source**

Ecological Associates (2014), Ecological objectives and hydrological targets in Upper Gunbower Forest. Ecological Associates report AA021-1-B prepared for North Central Catchment Management Authority, Huntly. October 2014.

#### Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

## Reference source

Garnett S.T., Szabo J. and Dutson G. (2011). The action plan for Australian birds 2010. CSIRO Publishing, Victoria

## Reliability

Prepared by research institute

#### Uncertainties

Based on research information current at time of preparation.

## Reference source

Geering, A., Agnew, L. and Harding, S. (2008). Shorebirds of Australia, CSIRO Publishing, Victoria

#### Reliability

Reference Text



## Uncertainties

Reference text based on information

#### Reference source

GHD (2017). Gunbower National Park Flora and Fauna Assessment. Report prepared for the North Central CMA.

Gippel C (2014). Spells Analysis of Modelled Flow for the River Murray at Torrumbarry and Barham, Fluvial Systems Pty Ltd, Stockton, report prepared for North Central Catchment Management Authority, Huntly.

#### Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

#### Reference source

Hale J and Butcher R (2011). Ecological Character Description for the Gunbower Forest Ramsar Site. Report to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), Canberra.

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

## **Reference source**

Kaufman RJ and Ballinger R (2014). Gunbower National Park Culural Heritage Assessment (non-indigenous) including an Historical Archaeological Survey. Prepared by Kaufman RJ and Ballinger R for North Central CMA.

## Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

## Reference source

Lucas A (2010). National Recovery Plan for the Mueller Daisy Brachyscome muelleroides. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-mueller-daisy-brachyscome-muelleroides. In effect under the EPBC Act from 13-Aug-2010.

## Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

## Reference source

Lumsden L. (1994). The distribution, habitat and conservation status of the Greater Long-eared Bat Nyctophilus timoriensis in Victoria. The Victorian Naturalist 111: 4–9.

Manning A.D., Lindenmayer D.B., NixH.A. & Barry S.C. (2005). A bioclimatic analysis for the highly mobile Superb Parrot of south-eastern Australia. Emu 105, 193-201.



## Reliability

Peer reviewed, published paper

## Uncertainties

Journal article based on information current at time of preparation

#### **Reference source**

Mavromihalis J. (2010a). National Recovery Plan for the Winged Peppercress Lepidium monoplocoides. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/resource/national-recovery-plan-winged-peppercress-lepidium-monoplocoides

## Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Menkhorst, P., Rogers, D., Clarke, R., Davis, J., Marsack, P., Franklin, K., (2017). The Australian Bird Guide. CSIRO Publishing, Clayton South.

## Reliability

Reference Text

## Uncertainties

Reference text based on information current at time of preparation

#### Reference source

Murphy AH (2006). National Recovery Plan for the Ridged Water-milfoil Myriophyllum porcatum. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-ridged-water-milfoil-myriophyllum-porcatum. In effect under the EPBC Act from 22-Dec-2006.

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Murray KA, Retallick RWR, Puschendorf R, Skerratt LF, Rosauer D, McCallum HI, Berger L, Speare R & VanDerWal J (2011a). Assessing Spatial Patterns of Disease Risk to Biodiversity: Implications for the Management of the Amphibian Pathogen, Batrachochytrium dendrobatidis. Journal of Applied Ecology, 48, 163–173

#### Reliability

Peer reviewed, published paper

#### Uncertainties

Journal article based on information

## Reference source

Murray-Darling Basin Authority (MDBA) (2011). Acid sulfate soils in the Murray-Darling Basin. MDBA, Canberra.

Murray-Darling Basin Authority (MDBA) (2012). Gunbower Forest Environmental Water Management Plan. MDBA, Canberra.

#### Reliability



## Government publication

## Uncertainties

Government publication based on information current at time of preparation.

## **Reference source**

National Murray Cod Recovery Team (NMCRT) (2010). National Recovery Plan for the Murray Cod Maccullochella peelii peelii. Department of Sustainability and Environment, Melbourne.

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Nature Maps South Australia (2020) Roadside Significant Site Database Sites (RSSD), Sites 968, 979. Department of Planning, Transport and Infrastructure. Access to Naturemaps via: https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx

## Reliability

Government web map

## Uncertainties

Government publication based on information current at time of preparation

## **Reference source**

Nevill GR & M Camilleri (2010). National recovery plan for the Stiff Groundsel (Senecio behrianus). Department of Sustainability and Environment, Victoria. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-stiff-groundsel-senecio-behrianus. In effect under the EPBC Act from 12-Mar-2010.

## Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### Reference source

North Central CMA (NC CMA) (2012), Mapping Grey Box (Eucalyptus microcarpa) Grassy Woodland within Gunbower Forest. Unpublished report prepared for GMW.

NC CMA. (2012a), Pig Swamp Environmental Watering Plan, Report prepared for the Goulburn Murray Water Connections Project, North Central CMA, Huntly.

NC CMA (2014a), Gunbower National Park Environmental Works Project Sustainable Diversion Limit Adjustment Supply Measure Business Case.

NC CMA (2014b), Gunbower National Park Cultural Heritage Assessment (non-indigenous) including an Historical Archaeological Survey. Prepared by Kaufman RJ and LRGM Services for North Central CMA.

NC CMA. (2014c), Seasonal Watering Proposal for Gunbower Forest and Gunbower Creek 2014-15, draft, North Central CMA, Huntly.

NC CMA. (2014d), Gunbower National Park Environmental Works Project Operating Plan; Final Draft: December 2014, North Central CMA, Huntly.



#### Reliability

Prepared by consultant

## Uncertainties

Consultant report based on information current at time of preparation.

#### **Reference source**

North Central CMA. (2014e), Gunbower National Park Ecological Objectives and Hydrological Requirements Justification Paper; Final December 2014, North Central CMA, Huntly.

North Central CMA. (2015), Gunbower Creek System Environmental Water Management Plan, North Central CMA, Huntly.

NC CMA (2016) Gunbower National Park Key Decisions Summary. Report prepared for the Sustainable Diversion Limit Stakeholder Reference Group, North Central CMA, Huntly.

#### Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

#### **Reference source**

Office of Environment & Heritage (OEH) (2019) Grantiella picta (Painted Honeyeater) Profile. New South Wales Government. Accessed online June 2020 from: https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx? id=10357

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Pizzey, G. and Knight, F. (2012). The Field Guide to the Birds of Australia. Harper Collins Australia, Sydney.

#### Reliability

Reference Text

## Uncertainties

Reference text based on information current at time of preparation

#### **Reference source**

Schultz M.A. (2008). Distribution and detectability of Southern Bell Frog Litoria raniformis in the South Australian River Murray Floodplain: Proceedings of the Biology and Conservation of Bell Frogs Conference. Australian Zoologist 34, 438-445

## Reliability

Peer reviewed, published paper

#### Uncertainties

Journal article based on information current at time of preparation

#### **Reference source**

Seran BL&A (2018), Screening of the potential impacts on threatened species and communities associated with the construction and operation of Victoria's nine Basin Plan environmental works projects

#### Reliability



## Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.

## **Reference source**

Threatened Species Scientific Committee (TSSC) (2003), Commonwealth Listing Advice on Maccullochella peelii peelii (Murray Cod, Cod, Goodoo). At: http://www.environment.gov.au/biodiversity/threatened/species/m-peelii.html.

TSSC (2009), Commonwealth Listing Advice on Weeping Myall Woodlands. At: http://www.environment.gov. au/biodiversity/threatened/communities/pubs/98-listing-advice.pdf

TSSC (2012a). Approved Conservation Advice for Natural Grasslands of the Murray Valley Plains ecological community. TSSC. At: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/117-conservation-advice.pdf

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.

## **Reference source**

Threatened Species Scientific Committee (TSSC) (2012b). Commonwealth Listing Advice on Craterocephalus fluviatilis (Murray Hardyhead). At: http://www.environment.gov.au/biodiversity/threatened/species/pubs/56791-listing-advice.pdf

## Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### **Reference source**

Threatened Species Scientific Committee (TSSC) (2015), Conservation Advice Nyctophilus corbeni south-eastern longeared bat. At: http://www.environment.gov.au/biodiversity/threatened/species/pubs/83395-conservation\_advice-01102015.pdf

TSSC (2016g). Conservation Advice Myriophyllum porcatum ridged water-milfoil. At: http://www.environment.gov. au/biodiversity/threatened/species/pubs/19919-conservation-advice-16122016.pdf

TSSC (2016e). Conservation Advice Polytelis swainsonii superb parrot. At: http://www.environment.gov. au/biodiversity/threatened/species/pubs/744-conservation-advice-05052016.pdf

TSSC (2019a). Conservation Advice Crinia sloanei (Sloane's Froglet). At: http://www.environment.gov. au/biodiversity/threatened/species/pubs/59151-conservation-advice-04072019.pdf

TSSC (2019b). Conservation Advice Botaurus poiciloptilus Australasian Bittern. Canberra, ACT: DEE. At: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1001-conservation-advice-180120

#### Reliability

Government publication

## Uncertainties

Government publication based on information current at time of preparation.



## Reference source

Todd J.A. (2000). Recovery Plan for Twelve Threatened Spider-orchids Caladenia taxa of Victoria and South Australia 2000 – 2004. Department of Natural Resources and Environment (DNRE), Melbourne, Victoria

Trout Cod Recovery Team (2008a). National Recovery Plan for the Trout Cod Maccullochella macquariensis. Department of Sustainability and Environment, Melbourne.

#### Reliability

Government publication

#### Uncertainties

Government publication based on information current at time of preparation.

#### Reference source

URS (2015) NCCMA SDL Projects – Geotechnical Factual and Interpretive Report. Prepared by URS Australia Pty Ltd, 43260685/01/02 May 2015 for North Central Catchment Management Authority.

#### Reliability

Prepared by consultant

## Uncertainties

Consultant report based on information current at time of preparation.

#### **Reference source**

Walsh N and Entwisle T (1999). Flora of Victoria Volume 4: Dicotoledons; Cornaceae to Asteraceae. Inkata Press, Melbourne.

#### Reliability

**Reference Text** 

#### Uncertainties

Reference text based on information current at time of preparation

#### **Reference source**

Water Technology (2009), Applying Modelling Tools to Investigate Water Management in the Gunbower Forest – Part B Scenario Analysis, Water Technology, Notting Hill, Victoria.

Water Technology (2014a), North Central CMA Levee Breach Risk Assessment and Strategy, report prepared for North Central Catchment Management Authority, Huntly.

## Reliability

Prepared by consultant

#### Uncertainties

Consultant report based on information current at time of preparation.



Section 8
Proposed alternatives
Do you have any feasible alternatives to taking the proposed action?
Yes 🗹 No



Section 9		
Person proposing the action		
9.1.1 Is the person proposing the action a member of an organisation?		
Organisation		
Organisation name	LOWER MURRAY URBAN AND RURAL WATER CORPORATION	
Business name	Lower Murray Water	
ABN	18475808826	
ACN		
Business address	741 Fourteenth St, Mildura, 3500, VIC, Australia	
Postal address		
Main Phone number	03 5051 3400	
Fax		
Primary email address	contactus@lmw.vic.gov.au	
Secondary email address		
9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the ☐ Small business ☑ Not applicable	EPBC Act because I am:	
9.1.2.2 I would like to apply for a waiver of full or partial fees under Sche	edule 1, 5.21A of the EPBC Regulations *	
🗋 Yes 🗹 No		
9.1.3 Contact		
First name	Josh	
Last name	White	
Job title	Project Director - VMFRP	
Phone		
Mobile	0400 697 304	
Eax		
Email	Josh.White@vmfrp.vic.gov.au	
Primary address	PO Box 1438. Mildura. 3502. VIC. Australia	
Address		
Declaration: Person proposing the action		
Losh White	de deve thet	
to the best of my knowledge the information I have given on or attached	, declare that	
correct Junderstand that giving false or misleading information is a set	rious offence. I declare that I am not taking the action on	
behalf or for the benefit of any other person or entity		
	001	
Signature: Date: Date:	120	
I, Josh White	, the person	
proposing the action, consent to the designation of Lower Murray Water as the proponent for the		
purposes of the action described in this EPBC Act Referral.		
Att		
Simulture 28 August 2020		



Proposed designated proponent		
9.2.1 Is the proposed designated proponent a member of an organisatio	n?	
Yes No		
Organisation		
Organisation name	LOWER MURRAY URBAN AND RURAL WATER CORPORATION	
Business name	Lower Murray Water	
ABN	18475808826	
ACN		
Business address	741 Fourteenth St, Mildura, 3500, VIC, Australia	
Postal address		
Main Phone number	03 5051 3400	
Fax		
Primary email address	contactus@Imw.vic.gov.au	
Secondary email address		
9.2.2 Contact		
First name	Josh	
Last name	White	
Job title	Project Director - VMFRP	
Phone	0400 697 304	
Mobile	0400 697 304	
Fax		
Email	Josh.White@vmfrp.vic.gov.au	
Primary address	PO Box 1438, Mildura, 3502, VIC, Australia	
Address		
Declaration: Proposed Designated Proponent		
ı, Josh White	,the	
proposed designated proponent, consent to the designation of		
myself as the proponent for the purposes of the action described in this EPBC Act Referral. Signature:		



Referring party (person preparing the information)		
9.3.1 Is the referring party (person preparing the information) a member	of an organisation?	
🗹 Yes 🔲 No		
Organisation		
Organisation name	LOWER MURRAY URBAN AND RURAL WATER CORPORATION	
Business name	Lower Murray Water	
ABN	18475808826	
ACN		
Business address	741 Fourteenth St, Mildura, 3500, VIC, Australia	
Postal address		
Main Phone number	03 5051 3400	
Fax		
Primary email address	contactus@lmw.vic.gov.au	
Secondary email address		
9.3.2 Contact		
First name	Josh	
Last name	White	
Job title	Project Director - VMFRP	
Phone	0400 697 304	
Mobile		
Fax		
Email	Josh.White@vmfrp.vic.gov.au	
Primary address	PO Box 1438, Mildura, 3502, VIC, Australia	
Address		
Declaration: Referring party (person preparing the information)		
I,Josh White, declare that		
to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and		
correct. I understand that giving false or misleading information is a serious offence.		
28 August 2020		
Signature:		



Appendix A	
Attachment	
Document Type	File Name
action_area_images	Attachment 1a_Project Location Map.pdf
action_area_images	Attachment 1b_Project Structures Construction and
	Access_Part 1.pdf
action_area_images	Attachment 1c_Project Structures Construction and
action area images	Access_Part 2.001 Attachment 1d, Managed Inundation Area.pdf
action_area_images	Attachment 2. Waterway and Wetland Man pdf
action_area_images	Gunhower IndicativeEPBC 20200827 zin
supporting tech reports	Attachment 3a, Elora and Eauna Assessment, Part1 ndf
supporting_tech_reports	Attachment 3b, Elora and Fauna Assessment, Part2 pdf
supporting_tech_reports	Attachment 3c Flora and Fauna Assessment, Part3 ndf
supporting_tech_reports	Attachment 3d Flora and Fauna Assessment Part/ ndf
supporting_tech_reports	Attachment 3e Flora and Fauna Assessment Part5 ndf
supporting_tech_reports	Attachment 3f Flora and Fauna Assessment Part6 odf
supporting tech reports	Attachment 3g, Flora and Fauna Assessment, Part7 ndf
supporting tech reports	Attachment 3h Flora and Fauna Assessment Part9 pdf
supporting tech reports	Attachment 3i Flora and Fauna Assessment Part10 ndf
supporting tech reports	Attachment 3i Flora and Fauna Assessment Part8 pdf
flora fauna investigation	Attachment 3k Flora and Fauna Assessment Part12 pdf
flora fauna investigation	Attachment 31 Flora and Fauna Assessment Part13.pdf
flora fauna investigation	Attachment 3m Flora and Fauna Assessment Part11.pdf
flora fauna investigation	Attachment 3n Flora and Fauna Assessment Part14.pdf
flora fauna investigation	Attachment 30 Flora and Fauna Assessment Part15.pdf
flora fauna investigation	Attachment 4 Additional MNES assessment of impacts.pdf
flora fauna investigation	Attachment 5 Ramsar Wetland Assessment.pdf
hydro_investigation_files	Attachment 6 Groundwater Assessment.pdf
impact reduction docs	Attachment 7_Draft Environmental Management
	Framework.pdf
impact_reduction_docs	Attachment 8_Options Development Summary.pdf
impact_reduction_docs	Attachment 9_Ecological Objectives and Hydrological
	Requirements.pdf
corp_env_policy_docs	Attachment 10_LIMW Environmental Policy.pdf
Appendix B	
Coordinates	
Area 1	
-35.857246504066,144.34658828319	
-35.85713559408,144.34882818794	
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Appendix B
Coordinates
Area 1
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