Planning Panels Victoria

Victorian Murray Floodplain Restoration Project

Standing Inquiry and Advisory Committee Report No. 2

ER Central – Nyah and Vinifera Floodplain Restoration Projects

Environment Effects Act 1978 Planning and Environment Act 1987

5 July 2023



Planning Panels Victoria acknowledges the Wurundjeri Woi Wurrung People as the traditional custodians of the land on which our office is located. We pay our respects to their Elders past and present.

We acknowledge the Traditional Owners of the lands and waters that are the subject of this report. We pay our respects to their Elders, past and present, and acknowledge their continuing connection to country and the responsibilities they carry.

Environment Effects Act 1978

Inquiry report under section 9(1)

Planning and Environment Act 1987

Advisory Committee report under section 151(1)

ER Central – Nyah and Vinifera Floodplain Restoration Projects - Standing Inquiry and Advisory **Committee Report No. 2**

5 July 2023

Muholas Winbuch Trevon Blakes

Nick Wimbush, Chair

Trevor Blake, Member

Planning **Panels** Victoria

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Glossary and abbreviations

ANU Fenner School	ANU Fenner School of Environment and Society
AOI	Area of Investigation
AOIB	Assessment of overall improvement for biodiversity
ASS	acid sulfate soils
Basin Plan	Murray-Darling Basin Plan
BSM2030	Basin Salinity Management 2030
CEMP	Construction Environment Management Plan
СНМР	Cultural Heritage Management Plan
Committee	Standing Inquiry and Advisory Committee for Environment Report Central package
CWE	Conservation Work Exemption
DEECA	Department of Energy, Environment and Climate Action
DELWP	(former) Department of Environment, Land, Water and Planning
DO	dissolved oxygen
DOC	dissolved organic carbon
DTP	Department of Transport and Planning
EDS	Environmental Delivery Standard
EE Act	Environment Effects Act 1978

EES	Environment Effects Statement	
EMF	Environmental Management Framework	
EPA	Environment Protection Authority	
EP Act	Environment Protection Act 2017	
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)	
ER	Environment Report	
EVC	Ecological Vegetation Class	
EWRC	Ecological Regime Watering Class	
expert elicitation report	Expert elicitation of tolerable and optimal watering regimes for Murray River floodplain vegetation, ARI of Environmenta Research, December 2022 (EES Central D73)	
FFG Act	Flora and Fauna Guarantee Act 1988	
FoNVP	Friends of Nyah Vinifera Park	
НІМ	Habitat Importance Map	
Mallee CMA	Mallee Catchment Management Authority	
MDBA	Murray-Darling Basin Authority	
MIA	Maximum Inundation Area	
MNES	Matters of National Environmental Significance	
OEMP	Operation Environmental Management Plan	
PE Act	Planning and Environment Act 1987	
Project	Refers to the Nyah and Vinifera projects collectively unless the projects are referred to separately	
PSA	Planning Scheme Amendment	
RAP	Registered Aboriginal Party	
SCO	Specific Controls Overlay	
SDLAM	Sustainable Diversion Limit Adjustment Mechanism	
SIAC	Standing Inquiry and Advisory Committee	
SMM	Source Murray Model	
the Minister	Minister for Planning	
TOR	Terms of Reference	
TPZ	Tree Protection Zone	
TRG	Technical Reference Group	
VMFRP	Victorian Murray Floodplain Restoration Project	

Project summary		
The Project	Environment Report Central Package – Nyah and Vinifera Floodplain Restoration Projects (ER Central). Burra Creek was included in this package but will be reported on separately due to additional investigations being carried out.	
Brief description	The ER Central Project, part of the Victorian Murray Floodplain Restoration Project, is designed to return a more natural inundation regime to floodplains adjacent to the Murray River in Victoria. The aim is to achieve specific ecological objectives by the construction of water management infrastructure.	
Project locations	The Nyah and Vinifera Projects are located approximately 20 -30 kilometres north west of Swan Hill on the Murray River floodplain on the south (Victorian) side of the river.	
The Proponent	Lower Murray Water	
Environment Report	On 11 June 2020 (Nyah) and 7 July 2020 (Vinifera) were determined by the Minister for Planning not to require an Environment Effects Statement subject to conditions, including the preparation of an Environment Report (ER). The ER provides a description of both projects, articulates their benefits, and assesses their potential effects on the environment. The ER provides the basis for assessment of effects under the Environment Effects Act 1978 and Commonwealth Environment Protection and Biodiversity Conservation Act 1999.	
The draft Planning Scheme Amendment	Draft Planning Scheme Amendment C78 to the Swan Hill Planning Scheme.	

Overview

Standing Inquiry and Advisory Committee process		
ER Central Committee	Nick Wimbush, Chair	
	Trevor Blake, Member	
Technical Advisor	Dr Sandra Brizga, SIAC Member	
	Ian Hamm, SIAC Member, First Peoples Session	
Supported by	Amy Selvaraj, Senior Project Officer, Planning Panels Victoria	
	Gabrielle Trouse, Project Support Officer, Planning Panels Victoria	
Directions Hearing	Video conference, 20 March 2023	
Roundtable	Swan Hill (Hybrid) 13, 17, 18, 19, 20 April 2023	
	Video conference, 26 April 2023	
Site inspection	Unaccompanied, 14 April 2023	
Parties to the Hearing	See Appendix C	
Citation	VMFRP SIAC Report No. 2 – ER Central [2023] PPV	

Executive summary

(i) Summary

The Victorian Murray Floodplain Restoration Project (VMFRP) is being delivered as part of the Murray-Darling Basin Plan. The Murray-Darling Basin Plan aims to increase water available for the environment and improve health of the Murray River and its floodplains. It consists of nine projects in four packages.

This report is for package two, the Environment Report (ER) Central package. It consists of three projects being the Nyah Floodplain Restoration Project, the Vinifera Restoration Project and the Burra Creek Project. As it was determined further investigation work is required for Burra Creek, this report only considers the Nyah and Vinifera projects.

An ER to consider the three projects and their environmental risks and benefits were developed over the past few years and exhibited in early 2023. The projects essentially allow for the construction of infrastructure to:

- allow for longer retention of natural floods on the floodplain
- provide for the pumped inundation of the floodplains at times when there is not sufficient flow for natural floods.

The overall objective is to try and inundate the Project area floodplains on a more natural cycle, a cycle that has been disturbed by human intervention since settlement, primarily by diversions and extraction.

When exhibited, the ER Central report attracted 14 submissions. Many submitters were concerned about the proposals to 'artificially' manage floodplains and the role of such projects within the broader Murray-Darling system. Other specific concerns about the impact on flora and fauna and the floodplain environment were also raised. Some submitters were concerned about the consultation process and the communication with communities and Traditional Owners.

A Roundtable was held in Swan Hill in April 2023 to further consider submissions and key issues.

The ER Central Committee (the Committee) has considered the exhibited ER and submissions, and in accordance with its Terms of Reference has also considered the lessons learnt in the first package of projects assessed through the Environment Effects Statement (EES) Central process.

The general approach to issues in this report is consistent with the approach in EES Central with some modification to take account of the differences in the Project area itself, and the development of thinking around how the Project may be satisfactorily delivered within the broader VMFRP program.

The Committee considers there a range of issues which, while important, do not need specific attention beyond the controls provided in the Project approval, that is through the Planning Scheme Amendment and associated approval documents, and the other statutory approvals required. These issues include:

- Land use
- Agriculture
- Bushfire
- Landscape and visual
- Noise and vibration

- Traffic and transport
- Air quality.

There are a number of other higher order issues which the Committee has spent considerable time in this report addressing. These include:

- hydraulics and floodplain modelling and the relationship to ecological impacts
- erosion and land stability
- the ecological impacts of operation, both terrestrial and ecology.

While ultimately concluding that these are issues which can be addressed through Project implementation, the Committee has recommended changes to the Project delivery framework including the Incorporated Document and Environmental Delivery Standards to ensure that uncertainty can be identified and reduced to a greater extent than is currently apparent.

The Committee has also addressed several issues that are significant in the Project areas including Aboriginal cultural heritage, historic heritage and impacts on the use of the Nyah and Vinifera Parks.

Overall, the Committee concludes that the Project should have a net community benefit with positive ecological impacts due to the increased flooding of the Project areas and should proceed, but implementation, management and monitoring will need to be undertaken carefully and thoroughly to ensure risk is minimised.

(ii) Recommendations

The Committee makes the following recommendations.

Planning Scheme Amendment

- 1. Approve draft Planning Scheme Amendment C78 to the Swan Hill Planning Scheme subject to the Committee's recommendations in this report, including:
 - a) Revisions to the Incorporated Document as shown in Appendix E
 - Revision to the Environment Delivery Standards and Monitoring Requirements in the Environmental Management Framework as shown in Appendix F.

Incorporated Document

- 2. Revise the Incorporated Document to amend the requirements for an Operational Environmental Management Plan to include:
 - a) the objectives, targets and indicators that are to be used for the monitoring and evaluation of biodiversity responses
 - b) the conceptual framework of environmental system interactions that will guide adaptive management of both managed inundation and land management
 - c) a requirement to consult Swan Hill Rural City Council, as well as other nominated parties, with respect to the development and implementation of the OEMP.

- 3. Revise the Incorporated Document to require submitted Development Plans to be supported by an assessment of the following to the satisfaction of the Minister for Planning:
 - a) the need for siting of any works within 30 metres of the banks of the Murray River having regard to relevant alternatives
 - b) proposed measures to avoid and minimise impacts on native vegetation, large trees and habitats of threatened flora and fauna, as well as on cultural heritage, within 30 metres of the banks of the Murray River.
- 4. Revise the Incorporated Document to provide that the Secretary of Department of Energy, Environment and Climate Change may authorise the removal of native vegetation for the purpose of project works, subject to a deferred decision on offset requirements that would consider an evaluation of actual biodiversity outcomes.
- 5. Revise the Incorporated Document to include the photographic recording of any heritage structures as well as buildings.

Environmental Management Framework

6. Amend Section 20.8.3.4 Operating Plan of the Environmental Management Framework (page 20.32) to state:

The Operating Plans are not intended to prescribe particular watering events. They are a 'living document' that would be further refined and updated over time if legislation changes or operations in the major river systems require it or outcomes of monitoring identify an issue that requires rectification <u>or there</u> <u>are significant advances in science or technology.</u>

- 7. Revise the Environmental Delivery Standards to include:
 - a) Revised EDS SW2 in relation to:
 - the purposes that are to guide the site-specific management of operational risks related to surface water
 - the timing and management of inundation events, as well as the management of organic matter loads, to reduce the risk of hypoxic or anoxic blackwater events.
 - b) A provision in EDS SB3 for protocol be developed and implemented for communicating with the community and stakeholders regarding:
 - the risk or occurrence of blackwater events
 - intended responses for different stages of specific managed inundation events.
- 8. Revise the Environmental Delivery Standards and Monitoring Requirements to include:
 - a) Revised EDS GW2 to address requirements for additional groundwater monitoring and local adaptive management responses.
 - b) Revised Monitoring Requirement M GW1 to require additional bore sites to monitor changes to groundwater depth and elevation.
 - c) Revised Monitoring Requirement M GW2 to require additional bore sites and a monthly frequency for monitoring groundwater salinity.

- 9. Revise the Environmental Delivery Standards and Monitoring Requirements to include:
 - a) Revised EDS GS1 to specify requirements for further hydraulic assessment to inform the detailed design and implementation of the Project.
 - b) Revised EDS GS3 and M GSC1 to require monitoring of waterway erosion within the project area.
- 10. Revise the Environmental Delivery Standards to make minor changes to EDS CM1c, CM2 and GS1 in relation to soil characterisation and mapping.
- 11. Revise the Environmental Delivery Standards to include the following changes:
 - a) Revise EDS E1 to require further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species, with particular attention to be given to avoiding and minimising impacts within 30 metres of the top of the Murray River bank.
 - b) Revise EDS E2e to require:
 - development and implementation of a hollow replacement plan that is:
 - to provide for nominated priority fauna species on the basis of suitable evidence of their habitat requirements
 - to be implemented progressively over a ten-year period with appropriate monitoring to ensure its cost-effectiveness
 - to the satisfaction of the Secretary of the Department of Energy, Environment and Climate Action.
 - where possible, appropriate re-use of felled timber and logs.
- 12. Revise the Environmental Delivery Standards and Monitoring Requirements to:
 - a) Amend EDS E2e to require monitoring of rehabilitation outcomes including vegetation cover.
 - b) Adjust the terrestrial ecology monitoring requirement M TE2 to specify monitoring of the cover and quality of rehabilitation of indigenous vegetation, where consistent with any obligation established by a consent or agreement for the Projects under the *National Parks Act 1975*.
- 13. Revise the Environmental Delivery Standards to include a new EDS SW4 'Surface water Further hydraulic assessment of operational impacts on floodplain vegetation'.
- 14. Revise the Monitoring Requirements M TAE2 'Terrestrial and aquatic' to require transect surveys following inundation events to detect any presence of threatened flora species either within or adjoining the inundated area.
- 15. Revise the Environmental Delivery Standards and Monitoring Requirements to include the following changes:
 - a) Revise EDS SW2 in relation to:
 - timing of inundation events to reduce carp breeding
 - clarifying the purpose of the requirement to factor seasonal implications in the timing of filling and drawdown.

- b) Include a new monitoring requirement M AE3 for assessing the effects and benefits of floodplain watering for small-bodied native fish and control of Carp.
- c) Include a new EDS SW5 in relation to:
 - the design of regulators and the passage of native fish
 - the design of containment banks and spillways and the passage of turtles.
- d) Revise EDS E3 that requires the Pest Plant and Animal Monitoring and Management Plan to address both 'terrestrial and aquatic' pests, including Carp.
- e) Revise M AE7 to include monitoring and evaluation of fish strandings associated with the Project.

Other approvals

- 16. The Minister for Planning should ask the Minister for Water to consider, in relation to any approval for a licence for works on a waterway under section 67 of the *Water Act 1989*, applying a condition or conditions requiring the design, construction, operation and maintenance of project works on the Vinifera and Nyah floodplains to:
 - a) Be informed by an assessment of geomorphic and hydraulic risks, including of waterway erosion or other instability over the long-term, to the satisfaction of the Minister.
 - b) Provide for timely action to monitor and address risks or evidence of waterway erosion or other instability either attributable to or affecting the project works to the extent necessary to protect waterway values.
 - c) Coordinate assessments of risks and implementation of any relevant requirements relating to the Murray River with the responsible authorities in New South Wales.
- 17. The Minister for Planning should ask the Minister responsible for the *National Parks Act 1975* to consider applying a binding obligation under that Act through section 27 consent for the Proponent to:
 - a) Monitor any increase of environmental weeds within or adjoining all sections of the construction footprint, including proximate downstream sections of waterways, to the satisfaction of Parks Victoria for the first 12 months following construction or such longer period as Parks Victoria may direct.
 - b) Implement measures to control any local proliferation of environmental weeds associated with the project works to the satisfaction of Parks Victoria.
 - c) Monitor the cover and quality of rehabilitation of indigenous vegetation within the construction footprint.

PART A: INTRODUCTION AND BACKGROUND

1 The assessment process

1.1 The Victorian Murray Floodplain Restoration Project

The Victorian Murray Floodplain Restoration Project (VMFRP) consists of nine discrete projects that are to be assessed under the *Environment Effects Act 1978* (EE Act). The floodplain restoration projects have been grouped under four assessment packages, including:

- a single Environment Effects Statement (EES) covering the Belsar-Yungera and Hattah Lakes North projects (EES Central)
- a single EES covering the Lindsay Island and Wallpolla Island projects
- a single Environment Report (ER) covering the Vinifera, Nyah and Burra Creek projects (ER Central)
- a single ER covering Gunbower National Park and Guttrum-Benwell Forests projects.

The Proponent for the Project is Lower Murray Urban and Rural Water Corporation (the **Proponent**).¹

1.2 The Standing Inquiry and Advisory Committee

The Minister for Planning (**the Minister**) appointed the VMFRP Standing Inquiry and Advisory Committee (**SIAC**) on 27 September 2022. The SIAC consists of 19 members, including a Lead Chair, four Co-Chairs and 14 members. Specific SIAC members are appointed to each of the four VMFRP assessment packages when they are referred to the SIAC.

The SIAC is appointed as an:

- Inquiry pursuant to section 9(1) of the EE Act
- Advisory Committee pursuant to part 7, section 151(1) of the *Planning and Environment Act 1987* (**PE Act**).

(i) ER Central Committee

The ER Central package (**the Project**) was referred to the SIAC on 25 January 2023. The ER Central SIAC members (**the Committee**) were:

- Nick Wimbush, Chair
- Trevor Blake, Member.

Technical advice was sought by the Committee from SIAC members as follows:

- Dr Sandra Brizga (ecology and water)
- Ian Hamm (First Nations and Traditional Owner engagement).

The Committee was assisted by staff at Planning Panels Victoria including:

- Amy Selvaraj, Senior Project Officer
- Gabrielle Trouse, Project Support Officer.

¹ The Proponent advised it is supported by its partner agencies including Goulburn Murray Water, Mallee Catchment Management Authority, North Central Catchment Management Authority, Parks Victoria, the Water and Catchments division of the Department of Environment, Land, Water and Planning and the Commonwealth Department of Climate Change, Energy, the Environment and Water.

1.3 The SIAC's role

(i) Terms of Reference

A single Terms of Reference (**TOR**) was provided by the Minister for all four assessment packages. A summary of key elements in the TOR was provided in section 1.3 of the EES Central report. A copy of the TOR is included at Appendix A of this Report.

The Committee provides its consolidated response to the TOR in section 10.5.

(ii) Scoping requirements

Each of the three projects comprising the ER Central package were determined by the Minister to be subject to a '*No EES with conditions'*, under section 8B of the EE Act. The conditions required the preparation of an ER together with an Environmental Management Framework (**EMF**) and related plans. The scope for the ER was provided by the former Department of Environment, Land, Water and Planning (DELWP) in the *Scope for the environment report under EPBC Act Bilateral (Assessment) Agreement 2014 and EE Act* dated July 2021 (**ER Scope**). This ER Scope integrated requirements for assessing the three projects under the two acts.

The ER Scope states:

In summary, the environment report needs to examine and document the following for both the construction and proposed inundation areas for the three projects respectively:

- the expected benefits and ecological objectives of the project, with measurable indicators for monitoring and thresholds for action, including for specific species and ecological communities;
- assessment of project design alternatives to avoid and minimise adverse environmental effects, including options for the project layout and timing of inundation events;
- assessment of predicted effects (direct and indirect) on habitats and biodiversity values particularly associated with: listed species and communities (under the Flora and Fauna Guarantee Act 1988 and Environment Protection and Biodiversity Conservation Act 1999); native vegetation including large old trees; threatening processes;
- assessment of effects on hydrogeology and groundwater quality;
- assessment of effects on Aboriginal cultural heritage;
- potential cumulative effects of the project and other VMFRP projects and other existing or planned projects in the area, particularly in relation to downstream aquatic environments and beneficial water uses; and
- proposed native vegetation offset strategy.

The ER Scope set out the requirements for environment description, the consideration of alternatives, avoidance and mitigation measures, residual impacts and offsets and other matters in the ER and generally reflects and expands on the 'No EES conditions' decision by the Minister. The Scope did not incorporate 'evaluation objectives', and so there are none for the Committee to respond to. Note that the terms 'effects' and 'impacts' are used interchangeably in this report, while recognising that the EE Act refers to 'environment effects' and the EPBC Act refers to 'impacts'.

The three projects were declared controlled actions requiring approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in June and July 2020 due to their likely impact on matters of national environmental significance (MNES), being listed threatened species and communities. The delegate for the Commonwealth Minister for the Environment subsequently decided that they would be assessed by State using the ER process, in accordance with the *Bilateral (Assessment) Agreement 2014* between the Commonwealth of Australia and the State of Victoria.

(iii) Preliminary matters not addressed in this report

A range of issues around scope and the role of the Committee were ventilated in the SIAC process for EES Central Project including:

- the need for an EES
- the relevance and application of the broader policy context, including the Basin Plan, Sustainable Diversion Limit Adjust Mechanism (SDLAM) and Victorian Environmental Water Framework
- the extent to which project alternatives have been investigated
- the adequacy of the EES, including the extent to which it addressed the Scoping Requirements and the cumulative effects of the project
- the availability of environmental water
- project delivery
- the need to adequately resource the project during their operation.

These matters were addressed in Chapter 4 of the EES Central report. Similar submissions were made to this Committee for ER Central. This Committee generally adopts the views of the EES Central Committee in relation to these matters. Any further commentary on these matters is included within the issues discussion in the relevant chapters in the body of this report.

(iv) Project approvals

Figure 1 outlines the ER process and approvals as shown in Section 1 of the ER. The ER contains details of relevant legislation, policy and guidelines in Section 5.

Section 20.5 of the ER and Attachment III to the ER list the statutory approvals required for the Project under Commonwealth, Victorian and NSW legislation.² Project approvals are discussed in Chapter 10 of this report.

The EPBC Act and MNES are discussed in Chapter 10 of this Report.

(v) Project approval documentation

The specific Project approval documentation considered by the Committee includes:

- Victorian Murray Floodplain Restoration Project, Vinifera Floodplain Restoration Project, Nyah Floodplain Restoration Project & Burra Creek Floodplain Restoration Project Incorporated Document, Draft October 2022 (Incorporated Document)
- Environmental Management Framework (EMF), Section 20 of exhibited ER, including Environmental Delivery Standards (EDS) and monitoring requirements.

Note Table 20.3 in the ER refers to the Balranald Planning Scheme and LEP; the Committee understands this should be the Murray River Council planning documents.



Figure 1 ER Central process and key approvals

Source: ER Section 1.

The Committee directed the Proponent provide Day 1 versions of this documentation before the Roundtable to incorporate any changes arising from submissions, evidence or discussions at EES Central. Final Day versions were also tabled to include any changes arising from the Roundtable itself. The Proponent circulated:

- Day 1 version of the Incorporated Document (D19)
- Day 1 version of the EMF (D20)
- Day 1 version of the EDS and Monitoring Requirements (D21)
- Final day version of the Incorporated Document (D85)
- Final day version of the EDS and Monitoring Requirements (D84).

Parties were given the opportunity to provide written comments on a 'without prejudice' basis on the Project documents following the close of the Hearing. The Friends of Nyah Vinifera Park (Inc) provided written comments (D107).

The overall assessment and project approvals are discussed in Chapter 10 of this report.

1.4 Exhibition and submissions

(i) Exhibition

Clause 23 of the TOR provides for submissions to be lodged through the Engage Victoria website and collected by Planning Panels Victoria.

The ER was exhibited from 30 January to 10 March 2023. A total of 14 submissions were received (see Appendix B), including:

- two government agencies:
 - Environment Protection Authority Victoria (EPA) (S7)
 - Department of Energy, Environment and Climate Change (DEECA) (S12).
- three environment and specific interest groups or organisations (S5, S11 and S14)
- one local community group (S13)
- eight individuals.

(ii) Summary of submissions

Concern and criticism were expressed by some submitters regarding the community engagement and stakeholder consultation process run by the Proponent. Many emphasised the Project lacked community support and raised concerns that community consultation had been inadequate, selective, questions or concerns were not addressed, and community views were misrepresented. The adequacy of consultation with Traditional Owners was also raised as a concern.

At the request of the SIAC, the Proponent prepared a submissions summary (D17b). The submissions have been read in full by the Committee and considered irrespective of whether the submitter participated in the Roundtable.

Key issues raised by submitters are outlined below in summary form. They were like some of the key issues raised in EES Central. They included:

- the strategic justification, feasibility and viability of the Project in the context of the Murray-Darling Basin Plan and associated Sustainable Diversion Limits
- the adequacy of the technical assessments and that the Project is risky, destructive, untested and experimental
- concern proposed mitigation measures are inadequate and the use of adaptive management as an appropriate approach to manage the operation of the Project
- the cumulative impacts of projects, including with respect to the other VMFRP and non VMFRP projects and on Murray River floodplains beyond the VMFRP project sites and downstream
- impacts on surface water, including the availability of water for downstream floodplains, reduced water quality, floodplain hydraulics, waterway salinity, and potential effects on Ramsar wetlands
- impacts on groundwater
- impacts on terrestrial ecology, including rare and threatened species, extent of vegetation removal and implications of habitat loss, loss of large and hollow-bearing trees
- impacts on aquatic ecology, including rare and threatened species, poor water quality and blackwater events, native fish strandings, increased carp and weed infestations

- impacts on Aboriginal cultural heritage sites, including altering the pattern of water movement and impacting areas used by Traditional Owners and cultural artefacts and places
- concerns around the Project's management and operation, including level of human intervention and costs.

Submissions on some issues are considered in more detail further below.

Impacts on surface water

The impacts of the Project on floodplain hydrology and surface water quality were a key concern. Submitters were significantly concerned about how the Project would be operated and if inundation events would be managed to mimic natural flood behaviour. Several submissions expressed concern about the impacts the changes in patterns of inundation could have on the natural functioning of ecosystems in the Project areas, and that managed inundation events would not replicate a natural over-bank flood event, causing reduced connectivity and nutrient cycling.

Some submitters were concerned that the ponding of water on the floodplain behind containment banks would impact water quality by increasing the frequency of hypoxic blackwater events and the prevalence of algae blooms and cyanobacteria. The potential for increased salinity in the Project areas and saline water being discharged to the Murray River was another area of concern.

Impacts of the Project altering downstream flows was also a concern for submitters. They submitted the Project would affect the availability of environmental flows to downstream projects and this may compromise their operation and the achievement of their ecological outcomes. Concern was also raised that the Project would impact and reduce environmental water recovery for downstream Ramsar wetlands.

A portion of submissions also raised concerns that the Projects are not genuine ecological restoration projects and that methods to be used are untested and experimental. The reliability of the Source Murray Model was also raised as a concern, as well as, that the Projects are not represented in the Source Murray Model and assessed as part of a larger system.

Terrestrial ecology effects and impacts on biodiversity

While submitters generally acknowledged that managed inundation of the Project areas would be beneficial to native vegetation, some submitters were concerned about the impact the inundation would have on the existing established vegetation and possible ecological loss if inundation was not managed appropriately. Concern was also raised that the managed inundation of only a few key locations would be harmful to the remainder of the floodplain habitats and it would not allow the river system as a whole to be managed which could result in significant ecological losses.

Several submitters were concerned about the extent of proposed native vegetation removal associated with Project construction and the consequential adverse impacts on biodiversity and habitat, through the loss of large and very large trees and hollow-bearing trees for hollow dependent species. Some submissions considered more flora and fauna surveys should be carried out to ensure baseline data is accurate.

Several submissions pointed to the impacts the Project could have on rare and threatened species, including Regent Parrot, Painted Honeyeater, Growling Grass Frog and Carpet Python.

Concern was raised in relation to the lack of a native vegetation offset strategy, on the assumption the Project would have an overall predicted biodiversity benefit. Several submissions also noted

native vegetation offsets can be difficult to assess and are rarely like for like and are often unmeasured.

Some submitters noted the benefits of the Project may not be as extensive as alternative options.

Concerns were expressed that no rationale is provided by the Proponent as to why building infrastructure to achieve a return to more natural water inundation regime will achieve an improvement in floodplain condition.

Aquatic ecology effects

Several submitters expressed concerns about the impacts and risks the Project could have on aquatic ecosystems and biota and rare and threatened aquatic species during construction and managed flood inundation events.

Several submitters were concerned Project's operations would cause the degradation of aquatic habitat through water quality changes and pose a risk to aquatic fauna, in particular fish and the Murray Crayfish. Concern was raised that proposed mitigation measures were inadequate and the mitigation strategies in the Fish Management Plan may not be practically implemented.

The risk of stranding aquatic species (including native fish and turtles) on the floodplain from the Project operation was also raised as a concern. Concern was also raised that inadequate flooding (due to lack of water or restricted use of environmental water) would result in large fish kills due to blackwater events when inundation – either natural or managed - does eventually occur (as seen in the 2022 flood).

Several submitters expressed concerns about the effects of the Projects on connectivity for aquatic fauna. They noted the construction of structures, including regulators and containment banks would reduce the connectivity of floodplain ecosystems by impeding the passage of aquatic fauna including fish and turtles.

Other repeated concerns included the impact the Projects operation would have on increasing carp populations, as well as the potential for weed infestations and aquatic weeds to be transferred into other habitats by managed watering events.

Impacts on Aboriginal cultural heritage

Some submitters raised concerns regarding the adequacy of the Proponent's consultation with Traditional Owners. They submitted it lacked depth, appeared not to be genuine and did not engage with Traditional Owner interests and aspirations.

Concerns were raised in relation to the Project destroying and damaging Aboriginal cultural heritage sites, including altering the pattern of water movement and impacting areas used by Traditional Owners.

1.5 Roundtable

In the referral letter (D1), the Department of Transport and Planning (**DTP**) suggested a Roundtable process for considering submissions may be suitable; this was confirmed by the Committee following receipt of submissions.

A Directions Hearing was held by videoconference on 20 March 2023. Directions and a timetable were issued (D6) explaining the process for the Roundtable and including procedural directions.

The Roundtable was held in person (with video joining capacity) in Swan Hill on 13 and 17-20 April 2023. A final day was held via videoconference for closing submissions on 26 April 2023.

Compared to a Hearing, the Roundtable was run on a less formal basis with structured theme days and more opportunity for discussion and questions. A session was provided on 20 April 2023 for discussions with First Nations people around Aboriginal cultural heritage.

1.6 Deferral of Burra Creek Project

Prior to the Roundtable commencing, the Proponent advised that it was undertaking further work on the Burra Creek Project because of the identification of backflow effects from the Wakool Junction and would not be ready to consider this project at the Roundtable (D11).

The Committee therefore addressed only the Nyah and Vinifera projects in the Roundtable and in this report. The future process for Burra Creek will be determined following the further evaluation work being undertaken by the Proponent with a Roundtable likely later in 2023.

1.7 Site inspection

A draft itinerary for inspecting the three projects was developed by the Proponent at the Committee's request. The Committee provided an opportunity for party input (D3).

The Committee and Senior Project Officer inspected the Nyah and Vinifera projects on an unaccompanied basis on 14 April 2023, inspecting all the key project infrastructure locations except Location 9 (Containment Bank 6) in Nyah due to track closures associated with recent flooding.

The Committee had intended to inspect the Burra Project locations, but this did not occur due to a lack of time and the possibility of project infrastructure being modified after further investigations.

1.8 The Committee's approach

The material before the Committee is significant and includes:

- the ER main report, attachments and Specialist Assessments
- 14 submissions
- 108 tabled documents, plus many more referred to the Committee that were tabled in the EES Central process.

The Committee has considered all issues put to it, but has not explicitly responded to every written submission or further submission in this Report.

The TOR at Clause 44, includes:

The SIAC should, as appropriate, use relevant understandings gained from SIAC's other public hearings or roundtable forums, including to assist with common matters and consistency.

Accordingly, the Committee has built on the identification of key issues and lessons from the EES Central process.

However, at Clause 47, the TOR make it clear that each assessment package must be assessed on its merits. Some of the issues raised in submissions or evidence about ER Central were also raised in submissions or evidence about EES Central. This Committee generally reaches the same overall

conclusions in relation to the common issues in the EES Central report. In some instances there are differences in detail in the recommended Incorporated Document and EMF due to:

- different issues raised in the ER Central Project, for example differences in the Project natural environment setting such as proximity to the river, floodplain character, habitat and species
- building on the approach in EES Central to strengthen and clarify Project implementation measures.

This Report has four parts:

- Part A: Introduction and background
- Part B: Environmental effects and benefits
 - Surface water and groundwater
 - Soils and land stability
 - Ecological effects of construction
 - Ecological effects of operation
 - Ecological effects and offsets
 - Aboriginal cultural heritage
 - Historic heritage
 - Social and business
- Part C: Approvals and implementation
- Part D: Appendices.

There are other issues, which while important, the Committee considers can be managed through the Incorporated Document, EMF and other project approvals and are not addressed in detail in this report. These issues are:

- Land use
- Agriculture
- Bushfire
- Landscape and visual
- Noise and vibration
- Traffic and transport
- Air quality.

1.9 Acknowledgements

The Committee thanks all who participated in its process. It appreciates the time and effort put in through written submissions, evidence and speaking at the Roundtable.

The Committee thanks the Proponent for its administrative support, including organising the logistics for the hybrid Roundtable, managing the document sharing platform, and providing technical support throughout the process.

The Committee particularly thanks staff at Planning Panels Victoria for their support and assistance throughout the process, with special acknowledgement to Amy Selvaraj, Senior Project Officer and Gabrielle Trouse, Project Support Officer.

2 The Project

VMFRP overview

2.1 Background

Figure 2

The Project forms part of the VMFRP which is a SDLAM project under the Murray-Darling Basin Plan (Basin Plan).

The broader background to the VMFRP is outlined in Section 1 of the ER and section 2.1 of the EES Central Report. The Vinifera and Nyah Floodplain Restoration Projects are the subject of this report and can be seen in context in Figure 1.



Source: ER Section 1

The Project is within the Rural City of Swan Hill and Mallee Catchment Management Authority (**Mallee CMA**) area except for a drop structure within the river, which is in the Murray River Council local government area in NSW.

The Project is in an area where Traditional Owners and Aboriginal parties and organisations have not been formally recognised under relevant legislation, either as a Registered Aboriginal Party (RAP), through a Native Title Agreement or through a Recognition Settlement Agreement.

2.2 Vinifera

(i) Project site

The Vinifera project is approximately 25 kilometres north west of Swan Hill as shown in Figure 3. It comprises the construction footprint (containing the proposed infrastructure) and the Maximum Inundation Area (**MIA**).

The Vinifera floodplain has an area of 638 hectares of wetland, forest and woodland of which the Project aims to facilitate inundation of approximately 335 hectares.

The ecological and human use values of the floodplain are described in Section 6 of the ER.



Figure 3 Vinifera Project area

Source: ER Section 1

(ii) Project components

The infrastructure works for Vinifera are described in Section 6 of the ER, and shown spatially in Figure 4, including:

- one large regulator (V1 Box culvert regulator)
- two small regulators (V2 Box culvert regulator and V4 Regulator)
- one pipe culvert regulator (V3 Pipe culvert regulator)
- containment banks (2.3 km) incorporating seven spillways
- a drop structure to provide erosion control for flows returning from the floodplain to the Murray River
- one permanent hardstand, for temporary pumps to transfer environmental water as required
- upgrades to existing access tracks (approximately 1 km)
- creation of new access tracks (approximately 2 km)
- use of existing access tracks, including for maintenance activities during operation (approximately 1.7 km).

No permanent pumps are proposed, and no redundant structures are to be removed. Several regulators replace existing road culverts.



Figure 4 Vinifera Project components

Source: ER Section 6

2.3 Nyah

(i) Project site

The Nyah project is approximately 30 kilometres north west of Swan Hill as shown in Figure 35, immediately north of Vinifera. It comprises the construction footprint (containing the proposed infrastructure) and the MIA.

The Nyah floodplain has an area of 913 hectares of wetland, forest and woodland areas of which the Project aims to facilitate inundation of approximately 475 hectares.

The ecological and human use values of the floodplain are described in Section 6 of the ER.



Figure 5 Nyah Project area

Source: ER Section 6.

(ii) **Project components**

The infrastructure works for Nyah are described in Section 6 of the ER, and shown spatially in Figure 6, including:

- one large regulator (N2 Regulator)
- four small regulators (N1a Regulator, N1b Regulator, N5 Regulator and N7 Regulator)
- containment banks (1.6 kilometres)
- one drop structure to provide erosion control for flows returning from the floodplain to the Murray River
- one permanent hardstand area, for temporary pumps to transfer environmental water when required
- upgrades to existing access track (approximately 0.3 kilometres)
- creation of new access tracks (approximately 2.8 kilometres)
- use of existing access tracks, including for maintenance activities during operation (approximately 4.3 kilometres)
- decommissioning and removal of two redundant structures (N4 Bank and Pipe) and a block bank (N6 Regulator) in Parnee Malloo Creek.

There are no permanent pumps proposed as part of the Nyah project.



Figure 6 Nyah Project components

Source: ER Section 6.

PART B: ENVIRONMENTAL EFFECTS AND BENEFITS

3 Surface water and groundwater

3.1 Introduction

Surface water and groundwater are discussed in:

- ER Sections 10.1 and 10.2 for Vinifera and Sections 14.1 and 14.2 for Nyah
- Specialist Assessment C Surface Water
- Specialist Assessment D Groundwater
- ER Attachment V Vinifera Assessment of overall improvement for biodiversity
- ER Attachment VI Nyah Assessment of overall improvement for biodiversity.

The exhibited EMF includes the following EDS:

- GW1 Groundwater management Construction
- GW2 Groundwater management Operation
- SW1 Surface water management Construction
- SW2 Surface water management Operation
- SW3 Surface water Monitoring.

The Proponent provided the following Technical Notes and reports:

- TN01 Ecological Associates Reports (D22, D23, D24)
- TN07 Groundwater expert evidence response to questions taken on notice (D95)
- TN10 Surface water expert evidence response to questions taken on notice (D98).

Additionally, the Committee had regard to:

- relevant submissions and evidence
- the Proponent's Final Day EDS and Monitoring Requirements (D84).

Error! Reference source not found. lists the surface water and relevant groundwater evidence.

Table 1	Surface water and groundwater evidence
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Party	Expert	Firm	Area of expertise
Proponent	Dr Simon Treadwell (D12)	Jacobs	Surface water
Proponent	Greg Hoxley (D13)	Jacobs	Groundwater

3.2 Hydrologic assessment of Murray River flows (the Source Murray Model)

(i) The issue

The issue is whether the hydrologic assessment of the effects of water resource development on flows in the Murray River is fit for purpose. The hydrological assessment underpins the assessment of the Project's hydraulic, water quality and ecological effects.

The EES Central Committee found that the MDBA's Source Murray Model (SMM) was fit for purpose in providing modelling for the Belsar-Yungera and Hattah Lakes North projects.³ The SMM is a daily time-step hydrological model that links various river system models from Murray-

³ See section 5.2 in SIAC Report for EES Central

Darling Basin states and territories. The SMM was established by the MDBA in consultation with Basin states pursuant to requirements in the *Water Act 2007* (Cth). It can be configured to represent different levels of water resource development. Attention here focuses on relevant aspects of using the SMM for assessing the Vinifera and Nyah projects.

(ii) What did the ER say?

Hydrologic assessments were presented in two parts of the ER, Specialist Assessment C (Surface Water) and Attachments V and VI (Vinifera Assessment of Overall Improvement in Biodiversity and Nyah Assessment of Overall Improvement in Biodiversity). The current hydrology of the Murray River and the Vinifera and Nyah floodplains was described based on a synthesis of information from available modelling and past reports. Modelled flows were produced by the MDBA, using the SMM. Key assumptions underlying the SMM model runs for different flow scenarios relate to the level of river regulation and the amount of water allocated to consumptive uses. SMM data for the Swan Hill to Wakool reach were extracted for the purposes of the ER. Flow series used in the ER assessment are shown in Table 2.

Flow scenario	Model run	Period	Description
Natural (Without Demand)	Source Murray Model 1015	1896-2009	The without-development scenario is a near natural condition model run. It is based on the baseline conditions scenario, from which all of the dams, irrigation and environmental works infrastructure and all consumptive users (such as irrigation, town water supply and industrial water uses) are removed from the system. (MDBA 2011)
Baseline (current)	Source Murray Model 1016	1896-2009	The baseline scenario represents the water sharing arrangements and diversions as permitted by the transitional and interim water resource plans, where these were in place as at June 2009 (MDBA 2011)
Benchmark (BP2750)	Source Murray Model 1132	1896-2009	A modelled scenario with the water recovery of 2750 GL in annual average for environment from the Baseline scenario, the Benchmark model is defined in schedule 6 of the Basin Plan (MDBA, 2017a)
Benchmark (BP2100)	Source Murray Model 1138	1896-2009	A modelled scenario with the full operation of the notified supply measures in the Basin Plan Benchmark and their supply contributions of 605 GL (MDBA, 2017b)
Historical	Gauged data	Varies depending on site	Measured flow that represents the actual flow experienced inclusive of changes associated with historical water resource development

Table 2	Flow scenarios referred to and used in Specialist Assessment C
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Source: Table 3-4 in Specialist Assessment C

Specialist Assessment C summarises these various flow scenarios in graphical plots. Figure 7 shows time series of the MDBA modelled Natural and Benchmark flows as well as historical flows at Swan Hill relative to key inundation thresholds at Nyah. Note the decline in flood events since the mid-1990s.



Figure 7 Natural, Benchmark and Historical flows at Swan Hill relative to inundation thresholds at Nyah

The histogram in Figure 8 shows summary data for over a century. It highlights the drop in the frequency of flood events over 20,000 ML/d at Swan Hill in recent decades due to climate variability and water extraction. The grey dashed line shows the frequency of floodplain inundation at this flow level that is proposed to be achieved through the Nyah project.

Specialist Assessment C did not provide flow scenarios that factored in the implementation of specific VMFRP projects. Rather it notes the benchmark BP2100 scenario represents the implementation of all notified SDLAM supply measures that collectively would enable the allocation of another 605GL/y to consumptive uses. It also notes the relatively small allocation of water from environmental entitlements required for the Vinifera (0.4GL/y) and Nyah (0.8GL/y) projects, and the expectation that most of this water would return from the floodplains to the Murray River.

Specialist Assessment C notes that the MDBA had completed a climate change stress test on the VMFRP projects in 2021.⁴ The approach involved the development of a series of SMM flow scenarios representing wet, medium and dry climate outcomes at the years 2045 and 2070. The expectation is that the frequency of natural floodplain inundation will continue to decrease, reinforcing the case that managed inundation events will be needed more often.

Source: Specialist Assessment C page 203

⁴ The final report is 'Victorian Murray Floodplain Restoration Project Climate Change Stress Test', Murray–Darling Basin Authority Canberra, 2022



Figure 8 Frequency of inundation events associated with Swan Hill flow >20,000ML/d⁵

Source: Specialist Assessment C, upper panel of Figure 10-6 on page 211

Attachments V and VI presented hydrologic comparisons based on three modelled cases provided by MDBA: pre-regulation, regulated river, and Basin Plan. The Basin Plan case is understood to be equivalent to the benchmark BP2750 case presented in Specialist Assessment C but based on an earlier MDBA model (D98). This is not clearly documented.

(iii) Evidence and submissions

The ER relied on previous hydrological modelling to support its assessment of potential project effects related to the interaction of river flows and floodplain inundation. Expert evidence provided to the Roundtable by Dr Treadwell on behalf of the Proponent stated that the ER (Specialist Assessment C) *"has relied on the data provided by the MDBA as representing the best available flow data at the time and as has been agreed as the baseline for water planning under the Basin Plan"*. He advised that the MDBA has indicated its intention to update the SMM to incorporate climate change, but the updated modelling was not available for the ER assessments.

Submissions from Environment Victoria and the ANU Fenner School questioned whether the hydrological modelling had considered an appropriate range of scenarios. Environment Victoria observed that:

The VMFRP and other SDLAM projects are not explicitly represented in the SMM and therefore this modelling does not assist in understanding the cumulative impacts of those works.

Relevant to this concern, Dr Treadwell observed in his expert witness statement that:

The MDBA is in the process of reviewing and updating their processes for coordinating SDLAM projects into their operational framework and for addressing potential dependencies and interactions between different water management objectives.

The ANU Fenner School (together with several other submissions) expressed concern that the ER does not consider *"how the implementation of constraints management in the Goulburn River and*

⁵ For modelled natural, baseline and benchmark conditions, historical flows and compared to the proposed inundation frequency at Nyah.

the Hume to Yarrawonga reach of the River Murray will affect the operation of these [VMFRP] projects".⁶

Further:

There is no assessment of a scenario of 'Basin Plan with Constraints management' for these VMFRP projects. Yet in July, 2022 the NSW government released comprehensive hydraulic modelling, validated against satellite imagery, of the extent of inundation under different scenarios of flow volume, for its Reconnecting River Country program for managing constraints in the NSW Basin (DPE 2023)

The models include the area covered by the Vinifera, Nyah and Burra Creek projects (Swan Hill to Boundary Bend), based on flows scenarios of 15,000, 25,000, 30,000 and 40,000 ML/day downstream of Yarrawonga Weir (where 30,000 ML/day at the Yarrawonga Weir downstream gauge is equivalent to 24,000 ML/day at the Swan Hill gauge).

The Proponent countered that constraints management was outside the Committee's scope. The Proponent submitted that it was "unable to identify any modelling which could reasonably be said to represent the likely or actual outcomes of constraints measures, given the associated degree of uncertainty" (D98). The Proponent pointed to its Part C Submission to the EES Central hearing, which stated at paragraph 122.3 that:

...even assuming constraints measures are delivered, they will not themselves guarantee appropriate levels of flow in the River at the Project sites as would be required to water the full extent of the MIA, or necessarily provide for appropriate levels of flow to undertake watering in patterns closer to natural seasonal variation.

However, in its Part C Submission to ER Central the Proponent advised that:⁷

In the context of VMFRP projects, constraints relaxation measures could be expected to complement environmental works by providing additional opportunities for the operation of works or reducing the need for pumping. They will not deliver inundation of the requisite frequency or duration.

In his expert witness statement, Dr Treadwell offered a wider perspective:

If implemented, Constraints Management offers a range of benefits to broader floodplains outside of the VMFRP project areas, but may also provide additional benefit to VMFRP project areas through optimised environmental water delivery. If Constraints Management are not implemented, the VMFRP projects can stand alone as mechanisms for enabling managed inundation, particularly of higher floodplain elevations.

Environment Victoria's submission also referred to investigations by the Wentworth Group of Concerned Scientists suggesting that significant inaccuracies may exist in the SMM outputs.

In terms of other reservations about the modelling, the ANU Fenner School also asserted that:

There is no credible modelling of climate change impacts in the Environment Report that details its impacts on the operation of the projects, not [nor?] whether the projects themselves will be sufficient to address the effects of climate change on changes in flow and flood regimes.

Relevant to aspects of the concerns raised by Environment Victoria and the ANU Fenner School, Specialist Assessment C noted that the SMM is currently being updated to include explicit representation of all SDLAM projects, and to enable further insights into climate change impacts.

⁶ 'A 'constraint' is a technical term for anything that reduces the ability to deliver water for the environment. Constraints can include physical restrictions such as low lying bridges, crossings or private land. Constraints can also include operational aspects such as river rules or operating practices. These 'constraints' mean we are not running the river system as efficiently as we could.' from https://www.mdba.gov.au/basin-plan-roll-out/managing-constraints

⁷ ER Central Part C Submission page 7.

Neither Environment Victoria's submission nor that from the ANU Fenner School identified an alternative to SMM for modelling the Murray River flows.

(iv) Discussion

Like the EES Central Committee, this Committee is satisfied that use of the SMM for the ER was appropriate. There was no evidence that the SMM modelling tool was inadequate for the modelling of Murray River flows, or that a superior alternative was available.

At the same time, a somewhat limited set of modelled flow scenarios for the local reach of the Murray River, as generated by the SMM, has been relied on for the ER. Several implications warrant consideration here.

First, the rationale for using the benchmark BP2100 and the BP2750 flow scenarios in various assessment contexts is not clear. As noted above, the SMM is being updated by the MDBA to explicitly address the implementation of SDLAM projects, including interactions between different projects and the use of environmental water allocations.⁸ In the absence of a more refined model, the ER should have explained the implications in terms of the interpretation of the benchmark scenarios and associated uncertainties, both in the Surface Water Assessment (Specialist Assessment C) and assessments of overall improvements in biodiversity (Attachments V and VI).

Second, notwithstanding that the policy alternative of implementing constraints management projects is outside the scope of the Committee, explicit consideration of flow scenarios that took account of the potential contribution of the constraints management proposals to passing river flows would have been helpful. At the very least, it would have been appropriate for the ER to examine constraints relaxation in the context of cumulative effects and benefits, in the same way that other related and unrelated infrastructure projects have been considered in the cumulative effects assessment.

Third, the ER relied on the MDBA's modelling of future Murray River flows at Swan Hill, together with a qualitative discussion of water availability, to address the implications of climate change. Noting the forthcoming update of the SMM, this was a reasonable approach. This Committee, like the EES Central Committee, has proceeded on the basis that the Project will increase resilience to climate change, and has not discussed climate change as it relates to the SMM further.⁹

That said, the implications of climate change for passing flows and project operation are matters that will require further and on-going attention during project design and operation for all VMFRP projects.

(v) Findings

The Committee finds:

- the SMM is fit for the purpose of modelling passing flows in the Murray River to underpin the assessment of environmental effects of the Vinifera and Nyah projects
- the combination of the natural, baseline, BP2100 and BP2750 Benchmark flow scenarios and gauged data provides a sufficient hydrologic context for assessing the effects of the Vinifera and Nyah projects
- future assessment, implementation and communication of VMFRP projects should:

⁸ This is noted in Victorian Murray Floodplain Restoration Project Climate Change Stress Test, Murray–Darling Basin Authority Canberra (2022), page ii.

⁹ See Chapters 4(vii) and 5.2 of the EES Central Report.

- make appropriate use of updated SMM modelling when available, particularly in relation to the implementation of other SDLAM projects and climate change
- consider the likely implications of implementation of SDLAM constraints relaxation measures for available flows.

3.3 Modelling of floodplain hydraulics

(i) The issue

The issue is whether the hydraulic modelling and assessment for the ER is adequate to inform the assessment of likely floodplain inundation (and its ecological consequences) and erosion risks.

(ii) What did the ER say?

Specialist Assessment C addresses the hydraulic effects of the proposed use of infrastructure to hold water on the floodplain at a particular level and for some regulated duration. It explains that managed inundation events can result in hydraulic differences from unregulated flood events, including the period and depth of inundation, changes in flow velocities and shear stresses leading to increased erosion in certain areas, as well as degradation of habitats and even ponding of water leading to vegetation losses. The results of the hydraulic assessment were used to inform the geomorphological and ecological assessments in Specialist Assessments C and B, as well as the assessments of overall improvement in biodiversity in ER Attachments V and VI.

The assessment of the hydraulic effects of the Project in Appendix B of Specialist Assessment C relies largely on graphical analyses of the modelled pattern of depth distributions, flow velocities and bed shear stresses. The analysis is in the form of box plots that capture the statistical variation of these parameters across grid cells within segments of the respective floodplains. Figure 9 provides examples for the Nyah floodplain for inundation at a 25,000 ML/day flow. Appendix B of Specialist Assessment C provides similar plots for the Vinifera floodplain.

(iii) Evidence and submissions

Several submissions raised broad concerns relating to the effects of managed – especially pumped – inundation of the Vinifera and Nyah floodplains, as distinct from unregulated or 'natural' events.

In relation to hydraulic effects, Ms McKay's submission expressed concern that the proposed works would alter *"the pattern of water movement"*, including with respect to 'flood runners' that connect the river to billabongs. Friends of Nyah Vinifera Park (**FoNVP**) expressed a similar concern in their final day submission, in terms of the impact of altering the floodplain topography.


Source: Specialist Assessment C, Appendix B, Figures B-6, B-9 and B-12.

Location

Dr Treadwell responded to these concerns in his expert witness statement, in part by stating:10

Pumping is not the preferred mode of operation because it is not necessarily associated with natural cues and some aspects of pumping do not as closely match an unregulated flood or flood capture event (e.g. rates of flow through). However, pumping does enable watering to be undertaken in the absence of unregulated flows that result in inundation of the project area, and in that context can be a mechanism for providing floodplain inundation during extended periods of low river flows, subject to the needs of the floodplain community.

Modelling of the inundation patterns for the project areas was used to identify locations for infrastructure (regulators, containment banks and spillways) that would enable an unregulated flood event to pass across the floodplain in a way that is hydraulically similar to current conditions. Regulators and spillways are proposed to be located at key points of flow to ensure that water flow is maintained in a natural pattern across the floodplain to areas outside the managed inundation extent during an unregulated flood event. In this way those parts of the floodplain outside of the managed inundation extent would continue to experience inundation during unregulated floods in way that is similar to current.

Only the ANU Fenner School referred explicitly to hydraulic modelling, in relation to that undertaken for the NSW Reconnecting to River Country program. In contrast to the ER focus on modelling outcomes, several submitters at the Roundtable suggested there were missed opportunities to tap indigenous and community knowledge.

During the Roundtable, the Committee asked the Proponent to clarify aspects of some plots in Specialist Assessment C, particularly in terms of variations of depth, velocity and shear stresses during the release of managed inundation via regulators. In response the Proponent provided useful context in TN10 (D98), noting that the modelling assumes steady state flows and maximum regulator opening during the release phase. The latter assumption is conservative, and the Proponent noted that EDS SW2 requires release rates to be managed to avoid high downstream velocities and hence shear stresses.

In response to questions from the Committee, the Proponent tabled extensive further information about the hydraulic assessment of the Project, including mapping of modelled inundation depths (D13a and 13b), the hydraulic modelling reports by Jacobs that informed the Specialist Assessment C (D99, D100), and responses to questions about the interpretation of the hydraulic information in Specialist Assessment C. Some key points arising from this additional material are:

- The Nyah project infrastructure is expected to increase flood levels in the Nyah MIA compared with existing conditions whereas the Vinifera project infrastructure is not expected to increase flood levels due to the flat topography of the Nyah floodplain (D99 and D100)
- Hydraulic mapping for the Project is limited to the depth and extent of inundation. No maps were provided for velocity or shear stress (including in the Jacobs D99 and D100 modelling reports)
- There are differences between the ER and Jacobs reports (D99 and D100) with the regard to the specifications of the Project infrastructure, which may have implications in relation to the hydraulic effects of various structures.

The Committee also asked that maps of flow velocities and bed shear stresses be generated from the hydraulic model data files. It was later advised that this was not feasible.

¹⁰ Expert witness statement of Dr Treadwell, page 14.

(iv) Discussion

The Committee's interest in the hydraulic modelling used in the ER reflects its importance in underpinning the assessment of floodplain inundation, the ecological consequences of this, and erosion risks during the filling and draining of the floodplain.

The EES Central Committee found that the hydraulic modelling of the EES Central projects did not adequately define the effects of those projects on floodplain hydraulics within the project areas. It recommended a new EDS SW4 requiring hydraulic effects to be determined in more detail, to confirm the effects of the projects on floodplain vegetation and to inform detailed design and operation of the projects.

This Committee has reached essentially the same conclusion in relation to the hydraulic modelling undertaken for the Vinifera and Nyah projects. It provides additional commentary below to that provided in Chapter 5.3 of the EES Central report, to further explain its conclusion.

Prior to the Roundtable, the Proponent tabled two reports that assessed the extent of inundation of the Ecological Vegetation Classes (**EVCs**) on the Vinifera and Nyah floodplains resulting from different levels of flooding, extending beyond the proposed MIAs (D23 and D24). They provide a more detailed analysis of the likely inundation of EVCs than that provided in the ER Specialist Assessments B and C (discussed further in section 6.2).

Specialist Assessment C outlines the development of the hydraulic modelling in Appendix B. Jacobs was initially commissioned by Mallee CMA in 2014 to develop hydraulic models for the Nyah-Vinifera and Burra Creek. These models were peer-reviewed in 2014 and 2016. The reviewer considered the models suitable to underpin the Project businesses case but that the *"detailed design phase might demand a higher level of certainty"*. The key recommendations were for:

- model calibration from observed events
- inclusion of bathymetric data for the Murray River and key floodplain anabranches.

Later Jacobs modelling in 2017 reiterated the reviewers' recommendations, one concern being that "available calibration data is limited, with the most reliable information is anecdotal evidence on River Murray flows at which breakouts occur into the floodplain". The Committee understands these recommendations have not been implemented, although detailed design is yet to commence.

Maps showing the extent and depth of floodplain inundation are presented in Appendix B of Specialist Assessments C. These appear to have been derived from the work done by Jacobs in 2016/17 and documented in the 2017 reports on 'Hydrodynamic Modelling of SDL Sites' for the Vinifera Forest and Nyah Forest (D99 and D100).

The maps were provided for natural conditions, current conditions and for the proposed works. These maps were difficult to compare due to being on separate sheets, and difference maps to contrast the depth of inundation under current and proposed conditions were not provided.

The inundation depth/extent maps in Appendix B were presented with one metre intervals. Dr Treadwell advised that data files from the hydraulic modelling exist for 1 centimetre depth intervals. The Committee asked if maps with 25 centimetre depth intervals and difference maps could be provided but the Proponent advised this was not feasible in the time available. The Committee's sought the information to assess the relationship more clearly between inundation depths and the distribution of EVCs across the floodplains, and any significant implications.

Appendix B concluded that uncertainties related to calibration and bathymetry were likely to have a low impact on the modelled MIA, while uncertainties in estimates of velocity and shear stress are likely to be similar across scenarios (particularly during filling), so comparative differences would still be valid for assessing potential impacts.

From the Roundtable, and subsequent clarification from the Proponent, the Committee considers that even with the relatively coarse-grained analysis it been sufficient to:

- demonstrate the broad pattern of floodplain inundation under different flow threshold scenarios
- indicate that the Nyah project will lead to elevated water levels on parts of the floodplain
- indicate that the Vinifera project is not expected to increase flood levels compared with existing conditions due to the flat topography of the Vinifera floodplain
- indicate that water velocities and bed shear stresses are unlikely to generate erosion that cannot be mitigated through Project controls
- indicate low velocity conditions that would enable deposition of sediment and organic matter on the floodplain.

However, consistent with the EES Central Committee's findings, more detailed modelling of the hydraulic effects of the Project is required to confirm the effects of the Project on floodplain vegetation, and to inform detailed design and operation of the Project, including:

- A finer-grained analysis (at a suitable horizontal and vertical scale) of the extent and depth of inundation to better understand the implications for EVCs for both projects.
- Mapping of the depth, velocity and bed shear stress outputs of the hydraulic modelling to supplement the box plots. The box plots may obscure significant local variations (in part suggested by the long 'whiskers' in many instances) and provide limited assistance for comparing hydraulic performance. The mapping should include difference maps of relevant parameters at their maximum levels for different inundation scenarios to assist in making comparisons at specific sites and for particular EVCs.
- More detailed time steps are needed in the hydraulic modelling to adequately determine the effects of held water release on velocity and shear stress loadings (this is discussed further in section 4.2). For example, the high velocities at site N2DS 1D (Figure 9) suggests potential erosion risks and fish passage effects that require further consideration during Project development.
- Appropriate calibration of hydraulic modelling to support more accurate modelling in:
 - assessing the effects of managed inundation scenarios for EVCs and individual species
 - informing detailed design of proposed works with respect to flow velocities, shear stress and erosion risks
 - providing the basis for on-going refinement of predictive modelling as part of adaptive management.
- The calibration of the modelling should include surface roughness and flow velocities, noting that both erosion and deposition of detritus will be affected by this.

(v) Findings

The Committee finds:

- the hydraulic modelling for the ER is adequate to enable assessment of ecological consequences and erosion risks of the Vinifera and Nyah projects for the purposes of Project approval
- more refined spatial analysis of likely depths and periods of inundation during inundation scenarios, using an appropriately calibrated model, is required prior to Project detailed design and implementation to:
 - enable a more accurate prediction of the Project ecological effects at a finer scale, which can then inform a refined assessment of the overall change in biodiversity
 - provide an appropriate foundation for detailed Project design and use in adaptive management
 - map velocity and shear stress to inform the detailed Project design to address the risk of erosion and/or sediment deposition.

The ecological consequences of this issue are discussed later in this report including recommended changes to EDS. Changes to the EDS around this issue were recommended in EES Central and this Committee's work builds on that approach.

3.4 Blackwater and algal bloom events

(i) The issue

The issue is whether managed inundation of the Vinifera and Nyah floodplains will increase the risk of blackwater and algal bloom events. The likely effects of blackwater events on aquatic ecology are addressed in section 6.6.

(ii) What did the ER say?

Blackwater events are caused by low levels of dissolved oxygen (**DO**) and can lead to 'fish kills' and loss of other aquatic fauna. Blackwater occurs when organic matter rapidly decomposes with the associated leaching of dissolved organic carbon (**DOC**) and consumption of DO.

Specialist Assessment C identifies key factors leading to blackwater events as: the accumulation of large amounts of organic detritus on the floodplain, slow-flowing or stagnant inundation with little mixing of the water column, the DO content of inflowing waters, and elevated water temperatures during warm weather. It noted that River Red Gum forests have high levels of leaf fall contributing organic matter.

Specialist Assessment C presented the results of 'blackwater modelling' of managed inundation events on the Vinifera and Nyah floodplains. In summary at page 149 it said:

The results show that DO concentration in water on the floodplain rapidly declines to zero upon the initial inundation of organic material that is present on the floodplain ... The DO remains low for a period of time until the majority of organic material is decomposed and then throughflow of water helps to bring in higher oxygenated water that eventually results in an increase in DO in floodplain water. ... Longer duration events do not necessarily result in more severe outcomes because the DO has recovered. However, pumped events to maximum inundation extent tends to have a longer period of low DO. This is likely because flood capture results in an initial removal of organic material from the floodplain during the initial inundation period, which acts as a first flush. Hence there is less residual organic matter on the floodplain when flood capture occurs compared to a pumped event where there is reduced opportunity for a 'first flush' event.

Figure 10 suggests that there could be a significant difference between the lower and higher flood levels in terms of the persistence of low DO conditions, the retention of a high flood potentially leading to some months of low DO conditions, even more prolonged for a pumped event.





Source: Specialist Assessment C, Figure 7-17, page 150. Murray River inflow is assumed to have typical dissolved oxygen and dissolved organic carbon concentrations.

Specialist Assessment C (on page 153) concludes that the managed inundation of the Vinifera and Nyah floodplains:

... may result in some localised water quality degradation that could lead to low DO concentrations. Even though DO is modelled to decline to low levels, the likelihood of adverse effects is low because screens on inflow pumps will minimise the chances of fish entering the floodplain during an event. The potential for adverse effects during a flood capture event or transition from a managed event to an unregulated event is also low because throughflow will provide opportunities for fish to exit the floodplain [if] conditions are unsuitable.

Increased algal blooms were identified as another risk in the Project. Algae, including blue-green algae (cyanobacteria), are normally present in aquatic ecosystems and may form dense blooms under favourable conditions, including during managed inundation.

A key factor is the timing of managed events. If these occur in winter and early spring, there is a low risk of excessive algal blooms in the Murray River and hence for seeding of algal blooms during managed inundation of the floodplain. However, extension of managed inundation events into early summer, with higher temperatures and light levels, would increase the risk.

The Final Day version of the EMF included wording within EDS SW2, which is intended to guide operational actions "to avoid, minimise and manage where practicable" both blackwater events and excessive algal growth.

(iii) Evidence and submissions

Submission 9 from Ms McKay asserted that blackwater events are a recent phenomenon in the local reach of the Murray River:

There were barely any cyanobacteria or hypoxic events, prior to the 2011 flood. I am careful to consult elders in the river communities at every available opportunity. Only one person could recall any blackwater, a single event in the Edward-Wakool system several decades ago, that was short lived and in one area.

When the accumulation of organic matter is excessive, (exacerbated as years pass without inundation), when there is a large uncontrolled flood event, it is impossible to prevent a massive blackwater event. The ecological devastation of this is huge. These events have occurred in 2011, 2016, and now in the 2022-2023 flood event.

The submission pointed to the need for "*regular over the bank flooding*" to avoid hypoxic/blackwater events, expressing concern that pumped inundation events would lead to stagnant conditions on the floodplain.

Expert evidence submitted by Dr Treadwell (D13) noted that:

... severe dissolved oxygen decline leading to hypoxic and anoxic conditions is more likely to occur following very large flood events when large areas of floodplain are inundated and following a long duration of no floods, which enables a large accumulation of organic material on floodplains.

He further noted that the modelling for Specialist Assessment C had shown the potential for low DO conditions to develop on the floodplain during managed inundation was similar to a natural flood event.

In responding to a request from the Committee for written input on appropriate revision of EDS SW1-3, including *"where possible to more specifically identify performance outcomes sought"*, Dr Treadwell (in TN10) proposed amendments to two dot point in EDS SW2:

- Factor seasonal implications in the timing of filling and drawdown <u>where practicable</u> <u>timing managed inundation to occur in winter-spring with drawdown prior to the onset</u> <u>of warmer conditions.</u>
- Manage drawdown rates by slowly opening downstream regulators to minimise rapid increase in velocity and shear stress downstream of regulators.

The first of these points is relevant to mitigating the risk of algal blooms, while the second point relates to mitigating erosion risks. These changes were not included in the Proponent's Final Day version of the EDS.

Submission 7 from the EPA acknowledged the high level of community concern regarding the impact of blackwater events. It called for an adjustment to EDS SB3 'Community and Stakeholder Engagement activities – Operation' to include an additional point providing for:

A protocol for how community expectations regarding potential adverse events, in particular adverse anoxic (blackwater) events, will be managed at identified stages of inundation events.

(iv) Discussion

The risk of blackwater and algal bloom events was considered in the EES Central report. This Committee takes a similar approach to the issue with consistent overall conclusions.

There is a widely shared view that more frequent inundations are needed to reduce litter loads and the risk of blackwater events, even amongst concerns in some parts of the community about using infrastructure to inundate the floodplains.

There is an evident tension between increasing the frequency and extending the duration of inundation events. In the absence of sufficiently frequent flooding to reduce litter loads, the blackwater modelling in the ER points to a higher risk that an extended inundation of EVCs at the higher levels of floodplains could subject them to protracted hypoxic or anoxic conditions, especially if a pumped event is implemented. This risk aligns with concerns expressed in some submissions.

The Committee accepts that blackwater conditions and algal blooms may not be avoidable in drying wetland pools. At the same time, it supports the adaptive management of managed inundation events to minimise the severity and duration of low DO conditions. At a local level, more frequent flooding of these floodplains through managed inundation will help to reduce litter loads that contribute to reduced DO levels. Appropriate management of regulators to enable a 'first flush' removal of suspended organic material¹¹ and water with low DO, or even keeping the regulators open when inflows from the river are low in DO, will mitigate the risk of hypoxic or anoxic conditions affecting aquatic fauna on the floodplain. This will be a key consideration in adaptive management.

The Committee considers that some refinements to EDS SW2 that relate to blackwater and algal bloom risks are needed. The EES Central Committee recommended that EDS SW2 be revised to better address of risks of hypoxic or anoxic conditions resulting from managed inundation, as well as other consequences of such inundation. This Committee considers that EDS SW2 for ER Central should be similarly amended to provide a clearer focus on the necessary responses to risks of hypoxic or anoxic conditions developing, as well as on other key priorities for managing risks related to surface water flows.

The Committee considers the EDS should clearly state the purposes that are to guide the sitespecific management of operational risks to provide a better focused framework for the environmental outcomes that are sought to be achieved and has recommended refinements to EDS SW2 from EES Central in Appendix F.

Further changes to EDS SW2 for ecological priorities and monitoring are addressed in Chapter 6.

Blackwater events and algal blooms are key community concerns. Monitoring and communication with the community will be important in Project implementation. The Committee supports the adjustment to EDS SB3 recommended by the EPA, and has made minor modifications to them for clarity in Appendix F.

¹¹ Other measures to reduce excessive litter loads will also warrant consideration, potentially including low temperature, 'cultural burning' by indigenous custodians.

(v) Findings

The Committee finds:

- building on the work of EES Central, changes to EDS SW2 are suggested to clarify the purposes that are to guide the site-specific management of operational risks related to surface water and to refine the measures that are to be applied for the identified purposes
- it is appropriate to require a protocol under the EDS SB3 to manage community expectation regarding blackwater and algal blooms as recommended by EPA.

(vi) Recommendations

The Committee recommends:

Revise the Environmental Delivery Standards to include:

- a) Revised EDS SW2 in relation to:
 - the purposes that are to guide the site-specific management of operational risks related to surface water
 - the timing and management of inundation events, as well as the management of organic matter loads, to reduce the risk of hypoxic or anoxic blackwater events.
- b) A provision in EDS SB3 for protocol be developed and implemented for communicating with the community and stakeholders regarding:
 - the risk or occurrence of blackwater events
 - intended responses for different stages of specific managed inundation events.

The changes are shown in Appendix F.

3.5 Groundwater and waterway salinity

(i) Issue

The issue is whether managed inundation of the Vinifera and Nyah floodplains will raise saline groundwater tables and increase the discharge of salt to the Murray River. The potential effects of saline groundwater on terrestrial ecology are addressed in Chapter 6.

(ii) What did the ER say?

Managed inundation of the Vinifera and Nyah floodplains may increase the recharge of groundwater and the height of the watertable. Depending on salinity and depth of groundwater, vegetation whose roots can access shallow groundwater may be either beneficially or adversely affected. The ER rated the risk of adverse effects from groundwater levels or and quality low, both before and after the application of EDS GW1 and GW2.

Conceptual models were presented to summarise the hydrologic relationships (see Figure 11). Recharge of the alluvial aquifer during floods, and discharge from it following floods, primarily occurs through direct exchange with the river. As a result of this exchange, the groundwater underlying the floodplain is relatively fresh, with lower levels of salinity than in upper aquifers outside of the floodplain.





Source: Specialist Assessment D, Figure 5-11, page 68.

Specialist Assessment D observes that there is low potential for groundwater to be intersected during project construction, and hence to require management of dewatering risks. Consequently, adverse effects are unlikely.

Numerical groundwater modelling of the combined Nyah and Vinifera project areas was undertaken using MODFLOW-USG to quantify potential changes to water balance and groundwater levels because of the two projects' operation. This modelling was informed by the hydrogeological conceptualisation above. It drew on findings from previous modelling studies, for example in relation to an assumed recharge rate of 2 millimetres/day (mm/d) for flood-induced recharge.¹²

Simulation modelling was conducted for the period from 2000 to the end of 2020, overlaying a representation of the historical conditions with an assumed series of managed inundation events. Although groundwater levels rise and fall annually, an average long-term rise of less than 0.5 metres in the groundwater table is predicted within the Vinifera inundation area, and an average rise of about 1 metre in the Nyah inundation area. That is, managed inundation is expected to produce groundwater patterns that are more like the pre-1990 condition before the Millennium Drought.

The modelling results were interpreted in terms of the risk of shallow groundwater (less than 2 metres below the surface) developing with the consequent risk of salinity (see Figure 12).

¹² Jacobs (2019) Mallee Model Refinement, Report prepared for the Mallee CMA



Figure 12 Percentage of time that shallow watertable is in the Vinifera project area over modelled period

Source: Figure 7-3 in Specialist Assessment D; note the text of erroneously refers to Figure 7-4. The percentage is the difference between the base case and the full operational scenario.

Specialist Assessment D extended the groundwater assessment in two ways:

- by modelling the contribution of shallower groundwater to increased evapotranspiration from vegetation
- by considering the volume and salt load of groundwater discharging back into the river as baseflow, that is, following managed inundation events.

A brief description of the calculation of potential salt discharges attributable to the two projects was provided (on page 85), as follows:

The plots shown in Figure 7.6 show some small differences in groundwater flow in and out of the river between the scenario and the base case, in the order of 1 ML/day. The model estimates that the scenario will result in increased salt load to the Murray River of approximately 1200 tonnes per year (3 t/day) using an average salinity of 3,000 mg/L for both the Nyah and Vinifera projects. This is approximately 1.5 t/day for the Vinifera project.

Specialist Assessment C puts the salt discharge estimates from Specialist Assessment D in the context of salt loads in the Murray River. It states (on page 138) that:

The current annual salt load in the Murray River at Swan Hill is around 150,000 tonnes in low flow years, increasing to greater than 300,000 tonnes is high flow years. ... The additional contribution from managed inundation at Vinifera represents ~0.6% of the annual salt load in a low flow year and would result in an increase in the salinity of the Murray River of <2mg/L. This is <1.5% of the typical background Murray River salinity of 150mg/L and the salinity concentration of the Murray River and salinity would remain well under concentrations that would exceed critical water quality objectives.

This estimate suggests that contribution of the Vinifera project to increased river salinity would be insignificant. Specialist Assessment C also provides an estimate of the potential cumulative impact

of salt loads from all VMFRP projects of around 10 percent. This is based on several conservative assumptions, including for groundwater salinity, as well as the maximum inundation of all sites in each year followed by their concurrent drawdown. Consequently, "the actual salinity increase as a percentage of background would be lower than modelled" (Appendix C, page 336).

The ER notes that changes to salt loads in the Murray River are managed through the Basin Salinity Management 2030 (**BSM2030**) Strategy under the Murray-Darling Basin Agreement. There are formal assessments of salinity discharges that are required under the BSM2030 framework, which have yet to be undertaken for the VMFRP projects. The BSM2030 Strategy allows for long-term increases in salt load to be offset by other works and measures elsewhere.

The proposed EDS GW2 for 'Operational groundwater management' identifies a broad procedural obligation to comply with BSM2030.

(iii) Evidence and submissions

No submissions specifically addressed groundwater. The EPA's submission notes that the obligation under the EP Act to minimise risks to human health and the environment encompasses groundwater values. Two submissions identified the potential cumulative impacts of VMFRP (and other SDLAM) projects on salinity in the Murray River.

Greg Hoxley, the senior author of Specialist Assessment D, provided an updated input on the potential cumulative salt load of the nine VMFRP projects in his expert witness statement to the Roundtable. This reflected further work undertaken on other VMFRP projects and was previously provided to the EES Central Committee (see Table 3).

Murray River flow to SA (2000-2022)	ML/d	Mean background salinity at SA border (2003-2022)		VMFRP cumulative contribution	Cumulative outcome on Murray River concentration	
		mg/L	µS/cm	mg/L	mg/L	µS/cm
Minimum entitlement flow	3,000			56	185	288
Median historical flow (2000-2022)	6,800	129	201	25	154	239
Average historical flow (2000-2022)	12,300			14	143	222
Water Quality Objectives: Basin Plan salinity target at SA border – 372mg/L (580µS/cm) Irrigation protection – 534mg/L (833µS/cm) Ecosystem protection – 1282mg/L (2000µS/cm)						

Table 3 Cumulative effect on salinity in the Murray River from all nine VMFRP projects

Source: Expert witness statement of Greg Hoxley to ER Central Roundtable.

While Mr Hoxley stressed the conservative assumptions underpinning this assessment of potential cumulative contributions of the VMFRP projects to salinity at the South Australian border, the Committee observes that – if they eventuated – the outcome would represent a substantial increase relative to the Basin Plan target of 372 mg/L.

(iv) Discussion

The Committee considers that the modelling and assessment that has been undertaken with respect to likely groundwater effects is generally sound, but some uncertainty remains in relation to:

- the availability and quality of groundwater to support floodplain vegetation
- the rate of discharge of salt to the Murray River and the cumulative downstream impacts
- in the context of a drying climate, changes in floodplain groundwater as a key indicator of stresses affecting floodplain vegetation and the need for managed inundation
- the feasibility of implementing effective contingency measures if adverse trends in groundwater salinity are detected
- the requirements for supporting adaptive management.

Salinity levels within the Vinifera and Nyah floodplains appear to be variable and there is little bore data to assess variations in groundwater depths. To confirm the adopted conceptual model and to refine the quantitative modelling that has underpinned the assessment, better baseline data is needed as well as monitoring following managed inundation events.

The proposed monitoring for EDS GW2 would involve monthly monitoring of groundwater depths at established bore monitoring sites (M GW1), and annual monitoring of groundwater salinity (M GW2), and daily monitoring of surface water levels and salinity (M GW3), together with a review of the monitoring outcomes and program after the first and second maximum inundation events. The Committee considers this approach is reasonable with two qualifications:

- additional shallow bores are needed within and immediately bordering the respective MIA areas, for the specific purpose of monitoring groundwater depths and salinity
- groundwater salinity as well as depth should be monitored monthly, on an on-going basis.

Groundwater monitoring should be aligned with the proposed monitoring of tree condition (under M TE9), which is aimed at assessing any effects of rising saline groundwater on local floodplain values from environmental watering.

This approach is consistent with the EES Central Committee which identified the need for additional monitoring sites:

- at locations where threatened flora and large trees have been identified as being at risk from rising groundwater and increasing salinity, and where tree health will be monitored
- in areas where there is relatively shallow groundwater with high salinity.

This is equally applicable to the Vinifera and Nyah projects.

Contingency measures to be included in the Operational Environment Management Plan (**OEMP**), would include adjusting the depth, frequency, duration or area of managed events. Other measures were identified in response to a question from the EES Central Committee in its Request for Information (D99) regarding salinity impacts on trees. These measures were to apply fresh water or to lower the watertable in the vicinity of relevant trees through drainage. Putting aside the practicability of these measures, this Committee concurs with the EES Central Committee that a preventative approach is preferable to mitigation after the event. Properly informing adaptive management is therefore crucial.

Having regard to the need to manage risks of saline groundwater within the Vinifera and Nyah floodplains, and to align site-level salinity management with regional and Basin-wide salinity

obligations, some adjustments are appropriate to the proposed EDS GW2 for 'Operational groundwater management'. The EES Central Committee recommended two additions to EDS GW2. This modified version of EDS GW2 is adopted by this Committee with some further minor refinements to improve clarity and operational effects as shown in Appendix F.

The Committee notes Mr Hoxley's evidence that salinity impacts from all VMFRP projects at the SA border could be significant, if unlikely. The Committee recognises that the Vinifera and Nyah projects would make a relatively minor contribution to these potential outcomes, relative to some of the other VMFRP projects.

(v) Findings

The Committee finds:

- the Vinifera and Nyah projects would make relatively minor contributions to the cumulative salt loads and salinity levels in the Murray River potentially resulting from the combined VMFRP projects
- EDS GW2 needs to address groundwater risks to local floodplain values in addition to the projects' contribution to salt discharges to the Murray River
- The variability of groundwater depths and salinity levels within the MIA for the Vinifera and Nyah projects warrants better baseline data including strengthening of monitoring to occur following managed inundation events
- More frequent monitoring of groundwater levels and salinity should occur in the same area as the tree monitoring, to provide a leading indicator of increased risk to the trees from rising saline groundwater.

(vi) Recommendations

The Committee recommends:

Revise the Environmental Delivery Standards and Monitoring Requirements to include:

- a) Revised EDS GW2 to address requirements for additional groundwater monitoring and local adaptive management responses.
- b) Revised Monitoring Requirement M GW1 to require additional bore sites to monitor changes to groundwater depth and elevation.
- c) Revised Monitoring Requirement M GW2 to require additional bore sites and a monthly frequency for monitoring groundwater salinity.

The changes are shown in Appendix F.

4 Soils and land stability

4.1 Introduction

Matters relating to soil are addressed in:

- ER Sections 10.3 and 14.3
- Specialist Assessment E Geology, Soils and Contamination.

Aspects of land stability including geomorphic and erosion risks are addressed in:

• Specialist Assessment C Surface Water

The exhibited EMF includes the following relevant EDS:

- CM1a Contaminated land duties
- CM1b Water, Soils and Waste Management Sub-Plan
- CM1c Soil characterisation
- CM2 Acid sulfate soils
- CM3 Contaminated land duties
- GS1 Minimising erosion and sedimentation through design
- GS2 Erosion and Sediment Control Plan
- GS3 Soils and landform stability.

The following Technical Note provided by the Proponent includes relevant responses:

• TN10 Surface water expert evidence - response to questions taken on notice.

Additionally, the Committee had regard to:

- relevant submissions and evidence
- EPA Publications referenced by the EPA
- the Proponent's Final Day EDS and Monitoring Requirements (D84).

No specific soil or land stability evidence was called at the Roundtable, although Dr Treadwell of Jacobs did address hydraulic aspects of erosion risks.

4.2 Erosion and land stability

The geomorphic setting and varying soil conditions influence erosion risks and other soil-related issues in the Project. The geomorphic context of land stability received limited attention in the ER.

(i) Issue

The issue is whether further measures are warranted to address erosion risks related to land stability.

(ii) What did the ER say?

The ER summarised the method for assessing soil-related effects, the geomorphic context and existing soil conditions, the assessment of potential residual effects during construction and operation, potential contingency measures and the proposed EDS.

Some erosion risks of the projects were rated as high before taking mitigation measures into account. Potential residual effects were described as low or insignificant. Erosion under managed flow events is expected to be similar to existing conditions. The main erosion risks are expected to

occur during the opening and releasing phases of managed inundation events, particularly downstream of regulators.

Specialist Assessment C describes the geomorphic context of the Vinifera and Nyah floodplains, which form part of the Northern Riverine Plain. These floodplains consist of deposits from past meanders of the Murray River and its anabranches. They are incised by the current channel of the Murray River, which continues to shift as it erodes its banks and deposits sediment, although according to Specialist Assessment C the channel alignment here is relatively stable.

The floodplains are bordered by natural levees at the river's bank, with natural drainage lines (flood runners) intersecting the banks.

Specialist Assessment C also identified the potential for seepage from ponding behind containment banks contributing to bank erosion. This risk is to be considered during the detailed design of containment banks in accordance with EDS GS1 and monitored in accordance with EDS GS3.

The risk of riverbank failure due to meander migration affecting project infrastructure is given more weight in Specialist Assessment E (at pages 78-90):

Land instability, in the form of natural steep slope riverbank failures, is associated with the outer meander banks of the Murray River, its tributaries and abandoned meander bends ... Given the inherent instability of soils in the region, particularly when wet, combined with the erosive power of high velocity river flows, ongoing bank failures from natural processes occur along the Murray River. Meanders typically migrate laterally, accreting sediment on their point bars and eroding their outer banks.

The drop structure, Containment Bank 4 and (to a lesser extent Containment Bank 1) are located along the outer banks of large meander bends and would be designed to reduce the likelihood of undercutting and collapse of structures as a result of riverbank failure through implementation of EDS GS1. ...

The infrastructure cited here is for the Vinifera project, but equivalent structures for the Nyah project would also be exposed to channel erosion risks. Specialist Assessment E expresses confidence in the effectiveness of the EDS GS1 response on the basis that *"it is standard practice for site specific geotechnical and riverbank conditions to be considered in design"*. Specialist Assessment E also acknowledges that *"the migration rate of these* [meander] *bends is currently unknown and* [is] *outside the scope of this study*".¹³

Specialist Assessment C draws on the outputs of the hydraulic modelling (see section 3.3) in relation to erosion risk. It contends that the modelling is adequate to address erosion risk, noting the scope for further mitigation through detailed design and operational management.

The assessment identifies higher velocity, bed shear stress, and hence erosion, are predicted for both projects where the confined inflow and outflow of floodwaters passes through regulators, as well as water discharge to the river via drop structures.

Notably, the geomorphic assessment in Specialist Assessment C concluded that:

Where velocities and shear stress values approach critical thresholds, further modelling would be required at the design stage to mitigate against any risks associated with operational procedures. The opening of regulators within the initial 24 hours and the managed drawdown are not modelled through the hydrological report. A full assessment of risks associated with the regulator operation and opening procedures should be conducted.

¹³ Ibid page 48.

The assessment also considers the vulnerability of different soil types to shear stresses. The role of vegetation cover, soil biomass and leaf/litter layers in resisting shear stress and reducing erosion is recognised. As an example, the site of the V1 regulator at the northern, downstream end of the Vinifera floodplain was identified as a low gradient area with a protective cover of vegetation and organic material (see Figure 13).



Figure 13 Vinifera floodplain inundation at V1 regulator location in October 2021

Source: Specialist Assessment C, Appendix C, Figure C-5.

(iii) Submissions and evidence

FoNVP expressed concern about existing bank erosion in the Murray River and expressed concerns that the Project might exacerbate bank erosion. It submitted (D103):

The Murray River is run as a 'perched' river, without the normal ephemeral flow it once had. These high river flows, just below the level needed for over-bank events, push water down river to vast unsustainable irrigation expansion and are causing extreme bank erosion, that is moving downstream from the Barmah choke like a cancer.

FoNVP further expressed concern that the Project might exacerbate bank erosion:

Things like the location of turning circles and hard stops, damaging the frontage continuity and integrity. Will it increase the bank erosion?

It submitted that the EDS should "try to avoid adding to bank erosion".

(iv) Discussion

In light of the ER materials, discussion at the Roundtable and its own inspection of existing conditions in the proposed works areas, the Committee considers that key risk scenarios for soil erosion or other land instability during project construction or operation would be:

 inadequate design, construction or maintenance of the regulator or drop structures, or sections of the containment banks in the vicinity of the river, leading to undercutting or seepage erosion and eventual structural failure

- longer-term erosion and lateral migration of the banks of the Murray River, particularly at the outsides of bends, affecting the integrity of project infrastructure
- floodplain erosion or possibly avulsion (sudden shift in river course) as a result of changes in flow paths or concentrations as a result of the Project, for example, through the borrow pit area.

The first of the risk scenarios above was partially addressed in Specialist Assessments C and E. Some aspects were considered in the Roundtable and in questions on notice to Dr Treadwell. In the TN10 response to Question 1 – "Has infrastructure located proximate to the river bank been designed to address erosion, including having regard to seepage and surcharge risks?", the Proponent referenced Specialist Assessment E and the requirement under EDS GS3 for the Operation and Maintenance Plan to monitor and respond to erosion risks affecting infrastructure.

The Committee agrees with Specialist Assessment C, and the evidence from Dr Treadwell, that erosion risk where infrastructure will be located should be able to be mitigated through design and operation. However, uncertainty remains, both in terms of the hydraulic performance of the proposed infrastructure and the longer-term risk of erosion of the river channel and intersecting creeks and flood runners.



Figure 14 Murray River bank erosion at Vinifera Containment Bank Site 4

Source: Committee photograph.

The Committee notes that Specialist Assessment C identified high flow velocities downstream of the N2 regulator (site N2DS 1D – as shown in Figure 9). Specialist Assessment C predicted that shear stress would be low in this area despite the high flow velocities and concluded that erosion risks would be low.

During its site inspection, the Committee observed numerous instances of exposed tree roots, collapsed trees and undercutting along the river banks, including for example, in the vicinity of the borrow pit site, N2 Regulator, Nyah Containment Bank 7, Vinifera Containment Banks 1, 2, 3 and 4 (see Figure 14). The Committee also observed erosion at the exit of several flood runners to the river, in the vicinity of proposed containment banks. These general observations were discussed in the Roundtable following the inspection.

The Committee considers that erosion risk requires further investigation at the N2 regulator given the high flow velocities identified. More generally, while the Committee notes that the box plots produced from the hydraulic modelling mostly show low velocities and shear stresses, suggesting low erosion risks, more detailed hydraulic modelling is required.

The Committee recommended in section 3.3 that the hydraulic modelling be updated and this should include the assessment of likely effects of the Project on channel stability, particularly on inflow and outflow channels to the Project area. This confirmation of assessment is the same approach as taken for EES Central.

One aspect of the updated modelling will be to implement suitable timesteps for different operational phases. The EES Central Committee recommended using an hourly time-step (rather than daily) for the initial release of water from the regulators in order to better evaluate the peak velocities and shear stresses during this higher risk period (see discussion on pages 58-58 of that report). This recommendation is equally applicable to this Project.

In terms of the need for improved hydraulic analysis, the EES Central Committee recommended a new EDS SW4 to provide for *"assessment of floodplain hydraulics and implications for floodplain vegetation prior to detailed design"*. EES Central also recommended in GS1 linkage to the work to be done in EDS SW4; this Committee supports such an approach.

The Committee has included the approach in EDS GS1 from EES Central with some additional changes for clarity.

In addition to the updated hydraulic assessment, the Committee considers that further, site-based assessment of geomorphic risks is warranted in some areas of the Project related to the specific design of the Nyah and Vinifera infrastructure in a highly dynamic setting. This assessment should:

- review relevant studies or records of bank erosion and channel changes in the Murray River proximate to Project infrastructure, as a minimum including aerial imagery and any survey compilations
- undertake a site appraisal of the geomorphic stability of sections of river bank, creeks and flood runners in the vicinity of proposed infrastructure, including all areas where the proposed infrastructure is within 30 metres of the river bank
- have regard to the effects of the river flow regime (including river regulation) on bank erosion rates
- assess erosional risks to project infrastructure, as well as risks that project infrastructure might exacerbate local erosion (including at the borrow pit site)
- provide advice on any adjustments to infrastructure siting, design or management that should be adopted.

The EES Central Committee recommended that EDS GS3 be revised to require monitoring of bank and bed erosion in watercourses between the project areas and the Murray River, to inform adaptive management and any necessary structural responses. While the waterways within the Vinifera and Nyah floodplain areas are relatively minor and are subject to relatively limited erosion risks, monitoring of erosion within these waterways will be appropriate. EDS GS3 should be modified to require monitoring of these risks for this Project. Monitoring of erosion of the Murray River bank adjoining project infrastructure should also be required, given that much of the Project infrastructure is close to the river, though in this case a separate requirement would be appropriate under conditions of a project approval.

Given the significance of the works, particularly on and near the Murray River, the Committee considers a direct accountability for robust assessment, design, construction, operation and maintenance of the project works may be appropriate under conditions of approval for a licence for works on a waterway under section 67 of the *Water Act 1989*.¹⁴ The Minister may apply conditions in accordance with section 71(1), including for "the standard of construction", "the future maintenance and operation of the works" and "the protection of the waterway and its surrounds". This Committee considers that a condition or conditions should address these matters and suggests the following wording:

Require the design, construction, operation and maintenance of project works on the Vinifera and Nyah floodplains to:

- be informed by an assessment of geomorphic and hydraulic risks, including of waterway erosion or other instability over the long-term, to the satisfaction of the Minister
- provide for timely action to monitor and address risks or evidence of waterway erosion or other instability either attributable to or affecting the project works to the extent necessary to protect waterway values
- coordinate assessments of risks and implementation of any relevant requirements relating to the Murray River with the responsible authorities in New South Wales.

(v) Findings

The Committee finds:

- the ER including Specialist Assessments C and E has provided a generally sound assessment of erosion risks from the Project but uncertainties remain
- the two key factors are the absence of a site-level geomorphic assessment of works in the immediate vicinity of the Murray River and limitations of the hydraulic assessment conducted to date
- the site-level geomorphic assessment, like the refined hydraulic assessment, is needed to inform the detailed design
- aspects of EDS GS1 and GS3 require clarification and strengthening, generally consistent with the findings of the EES Central Committee
- accountabilities for addressing geomorphic and hydraulic risks should be supported by conditions of approval for works on a waterway under the *Water Act 1989*.

(vi) Recommendations

The Committee recommends:

Revise the Environmental Delivery Standards and Monitoring Requirements to include:

- a) Revised EDS GS1 to specify requirements for further hydraulic assessment to inform the detailed design and implementation of the Project.
- b) Revised EDS GS3 and M GSC1 to require monitoring of waterway erosion within the project area.

¹⁴ Clause 47i of the TOR asks the Committee to consider conditions on other approvals.

The changes are shown in Appendix F.

The Committee recommends:

The Minister for Planning should ask the Minister for Water to consider, in relation to any approval for a licence for works on a waterway under section 67 of the *Water Act 1989,* applying a condition or conditions requiring the design, construction, operation and maintenance of project works on the Vinifera and Nyah floodplains to:

- a) Be informed by an assessment of geomorphic and hydraulic risks, including of waterway erosion or other instability over the long-term, to the satisfaction of the Minister.
- b) Provide for timely action to monitor and address risks or evidence of waterway erosion or other instability either attributable to or affecting the project works to the extent necessary to protect waterway values.
- c) Coordinate assessments of risks and implementation of any relevant requirements relating to the Murray River with the responsible authorities in New South Wales.

4.3 Other soil-related effects

(i) Issue

The issue is whether changes to the EDS or other measures are warranted to address soil-related effects other than erosion risks related to land stability.

(ii) What did the ER say?

Specialist Assessment E provided a description of soils across the Project area and an assessment of associated risks. This assessment was largely based on a desktop review of available information, with some sampling from the proposed borrow pit site.

The level of risk is rated as high for both construction and operation before EDS mitigation measures are applied and as low after mitigation. EDS GS1, GS2 and GS3 respectively aim to mitigate risks during design, construction and operation. According to Specialist Assessment E "the level of certainty of the mitigation strategies being effective is considered high" for the soil-related EDS. EDS E2e provides for post-construction rehabilitation, while EDS SW2 and SW3 are identified as contributing to mitigation during managed inundations, by managing the drawdown phase.

Another risk of unstable soils in the project areas identified in the ER is the presence of acid sulfate soils (**ASS**). Mapping in the Atlas of Australian Acid Sulfate Soils (CSIRO, 2013) was relied on, which indicates that such soils have a high probability of occurrence along the Murray River, Vinifera Creek/wetland and the linear wetland to its immediate north. These potential ASS intersect the construction footprint at several points within the Project area, including sections of the Vinifera containment banks, a shorter section of the Nyah containment bank, at the drop structure sites for both projects and at the borrow site.

The potential adverse effects of ASS exposure would be mitigated by EDS CM2 and GW1, which would require the acid-generating capacity of soil to be assessed and effective treatment or construction controls to be applied before either ground disturbance or dewatering.

There is also a potential for managed inundation events to accelerate, to some degree, the natural processes of formation and mobilisation of ASS. The risk assessment rated this as a low risk that would warrant attention during project operations, including by applying EDS GW2 and SW2.

Specialist Assessment E reviewed available historical evidence and concluded that some contamination from past agricultural activity within the Vinifera project area could be present, but that it is "*unlikely to be widespread or at significant concentrations*". Preliminary sampling at the borrow site indicates that contamination is unlikely. Several EDS would be applied to mitigate these risks from a medium to a low level, including CM1a, CM1b, CM1c, CM2, GW1, SW1 and RU1 – Waste management.

(iii) Submissions

While the submission from the EPA expressed an interest in risks of soil contamination, only the FoNVP submission raised a specific concern related to soil, namely that the importation of foreign soil could pose a risk to the biosecurity of the area, in terms of weed seeds or other contaminants. In response, the Proponent noted that soil would be re-used where possible and that any material sourced from the borrow pits would be managed in accordance with the EMF.

(iv) Discussion

Based on the assessment in the ER including Specialist Assessment E, the Committee concludes that soil-related risks are likely to be able to be managed with direct mitigation during construction, or with appropriate monitoring and adaptive responses during project operation. However, the EDS should be updated to provide clearer provision for soil characterisation and mapping, as well as provision for further hydraulic analysis. There should be greater emphasis on assessing the presence of ASS, erosion-prone soils or soil degradation at proposed construction sites.

Minor changes to the EDS in Appendix F are proposed to better guide the identification and characterisation of risk factors such as ASS and dispersive soils.

(v) Finding

The Committee finds:

• subject to some refinement of relevant EDS in relation to soil characterisation and mapping, risks related to soil contamination, ASS and other soil hazards can be adequately managed during both construction and operation.

(vi) Recommendation

The Committee recommends:

Revise the Environmental Delivery Standards to make minor changes to EDS CM1c, CM2 and GS1 in relation to soil characterisation and mapping.

The changes are shown in Appendix F.

Ecological effects of construction 5

Introduction 5.1

Ecological effects of construction are discussed in:

- ER Sections 9.1.6, 9.2.6, 13.1.6 and 13.2.6
- ER Attachment VIII (ER Project Development)
- Specialist Assessment A Ecology Aquatic
- Specialist Assessment B Ecology Terrestrial.

The exhibited EMF included the following EDS:

- E1 Native vegetation and habitat design minimisation
- E2a Construction biodiversity administrative processes
- E2b Construction vegetation management
- E2c Construction fauna management
- E2d Construction weed and pest management
- E2e Construction rehabilitation management
- E2f Aquatic fauna management.

Additionally, the Committee had regard to:

- relevant submissions and evidence
- the Proponent's Final Day EDS and Monitoring Requirements (D84).

Table 4 lists the experts providing evidence on the ecological effects of construction.

Table 4 Ed	cological effects of construction evidenc	e	
Party	Expert	Firm	Area of expertise
Proponent	Dr Drew King	Jacobs	Terrestrial flora
Proponent	Christopher Watson	Jacobs	Terrestrial fauna
Proponent	Jean-Michel Benier	Jacobs	Aquatic ecology

5.2 Effects on vegetation communities, large trees and habitats

(i) The issue

The issue is whether impacts on vegetation communities and large trees, and associated habitats, due to proposed construction works have been appropriately avoided and minimised.

(ii) What did the ER say?

Mapping of native vegetation

The Project area is located within the Murray Fans Bioregion, except for the borrow pit site, which extends into the Murray Mallee Bioregion. The vegetation communities in the Nyah - Vinifera Park are mostly dominated by River Red Gum (Eucalyptus camaldulensis) forests and woodlands, together with seasonal wetlands. There is a small occurrence of Black Box (Eucalyptus largiflorens) in Riverine Chenopod Woodland (EVC 103) on the upper floodplain terraces at the edge of both Vinifera Park and Nyah Park.

A key data source for the ER was DELWP's "*modelled mapping*" of extant EVCs across Victoria in 2005. This mapping within the Nyah-Vinifera Park was ground-truthed and refined for the ER by R8 through a series of surveys in 2020-22.

The R8 surveys assessed the vegetation within the park as mostly in a moderate to poor condition with a very sparse understorey and an over-abundant organic litter, largely attributing these conditions to the reduced frequency of inundation in recent decades.

Extent of native vegetation loss

At Vinifera, a total of 18.08 hectares of native vegetation was identified within the Area of Investigation (**AOI**), that is, the construction footprint required to construct the project plus a buffer. Of this, a total of 12.8 hectares across five EVCs will be potentially lost due to construction works. Similarly, within the AOI at Nyah, 25.78 hectares of native vegetation was identified, with 14.12 hectares across six EVCs being potentially lost. Within the combined AOI for Vinifera and Nyah, a total of 19.8 hectares of native vegetation could be lost due to project infrastructure works, another 6.1 hectares due to associated track works, and 1.1 hectares a from the borrow pit (which is largely cleared agricultural land) as shown in Table 5 and Table 6. These tables indicate that the largest losses would be from EVC 814 Riverine Swamp Forest, the most widespread EVC within the Nyah-Vinifera Park.

		Infrastructure		Tracks	
EVC	Status	Native vegetation (ha)	Large and Very Large Trees	Native vegetation (ha)	Large and Very Large Trees
103: Riverine Chenopod Woodland	Endangered	less than 0.01	-	less than 0.01	-
106: Grassy Riverine Forest	Depleted	0.17	2	0.07	-
295: Riverine Grassy Woodland	Depleted	1.15	21	0.24	1
810: Floodway Pond Herbland	Depleted	0.03	-	less than 0.01	-
814: Riverine Swamp Forest	Depleted	9.20	98	1.98	25
TOTAL		10.55	121	2.29	26

Table 5	Native vegetation impacts from construction works within each EVC (Vin	ifera)
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Source: ER Section 9, Table 9.20.

At Vinifera these vegetation losses could involve impacts on 100 Large and 47 Very Large trees. Ninety of these trees were identified as hollow-bearing, providing potential habitat for hollow dependent fauna. Loss of hollow-bearing trees is recognised as a threatening process for fauna under the *Flora and Fauna Guarantee Act 1988* (**FFG Act**).

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EVC	Status	Infrastructure		Tracks		Borrow site*	
		Native vegetation impacts (ha)	Large Tree impacts	Native vegetation impacts (ha)	Large Tree impacts	Native vegetation impacts (ha)	Large Tree impacts
106: Grassy Riverine Forest	Depleted	1.82	15	1.08	8	-	-
295: Riverine Grassy Woodland	Vulnerable	0.59	10	0.04	0	1.10	0
810: Floodway Pond Herbland	Depleted	0.23	1	0.02	0	-	-
814: Riverine Swamp Forest	Depleted	4.98	61	2.46	17	-	-
815: Riverine Swampy Woodland	Vulnerable	0.15	0	-	-	-	-
816: Sedgy Riverine Forest	Depleted	1.50	32	0.16	1	-	-
TOTAL		9.27	119	3.76	26	1.10	0

Table 6	Native vegetation	impacts from	construction w	orks within	each EVC	(Nyah)
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* Borrow site is used for Vinifera and Nyah projects but included only in the calculations for Nyah. Source: Specialist Assessment B, Table 10.4, page 356.

These potential losses at Vinifera include 81 trees that would require felling as well as 66 trees that are considered lost due to expected impacts within their Tree Protection Zone (**TPZ**) and/or Structural Root Zone. This latter "indirect impact" category was applied where more than 10 percent encroachment of the TPZs or pruning of over 30 percent of the existing crown of individual trees would occur, as specified under the 'Guidelines for the removal, destruction or lopping of native vegetation' (DELWP 2017). The estimate is considered conservative as some trees whose TPZ or crown is affected may not die, or may remain standing if they do die and still provide habitat.

The expected losses at Nyah are similar, involving impacts on 100 Large and 45 Very Large trees, with 76 trees to be felled and other 69 trees at risk from lopping or root disturbance, and 28 of the total 145 trees being identified as hollow-bearing.

Table 9.27 in ER Section 9 provides estimates of the proportion of EVCs that would be lost from the construction area relative to the extent of the EVCs across the Murray Fans Bioregion. While there appear to be errors in this table, it suggests that the EVC losses represent small proportions of their total bioregional extent.

Avoid and minimise

The obligation exists under Clause 12.01-25 'Native vegetation management' of the Swan Hill Planning Scheme to avoid and then minimise impacts on native vegetation (before considering offsets). Attachment VIII to the ER describes the consideration of site-specific design alternatives to avoid and minimise potential impacts, relative to Preliminary Infrastructure Design proposals, as part of the process of project development. Design alternatives that might deliver better ecological and cultural heritage outcomes were identified by inputs from the ER specialists, project partners and Traditional Owners. For the Vinifera project, the assessment of design alternatives resulted in:

- adoption of alternatives that avoid the felling and TPZ of 21 Large and 7 Very Large trees, as well as minimising impacts to another 18 Large and 11 Very Large trees by realigning the construction footprint so that the trees remain standing (though encroaching on their TPZ)
- reducing the construction footprint within the endangered EVC 103 Riverine Chenopod Woodland.¹⁵

For the Nyah project, the assessment of design alternatives resulted in:

- adoption of alternatives that avoid the felling and TPZ of 21 large and 7 very large trees, as well as minimising impacts to another 27 large and 21 very large trees by realigning the construction footprint so that the trees remain standing (though encroaching on their TPZ)
- reducing the construction footprint within the endangered EVC 103 Riverine Chenopod Woodland.¹⁶

The implications of design alternatives for avoiding and minimising impacts on threatened flora communities and species listed under the FFG Act or EPBC Act are considered in Chapter 5.3.

EDS E1 requires the contractor to implement further measures to avoid and minimise native vegetation removal during the detailed design and construction planning phases, including to ensure the works do not remove more than 12.844 hectares of native vegetation for the Vinifera project and 14.118 hectares for the Nyah project.

(iii) Evidence and submissions

A few submissions raised broad concerns about the extent of native vegetation and tree loss associated with the Project's construction footprint, including the loss of hollow-bearing trees and the absence of a native vegetation offset strategy. No submissions identified concerns about specific areas of vegetation that may be affected by works or called for consideration of site-specific design alternatives.

Submissions from FoNVP and Environment Victoria expressed concerns about the loss of trees and native vegetation that would occur because of construction. Environment Victoria submitted that:

... potential adverse impacts to biodiversity within the construction footprint are significant, particularly in relation to the removal of Large and Very Large Trees which provide vital habitat and can take decades to reach maturity.

Dr King's expert statement stressed the magnitude of the expected benefits:

The results of the proposed watering regime at each site are predicted to be overwhelmingly beneficial for vegetation communities present and for most threatened flora species identified as being present or having potential to occur.

He also noted that the assessed impacts of construction activities are a "worst-case scenario prior to the implementation of EDS E1". Similarly, the expert witness statement of Mr Watson anticipated significant overall benefits for terrestrial fauna.

DEECA's submission emphasised a concern "to ensure certainty that residual risks are mitigated", including with respect to accountability for losses of native vegetation and the achievement of an overall biodiversity improvement. It supported the inclusion of corresponding provisions in the

¹⁵ There is an ambiguous reference to 0.320 ha. It is it is unclear if this is the area saved.

¹⁶ There is an ambiguous reference to 0.059 ha. It is it is unclear if this is the area saved.

proposed Incorporated Document in the Swan Hill Planning Scheme, which are discussed later in this report.

DEECA's submission also recommended that a Hollow Replacement Plan be implemented to address expected losses of hollow-bearing trees. In response, Mr Watson contended that a hollow replacement program would be unlikely to provide effective mitigation due to the abundance of hollows locally, the difficulty in providing suitable artificial hollows or nest boxes, and the needs of different species. He stated that if a hollow replacement plan is pursued, it:

... needs to be done in a carefully considered manner with an understanding of the target species, hollow characteristics required and sufficient funds expended to ensure that the most appropriate natural or artificial hollows are installed and properly monitored.

(iv) Discussion

Minimising native vegetation loss

While EDS E1 would require the project contractor to implement further measures to avoid and minimise native vegetation removal, the likely effectiveness of such measures is uncertain as the only definitive requirements are the caps on total vegetation removal and the implementation of no-go zones.

EDS E1 does not provide clear accountability for the contractor to implement measures to avoid and minimise impacts on native vegetation. However, accountability would be provided through EDS E2a 'Construction biodiversity administrative processes', which requires a Native Flora and Fauna Management Sub-Plan including *"auditable specific commitments ... for avoiding and minimising impacts on biodiversity values"*, as well as approval of the encompassing Construction Environmental Management Plan (EDS EMF2) by the Secretary for DEECA.

The opportunity for the contractor to avoid and minimise removal of native vegetation and large trees will be effectively constrained by the Construction Footprint, ultimately as defined in the approved development plans. The robustness of the final designs is therefore critical.

The EES Central Committee recommended that EDS E1 be revised to add this requirement:

Undertake further investigation of identified alternatives where there may be opportunity to further avoid and minimise adverse effects to native vegetation through detailed design and construction methods.

The Committee supports this requirement for the Nyah and Vinifera Projects with minor modifications to make explicit the need to consider vegetation, large trees and habitat: Further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species.

ER Attachment VIII briefly describes the change in biodiversity and cultural heritage outcomes that identified design revisions could achieve. The broad logic of decisions on the relative merit of previous design proposals and specific alternatives is reasonably clear. In addition to cultural heritage impacts, key considerations have been the rating of the significance of potential impacts on native vegetation (total area lost and loss of endangered EVCs), threatened flora and fauna species, threatened ecological communities and large trees. As noted above, the ER records that design refinements that reduce the loss of EVC 103 and large trees have already been adopted.

Need for riparian setback

The Committee's main concern is the impact of project works (including containment banks/roadway, turning bays and laydown areas) on native vegetation fringing the Murray River, a

situation encountered to a much higher degree than in EES Central. The Committee notes the importance given to protecting the riparian zone in government policy, including the Victorian Waterway Management Strategy and Northern Sustainable Water Strategy, as well as the Swan Hill Planning Scheme.

The ER including Attachment VIII did not specifically consider impacts on native vegetation fringing waterways and other water bodies, including the Murray River, which the Committee considers is a relevant aspect of environmental values to be protected in accordance with Clauses 12.03-1S and 14.02-1S of the Swan Hill Planning Scheme.

Clause 12.03-15 'River and riparian corridors, waterways, lakes, wetlands and billabongs', which was introduced on 16 December 2022,¹⁷ has the objective:

To protect and enhance waterway systems including river and riparian corridors, waterways, lakes, wetlands and billabongs.

Its associated policy guidelines include to consider as relevant:

Locating earthworks, including dams, a minimum of 30 metres from waterway systems. Locating development a minimum of 30 metres from the banks of waterway systems.

It also has an associated strategy 'River corridors, waterways, lakes and wetlands', introduced to the Swan Hill Planning Scheme on 22 October 2021, to:

Set development back from waterways and water bodies to assist the protection of the catchment, natural environment and landscape.

Clause 14.03-15 'Catchment planning and management', which was introduced on 6 September 2021, has the objective:

To assist the protection and restoration of catchments, waterways, estuaries, bays, water bodies, groundwater, and the marine environment.

Its associated strategies include to:

Retain natural drainage corridors with vegetated buffer zones at least 30 metres wide along each side of a waterway to:

- Maintain the natural drainage function, stream habitat and wildlife corridors and landscape values
- Minimise erosion of stream banks and verges
- Reduce polluted surface runoff from adjacent land uses.

Also relevant is the intersection of these two policy clauses with Clause 12.01-1S 'Protection of biodiversity' and Clause 12.01-2S 'Native vegetation management', in terms of considering habitat fragmentation, cumulative impacts, and avoiding and minimising impacts on native vegetation.

The Proponent responded to a question on notice (D98) about the application of policy Clause 12.03-1S in part by highlighting the consistency of the VMRFP objectives with the policy's objectives of protecting and enhancing waterway systems, as well as emphasising the siting requirements necessary to deliver the Project.

The Committee accepts that there are functional requirements inherent in the project objectives that necessitate the siting of some works within 30 metres of the Murray River, as well as the potential contribution of the Vinifera and Nyah projects to *"protecting"*, *"enhancing"* and *"restoring"* the riparian corridors, wetlands and billabongs. That said, the two issues to be considered are:

¹⁷ Which the Proponent noted was after the ER was submitted for authorisation.

- Has sufficient effort been given to avoiding and minimising impacts on the riparian corridor through the setback of proposed works?
- What is the appropriate balance of policy in implementing the proposed projects?

The Committee considers that opportunities to set back works from the riverbanks and further reduce losses of native vegetation and large trees in the immediate vicinity of the Murray River banks should be assessed, in light of their ecological and landscape values (as well as cultural heritage values and the land stability issues discussed in Chapter 4.2). This assessment could potentially involve adjustments to the siting, design or construction methods for works (for example, containment banks) in proximity to the riverbanks. All proposed works within 30 metres of the Murray River banks should be subject to this further assessment. This assessment would need to:

- identify feasible alternatives for relocating works more than 30 metres from the river banks
- consider the ecological and other values as well as erosion risks associated with these alternatives for works in the vicinity of the river banks
- consider the potential to mitigate impacts of relocating works, including for example by rehabilitating existing track alignments if some works were to be shifted from them.

In relation to the first point, the Committee acknowledges that the location of some infrastructure (such as drop structures at inflow point to the Murray River) must necessarily be close to the Murray River to perform their intended function, but other infrastructure such as containment banks, vehicle turnaround areas and laydown areas may not need to be adjacent or close to the river. Vehicle turnaround and laydown areas are areas with a potentially heightened risk of soil erosion, leaks and spills that should preferably be set back from the river.

This assessment should be a requirement under the Incorporated Document. Development plans submitted to the Minister for Planning for approval should be supported by an assessment of relevant opportunities to the satisfaction of the Minister. A reference to this 'avoid and minimise' requirement will also be appropriate in EDS E1, which should require:

Further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species, with particular attention to be given to assessing siting, design and construction methods to avoid and minimise impacts within 30 metres of the top of the Murray River banks.

Other construction impacts

In relation to DEECA's recommendation that a hollow replacement plan be developed and implemented, the Committee has given weight to the qualified response by Mr Watson. It also notes that the EES Central Committee concluded that a hollow replacement plan was not warranted for the EES Central projects on the basis that *"the remaining landscape provides ample tree hollows"*.

The ER does not explain how the loss of nesting hollows is compensated by any long-term gain in habitat opportunities that may develop through the restoration of floodplain vegetation. All the same, the Committee (like the EES Central Committee) accepts that a one-for-one replacement of hollows would not be warranted, having regard to the short-term losses, the availability of similar habitat and the likelihood of new hollows developing over time.

That said, considering the DEECA submission, the Committee considers a requirement for a limited hollow replacement program for priority fauna species is warranted as part of any approval for

native vegetation clearance. It has recommended an adjustment to the wording of EDS E2e to this effect. One issue identified by the EES Central Committee that will need to be considered is the risk that nesting boxes, if provided, might cause over-heating, leading to failed breeding and mortality. Occupation of nesting boxes by pest and non-target species also need to be considered.

The Committee considers that a 10 year timeframe for the program is reasonable rather than the 15 years suggested by DEECA.

Addressing a related aspect, the EES Central Committee recommended the insertion into ESD E2e 'Construction rehabilitation management' of a requirement for the Native Flora and Fauna Management Plan to:

Where possible, reuse timber and logs from felled trees on site with habitat improvement uses prioritised.

This Committee supports this change to the EDS for the Vinifera and Nyah projects. It also adopts other changes to EDS E2d and E2e that were recommended by the EES Central Committee and included in the Proponent's Final Day version of the EDS for the Vinifera and Nyah projects. These changes reinforce aspects relating to biosecurity and weed management during construction.

(v) Findings

The Committee finds:

- there is likely to be limited scope to reduce losses of native vegetation and large trees within the proposed construction footprint
- siting and design of proposed works within 30 metres of the Murray Riverbank should be reviewed to assess opportunities to:
 - set back works at least 30 metres from the top of the bank, unless their siting closer to the river is essential for the functioning of the Project
 - avoid and minimise impacts on native vegetation and large trees to the extent practicable.
- while a one-for-one replacement of tree hollows is not warranted, a limited program for hollow replacement for priority fauna species is justified and should be required subject to consideration of risks such as over-heating and utilisation by pest species.

(vi) Recommendations

The Committee recommends:

Revise the Environmental Delivery Standards to include the following changes:

- a) Revise EDS E1 to require further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species, with particular attention to be given to avoiding and minimising impacts within 30 metres of the top of the Murray River bank.
- b) Revise EDS E2e to require:
 - development and implementation of a hollow replacement plan that is:
 - to provide for nominated priority fauna species on the basis of suitable evidence of their habitat requirements

- to be implemented progressively over a ten-year period with appropriate monitoring to ensure its cost-effectiveness
- to the satisfaction of the Secretary of the Department of Energy, Environment and Climate Action.
- where possible, appropriate re-use of felled timber and logs.

The changes are shown in Appendix F.

The Committee recommends:

Revise the Incorporated Document to require submitted Development Plans to be supported by an assessment of the following to the satisfaction of the Minister for Planning:

- a) the need for siting of any works within 30 metres of the banks of the Murray River having regard to relevant alternatives
- b) proposed measures to avoid and minimise impacts on native vegetation, large trees and habitats of threatened flora and fauna, as well as on cultural heritage, within 30 metres of the banks of the Murray River.

The changes are shown in Appendix E.

5.3 Threatened flora species and communities

(i) The issue

The issue is whether the likely effects of construction on threatened flora species and communities are acceptable.

(ii) What did the ER say?

Vinifera

No threatened flora communities listed under the FFG Act have been identified in the Nyah-Vinifera Park. The patch of EVC 97 Semi-arid Woodland did not qualify when reviewed against the qualifying descriptions of potential FFG Act listed communities.

According to Specialist Assessment B, a total of 83 native flora species have been recorded at Vinifera during field surveys for the VMFRP between 2015 and 2022, including 7 threatened flora species listed under the FFG Act.

Four species listed under the FFG Act were found within the AOI: *Acacia oswaldii* (Umbrella Wattle), listed as critically endangered, and *Senecio cunninghamii var. cunninghamii* (Branching Groundsel), *Sida intricata* (Twiggy Sida) and *Vittadinia pterochaeta* (Winged New Holland Daisy), which are listed as endangered. Umbrella Wattle was considered unlikely to occur within the MIA but the other three were either found or considered to possibly occur within the MIA.

Table 7 provides estimates of the numbers of each species within both the AOI and the final proposed Construction Footprint, showing the expected outcomes of efforts to avoid and minimise impacts on threatened flora species. While three individuals of Umbrella Wattle would still be lost, the Construction Footprint is expected to avoid Winged New Holland Daisies and to reduce the losses of Branching Groundsel and Twiggy Sida (page 233):

...with implementation of the relevant EDS mitigation measures, effects are expected to be minor and not ecologically significant given the occurrence of larger populations of these species immediately adjacent to the Construction Footprints and in suitable habitat close by

In the case of Branching Groundsel, the construction impacts would remove less than 1 percent of the estimated population of around 82,000 across the MIA. Umbrella Wattle and Twiggy Sida are described as *"terrestrial dry flora"* that have emerged locally during the drier conditions that have prevailed in recent decades. The ER rates the residual effect on these two species as *"medium"*.

The relevant EDSs include EDS E2a 'Construction biodiversity administrative processes', which requires a Native Flora and Fauna Management Plan as a sub-plan of the CEMP (under EMF2), E2b 'Construction Vegetation Management' and E2e 'Construction Rehabilitation Management'.

Another 20 species listed as endangered under the FFG Act were considered "possible" in terms of having suitable habitat within the AOI. Since they were not recorded in repeated surveys of the AOI, impacts on these species are considered unlikely, also having regard to the extent of the Construction Footprint relative to the available habitat in the wider area.

No threatened flora species listed under the EPBC Act have been recorded in either the Vinifera AOI or MIA. *Lepidium monoplocoides* (Winged Peppercress), which is listed as Endangered under both the EPBC Act and FFG Act, was assessed as possibly occurring within the Vinifera AOI, though it was not recorded in surveys. Further, it was not found in targeted surveys. No threatened ecological communities listed under the EPBC Act have been recorded or considered as possibly occurring within the AOI. Consequently, significant impacts are not expected on either flora species or ecological communities listed under the EPBC Act.

Species	Approximate numbers of individuals within the Area of Investigation	Approximate numbers of individuals within the Construction Footprint
Critically Endangered		
Acacia oswaldii (Umbrella Wattle)	3	3
Endangered		
Senecio cunninghamii var. cunninghamii (Branching Groundsel)	2000-2500	250-500
Sida intricata (Twiggy Sida)	25	10-15
<i>Vittadinia pterochaeta</i> (Winged New Holland Daisy)	100 - 150	0

Table 7	Numbers of FEG Act-listed species recorded within AOI and Construction Footprint at Vinifera
	Numbers of FFG Act-listed species recorded within AOI and Construction Pootprint at Vinnera

Source: Specialist Assessment B, Table 5.5.

Nyah

A total of 172 native flora species have been recorded at Nyah during field surveys for the VMFRP between 2015 and 2022, which is more than twice the number recorded at Vinifera. A total of 73 introduced species were recorded, which is similar to the total of 71 species recorded at Vinifera.

Six species listed under the FFG Act were found within the AOI: *Acacia oswaldii* (Umbrella Wattle) and *Dianella longifolia var. grandis* (Flax-lily), which are listed as critically endangered, and *Convolvulus graminetinus* (Grassland Bindweed), *Sclerolaena patenticuspis* (Spear-fruit Copperburr), *Senecio cunninghamii var. cunninghamii* (Branching Groundsel) and *Vittadinia cuneata var. hirsuta* (Fuzzy New Holland Daisy) are listed as endangered. Umbrella Wattle and Spear-fruit Copperburr were considered unlikely to occur within the MIA but the other four species were either found or considered to possibly occur within the MIA.

Table 8 provides estimates of the numbers of each species within both the AOI and the final proposed Construction Footprint, showing the expected outcomes of efforts to avoid and minimise impacts on threatened flora species. This suggests that Umbrella Wattle, Grassland Bindweed and Spear-fruit Copperburr could be avoided, while significant reductions in the losses of the other three species could be achieved.

Table 8	Numbers of FFG Act-listed species recorded within AOI and Construction Footprint at Nyah
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Species	Approximate numbers of individuals within the Area of Investigation	Approximate numbers of individuals within the Construction Footprint
Critically Endangered		
Acacia oswaldii (Umbrella Wattle)	<5	0
Endangered		
Convovulus graminetinus (Grassland Bindweed)	<5	0
Dianella longifolia var. grandis (Flax-lily)	<10	<5
Sclerolaena patenticuspis (Spear-fruit Copperburr)	<5	0
Senecio cunninghamii var. cunninghamii (Branching Groundsel)	40-50	30-40
<i>Vittadinia cuneata</i> var <i>. hirsuta</i> (Fuzzy New Holland Daisy)	25-50	10-15

Source: Specialist Assessment B, Table 8.5

As was the case for Vinifera, no threatened flora species or ecological communities listed under the EPBC Act have been recorded at Nyah, although *Lepidium monoplocoides* (Winged Peppercress) was assessed as possibly occurring within the Nyah AOI. Consequently, significant impacts are not expected on flora species or ecological communities listed under the EPBC Act.

(iii) Evidence and submissions

No submissions expressed specific concerns regarding the potential impacts of construction on listed flora species or communities.

DEECA submitted it did not consider *"the Project would pose an unacceptable risk or consequence to any State-wide population of any FFG Act listed flora"* or to any FFG Act listed communities.

Environment Victoria's submission referred to "the removal of threatened and protected flora species listed under the FFG Act" as one aspect of biodiversity impacts, while FoNVP called for more flora and fauna surveys to "ensure baseline data is accurate".

Dr King's expert statement did not provide additional evidence in on construction impacts on listed flora species and communities.

(iv) Discussion

Overall, the Committee is satisfied that potential effects on threatened flora from proposed construction activities have been appropriately assessed.

Given the assessment in the ER, and the generality of submissions relating to construction impacts on threated flora, the Committee places significant weight on the confidence of DEECA that the projects would not have unacceptable impacts on flora listed under the FFG Act. As discussed in section 6.2 below, Attachment VIII to the ER provides a summary account of the assessment of siting and design alternatives that led to the final proposals presented in the ER. One of the key considerations was the avoidance and minimisation of effects on listed flora species. For example, shifting the turning circle at the North Bank for Vinifera as proposed would avoid impacting 221 individuals of Branching Groundsel, while 55 individuals would still be impacted (see Figure 15). The trade-off is that the turning circle would now overlap the riverbank, which the Committee observed to be actively eroding.

Attachment VIII does not assess other alternatives at this site that might better reconcile functional requirements and environmental considerations. As discussed earlier, reduction of impacts on the riverbanks and their environs needs to be given further attention. At the same time, weight needs to be given to avoiding and minimising impacts on listed flora species (as well as Aboriginal cultural heritage).







With the qualification that further assessment of design alternatives in the vicinity of the Murray River bank is needed, the Committee accepts that the development and implementation of a Native Flora and Fauna Management Sub-Plan to be approved by the DEECA Secretary is an appropriate mechanism to address the further mitigation of impacts on potentially affected species.

The Final Day version of the EDS and Monitoring Requirements (D84) did not include monitoring of rehabilitation outcomes. Monitoring of rehabilitation outcomes as well as accountability for effective rehabilitation are needed.

(v) Findings

The Committee finds:

- construction of the Project would not have a significant impact on any threatened flora species listed under the EPBC Act, including the EPBC Act listed Winged Peppercress
- the Project would have an acceptable level of impact on flora species listed under the FFG Act that have either been recorded or assessed as possibly occurring within the proposed Construction Footprint, having regard to the local occurrences and regional populations of these species, the efforts to date to avoid and minimise impacts, and the prospect of habitat benefits from managed inundation
- modifications to the EDS are needed to reflect the need for monitoring of vegetation outcomes.

(vi) Recommendation

The Committee recommends that:

Revise the Environmental Delivery Standards and Monitoring Requirements to:

- a) Amend EDS E2e to require monitoring of rehabilitation outcomes including vegetation cover.
- b) Adjust the terrestrial ecology monitoring requirement M TE2 to specify monitoring of the cover and quality of rehabilitation of indigenous vegetation, where consistent with any obligation established by a consent or agreement for the Projects under the *National Parks Act 1975*.

The changes are shown in Appendix F.

5.4 Threatened fauna species and communities

(i) The issue

The issue is whether the likely effects of construction on threatened fauna species and communities are acceptable.

(ii) What did the ER say?

Vinifera

During field surveys undertaken at Vinifera between 2013 and 2021, 100 terrestrial fauna species were recorded, including 96 native species and four introduced species. These fauna species comprised 65 bird species, 26 mammals, five reptiles and four amphibians.

Only two terrestrial fauna species listed as threatened under the FFG Act were recorded as present in the Vinifera AOI and MIA, *Pomatostomus temporalis* (Grey-crowned Babbler) and *Lophochroa leadbeateri* (Major Mitchell's Cockatoo). The latter is widespread but uncommon in sparsely wooded, arid areas. There is potentially suitable habitat for both species within the AOI and MIA.

The Grey-crowned Babbler is one of the 'key' species that are characteristic of the Victorian Temperate Woodland Bird Community, listed under the FFG Act. Another 'key' species of this

community identified during surveys was *Gerygone fusca* (Western Gerygone). It was widely recorded through the area, whereas Grey-crowned Babbler was detected only a few times in riparian forest. Some species characteristic of the Victorian Mallee Bird Community were also detected in the Vinifera area, though suitable habitat for this community was not identified.

Another 13 terrestrial fauna species listed under the FFG Act were assessed to possibly occur within the AOI:

- Nyctophilus corbeni (Corben's Long-eared Bat/South-eastern Long-eared Bat) *
- Ninox connivens (Barking Owl)
- Falco subniger (Black Falcon)
- Coracina maxima (Ground Cuckoo-shrike)
- Melanodryas cucullate (Hooded Robin)
- *Hieraaetus morphnoides* (Little Eagle)
- Grantiella picta (Painted Honeyeater)*
- Polytelis anthopeplus monarchoides (Regent Parrot)*
- Lophoictinia isura (Square-tailed Kite)
- Haliaeetus leucogaster (White-bellied Sea-Eagle)
- Hirundapus caudacutus (White-throated Needletail)*
- Morelia spilota metcalfei (Carpet Python)
- Litoria raniformis (Growling Grass Frog)*.

Five of these species (marked with an asterisk) are also listed under the EPBC Act. Australian Painted Snipe is listed as endangered and the other species as vulnerable, while White-throated Needletail is also a listed migratory species. None of these five species were recorded in field surveys for the ER, including targeted surveys.

The ER considers potential effects pathways related to construction that could either impact native terrestrial fauna directly or indirectly through loss or disturbance of habitat. There was considered low or insignificant risk of construction impacts on most of these species. For the EPBC Act listed terrestrial species, this is because:

- South-eastern Long-eared Bat Significant impacts are unlikely as while minor losses of foraging habitat are expected, this is a flying animal with large areas of suitable habitat locally, and construction activities would pose a low risk of direct impacts on individuals.
- Painted Honeyeater and Regent Parrot Significant impacts are unlikely as both are highly mobile species with extensive suitable habitat outside of AOI, and only minor losses of foraging and perching habitat likely to occur within the construction footprint. The ER acknowledges that construction works could result in the direct or indirect loss of 20 trees within 120 m of the river that could provide nesting habitat for Regent Parrots.
- White-throated Needletail No impacts are expected as this is a very uncommon visitor to the area and is an aerial feeder which rarely alights to roost in trees. A similar assessment applies to other migratory species that may visit the area.
- Growling Grass Frog Significant impacts are unlikely as this species is currently absent from the project area and has very limited suitable habitat within the AOI.

Most of the other FFG Act listed bird species mentioned above, including Grey-crowned Babbler and Major Mitchell's Cockatoo are categorised as 'bushbirds', which rely on forest, woodland and shrub habitats. These species are mobile and diurnal in their behaviour, able to move away from disturbances such as construction activities. They are also mostly uncommon or rare in the area,
and able to access alternative habitats. Permanent or temporary loss of small areas of habitat would have a limited impact. As a consequence, ecologically significant impacts from construction works are unlikely, though the ER rates the residual level of adverse effect after EDS mitigation measures are implemented as "medium".

In contrast, wetland-dependent birds such as the White-bellied Sea-Eagle are considered unlikely to use habitats within the Construction Footprint regularly or frequently, and therefore adverse impacts from construction activities are not expected.

Although the Carpet Python was not detected during field surveys in 2021, there is suitable habitat within the AOI and MIA. It shelters in habitats like hollow trunks and limbs, and if present it could be affected by construction works. Having regard to the expected loss of small areas of potential habitat for this species, the residual level of adverse effect after EDS mitigation measures are implemented is rated as "medium". Relevant measures include EDS 2Eb 'Construction vegetation management' and EDS E2c 'Construction fauna management', which provide for pre-clearance surveys of potential fauna habitats and necessary fauna relocation.

Nyah

A total of 115 terrestrial fauna species were recorded in surveys at Nyah between 2013 and 2021, including 112 native species and three introduced species. These comprised 81 birds, 25 mammals, five reptiles and four amphibians. In addition to Grey-crowned Babbler and Major Mitchell's Cockatoo, also found at Vinifera, another four terrestrial species listed as threatened under the FFG Act were recorded:

- Lophoictinia isura (Square-tailed Kite)
- Polytelis anthopeplus monarchoides (Regent Parrot)
- Saccolaimus flaviventris (Yellow-bellied Sheathtail Bat)
- Varanus varius (Lace Monitor).

The Yellow-bellied Sheathtail Bat migrates into southern Australia during the summer and could be present in the AOI between January and April. It uses diverse habitats, usually flying above canopy height to feed, and roosting in large tree hollows.

Several other terrestrial fauna species listed under the FFG Act were assessed to possibly occur within the Nyah AOI, largely overlapping with those identified for Vinifera.

Four threatened terrestrial species listed under the EPBC Act that possibly occur at Vinifera (that is, Growling Grass Frog, Painted Honeyeater, Regent Parrot and South-eastern Long-eared Bat), were also identified for Nyah. Australian Painted Snipe (*Rostratula australis*) was also identified. The latter species is "*a rare, nomadic bird species capable of turning up at any suitable wetland … throughout all of eastern Australia*". It is expected to only be an occasional visitor to the AOI.

Aquatic fauna

Two species of aquatic fauna listed as threatened under the EPBC Act occur in the Murray River adjoining the Vinifera and Nyah project areas, that is:

- Murray Cod (*Maccullochella peelii peelii*), listed as vulnerable
- Silver Perch (*Bidyanus bidyanus*), listed as critically endangered.

According to Specialist Assessment A, neither species is considered likely to occur within the floodplain water bodies during construction and hence impacts on their passage are unlikely.

In addition to Murray Cod and Silver Perch, other aquatic fauna species listed under the FFG Act that may be present in the project areas are: Murray-Darling Rainbowfish (*Melanotaenia fluviatilis*), Freshwater Catfish (*Tandanus tandanus*), Broad-shelled Turtle (*Chelodina expansa*) and Murray River Turtle (*Emydura macquarii*). None of these species are expected to be at risk of significant adverse effects.

(iii) Evidence and submissions

The submissions from Environment Victoria and FoNVP expressed concerns about the potential impacts of construction on fauna species listed under the FFG Act and EPBC Act, including from permanent and temporary loss of suitable habitat and loss of habitat connectivity. Habitat for Regent Parrot, Painted Honeyeater, Carpet Python and Lace Monitor was seen to be at risk, particularly because of the removal of hollow-bearing trees. Although the ER surveys had not detected Growling Grass Frog, the FoNVP submission stated that it does occur in the area.

The submission from Ross Macfarlane mentioned his long familiarity with the project area and its *"importance as habitat for threatened species such as Regent parrots"*. The DEECA submission also made mention of the Regent Parrot as *"a species of interest to DEECA"*, noting the ER assessment of *"permanent and temporary loss of small areas of foraging and perching habitat"*.

In response to these concerns, the expert witness statement of Mr Watson observed that:

- Regent Parrots are "highly mobile and able to cover large distances"
- the distribution of Growling Grass Frogs is difficult to predict "and the species has the potential to colonise/recolonise in future if favourable conditions prevail".

(iv) Discussion

Relevant effects of construction can include direct loss of habitat or habitat connectivity due to the proposed works, injury of individual animals by project activities, and fauna disturbance due to construction effects such as noise and night lighting.

The ER, together with subsequent submissions and evidence, did not point to a strong likelihood that any fauna species either occurring or potentially occurring in the project areas would be significantly impacted by construction activities.

Rather, the likelihood is that construction activities would reduce the local availability of suitable habitat for a range of species, at least until both rehabilitation and recovery of temporarily disturbed areas and the anticipated longer-term recovery of habitats within the MIA have occurred. An example of this is the loss of hollow-bearing trees which are habitat for the Carpet Python. This evolution of outcomes is effectively acknowledged by the ER.

The ER notes that (Specialist Assessment B, page 241):

Four threatening processes [under the FFG Act] linked with impacts on native vegetation and fauna habitat have been identified as likely to occur or be exacerbated as a result of construction of the project – *Land clearance, Degradation of native riparian vegetation along Victorian rivers and streams, Habitat fragmentation as a threatening process for fauna in Victoria and Loss of hollow-bearing trees from Victorian native forests.*

•••

However, no construction activity is expected to create a significant barrier to fauna movement, and the project is considered unlikely to exacerbate habitat fragmentation as a threatening process.

Specifically in relation to adverse effects of construction on aquatic fauna, the Committee is satisfied, consistent with the findings of Specialist Assessment A, that the residual risks are low or insignificant for both Vinifera and Nyah. This is largely because of the quite confined areas in which construction works could impinge, directly or indirectly, on aquatic fauna. While construction of drop structures and regulators at the Murray River could require the short-term use of cofferdams within the river, fauna salvage protocols under EDS E2c could deal with any trapped fauna. In addition, the Proponent's Final Day version of EDS E2f 'Aquatic fauna management' provides a complementary suite of measures. The Committee supports the change made to EDS E2f to specify in relation to works requiring coffer-damming: "Where practical, undertake works under no-flow conditions or outside the periods of time when fish migration occurs". This measure, in combination with other EDS mitigation measures, would minimise construction-related risks to water quality that might affect aquatic fauna.

Other than habitat removal, the main risk from construction activities identified by the ER is the introduction or spread of weeds or plant pathogens, leading to habitat degradation. This is a key threatening process listed under the FFG Act that could be exacerbated in the Nyah-Vinifera Park by the Project construction.

Several weeds have been identified within the Vinifera and Nyah AOI that could be dispersed by moving vehicles or soil. The Proponent's Final Day version of EDS E2d and E2e (D84) provides for biosecurity checks of all vehicles entering the Construction Footprint, hygiene protocols for Chytrid Fungus (which is a threat to the Growling Grass Frog), as well as monitoring and management of weeds, as part of the Native Flora and Fauna Management Sub-Plan under the CEMP. Both terrestrial and aquatic weeds, as well as pathogens, are now addressed by the proposed EDS E2d. The risk of construction introducing or exacerbating the spread of plant pathogens is considered unlikely due to the low annual rainfall.

The significance of the residual effect of spread of weeds due to construction was rated as high in the ER, that is, after the EDS measures are applied. Considering this, the Committee considers that further mitigation measures are warranted to protect the values of the Nyah-Vinifera Park.

Monitoring Requirement M TE2 requires "monitoring of weed cover following construction to identify if additional management is required". It specifies the location as "construction footprint with specific focus on waterways" and the frequency as:

First 12 months following construction unless specified otherwise in the Section 27 consent or agreed with the land manager. Subject to outcomes of monitoring, management and further monitoring may be required.

Having regard to the objects of the *National Parks Act 1975*, the Committee considers that it would be prudent for any consent granted Proponent under section 27 of this Act to be subject to conditions to protect the values of the Nyah-Vinifera Park. Two relevant conditions would be to require:

Monitoring of any increase of environmental weeds within or adjoining all sections of the construction footprint, including proximate downstream sections of waterways, to the satisfaction of Parks Victoria for the first 12 months following construction or such longer period as Parks Victoria may direct.

Implementation of measures to control any identified local proliferation of environmental weeds to the satisfaction of Parks Victoria.

A further condition could reinforce the proposed EMF requirement discussed in section 0 for monitoring of the extent and quality of rehabilitation of indigenous vegetation.

(v) Findings

The Committee finds that:

- No fauna species listed as threatened under either the FFG Act or EPBC Act, which have either been recorded or assessed as possibly occurring within the proposed Construction Footprints, would be significantly impacted by the proposed construction works for the Vinifera and Nyah projects.
- Maximum retention of tree hollow habitats and other mitigation efforts will be important for a range of species including Regent Parrot and Carpet Python.
- The construction works could exacerbate various listed threatening processes, though none critically.
- In addition to minimising habitat disturbance, another priority should be to apply a high level of rigour in the monitoring and management of environmental weeds.
- The Proponent's Final Day version of the EDS E2d and E2e are generally acceptable (with changes as set out above) but accountability for monitoring and management of environmental weeds should be reinforced through conditions of a consent or agreement for the project made under the *National Parks Act 1975*.

(vi) Recommendation

The Committee recommends:

The Minister for Planning should ask the Minister responsible for the *National Parks Act 1975* to consider applying a binding obligation under that Act through section 27 consent for the Proponent to:

- a) Monitor any increase of environmental weeds within or adjoining all sections of the construction footprint, including proximate downstream sections of waterways, to the satisfaction of Parks Victoria for the first 12 months following construction or such longer period as Parks Victoria may direct.
- b) Implement measures to control any local proliferation of environmental weeds associated with the project works to the satisfaction of Parks Victoria.
- c) Monitor the cover and quality of rehabilitation of indigenous vegetation within the construction footprint.

6 Ecological effects of operation

6.1 Introduction

The effects of project operation on terrestrial and aquatic ecology are discussed in:

- ER Sections 9.1.5 and 9.2.5 respectively for the Vinifera project
- ER Sections 13.1.5 and 13.2.5 respectively for the Nyah project
- Specialist Assessment A Ecology Aquatic
- Specialist Assessment B Ecology Terrestrial
- ER Attachment V Vinifera Assessment of overall improvement for biodiversity (AOIB)
- ER Attachment VI Nyah AOIB.

The exhibited EMF includes the following relevant EDS:

- EMF3 Operational management
- EMF4 Operation performance management
- E2f Aquatic fauna management
- E3 Pest Plant and Animal Monitoring and Management Plan
- E4a Overall biodiversity improvement Vinifera
- E4b Overall biodiversity improvement Nyah
- SW2 Surface water management operation.

Some other EDS are also relevant, though to a lesser extent.

In response to the Committee's RFI and other issues raised at the Hearing, the Proponent provided the following Technical Notes:

- TN01 Ecological Associates Reports
- TN02 Conceptual models and approach to adaptive management
- TN08 Aquatic ecology expert evidence response to questions taken on notice.

Additionally, the Committee had regard to other documents including:

• VMFRP Ecological Monitoring, Evaluation and Reporting Plan (D44 for EES Central).

Table 9 lists the evidence relating to the ecological effects of project operations.

Table 9	Evidence relating to ecological effects of o	perations	
Party	Expert	Firm	Area of expertise
Propone	nt Drew King	Jacobs	Terrestrial flora
Propone	nt Christopher Watson	Jacobs	Terrestrial fauna
Propone	nt Jean-Michel Benier	Jacobs	Aquatic ecology

6.2 Effects on vegetation communities

(i) The issue

The issue is what effect is the proposed project operation likely to have on the vegetation communities in the Project area.

(ii) What did the ER say?

Vegetation within the Managed Inundation Areas

Mapping of vegetation types and condition within the MIAs were key inputs to the assessment of potential adverse and beneficial effects of managed inundation using the proposed infrastructure.

At Vinifera, seven EVCs were identified across 335 hectares of native vegetation within the MIA. Of this, 238.1 hectares was EVC 814 Riverine Swamp Forest and 80.1 hectares was EVC 810 Floodway Pond Herbland, together with small areas of other EVCs. At 46 percent of sites surveyed there was no evidence of tree canopy recruitment occurring, indicating a pattern of ecological decline in response to infrequent inundation. Low to nil levels of recruitment of understory species, especially sedges and herbs, were observed. Vegetation was in a poorer state or condition farther way from the river.

A further indicator of the impact of long-term reduction of the frequency of inundation was the presence at many sites of "*terrestrial*" flora species not characteristic of floodplain EVCs. Such "*terrestrialisation*" included the presence of *Eucalyptus camaldulensis* (River Red Gums) in areas considered to have previously been too wet to support it, including "*areas modelled to have previously been occupied by the treeless Spike-sedge Wetland, Floodway Pond Herbland and Tall Marsh EVCs*" (Specialist Assessment B page 247).

At Nyah, nine EVCs were identified across 475 hectares of native vegetation within the MIA, again the majority (408.4 hectares) was EVC 814 Riverine Swamp Forest. Similar patterns of vegetation condition as at Vinifera were found, with no evidence of canopy recruitment at 60 percent of surveyed sites.

Beneficial effects

In summary, the ER identified the potential benefits of a managed inundation regime for the vegetation communities of the Nyah-Vinifera Park based on these elements:

- Observation of widespread water stress of dominant trees and lack of juvenile recruitment across much of the floodplain forests and woodlands, the absence of aquatic and riverine macrophytes from the majority of sites where they would be expected, as well as the contraction of wetland EVCs and the presence of "terrestrial" flora within them.
- Attribution of these observed patterns to a diminished frequency and duration of natural events inundating different levels of floodplain vegetation in recent decades.
- Literature reviews pointing to evidence of the benefits of enhanced watering regimes for increasing the health and diversity of floodplain ecosystems.
- Evaluation of the practicability of using the proposed infrastructure at Nyah-Vinifera to increase the frequency and duration of inundation events reaching different levels of floodplain vegetation.

One statement of the anticipated project benefits was (Environment Report page 9.32):

The operation of the Vinifera project would generate environmental benefits from improving the health, structure and succession of canopy species, to increasing the diversity and abundance of flood dependent understorey species. The project would protect, restore and better align the inundation regime with the ecological needs of the floodplain.

In terms of the dominant species, regular flooding is expected to increase "the growth rate, health and vigour of River Red Gums", as well as increasing flowering, seed production and hence

recruitment, enabling multiple age classes of trees to develop. Flooding of wetland plant communities would promote the diversity and biomass of graminoid and herbaceous species.

The EVCs present in the Nyah and Vinifera Parks have been grouped into 'Ecological Water Regime Classes' (**EWRCs**), which are associated with distinct inundation regimes and hence threshold levels of passing river flows and operational scenarios:

- Seasonal Wetland Spike-sedge wetland, Floodway Pond Herbland and Tall Marsh; equivalent river flow of 15,000 ML/day
- Red Gum Swamp Forest Riverine Swamp Forest; equivalent river flow of 17,500 ML/day
- Red Gum Forest and Woodland Grassy Riverine Forest, Sedgy Riverine Forest; equivalent river flow of 20,000+ ML/day.

Figure 16 shows diagrammatically the transition of vegetation and habitats from wetter to drier in terms of the three EWRCs and corresponding flow thresholds. The EWRCs or habitats are not necessarily arranged in this order across the Vinifera floodplain, as shown in Figure 16. The equivalent transition at Nyah is shown in Figure 17.

Figure 16 EWRCs, operating scenarios and Murray River flow thresholds for the Vinifera project

				a
Ecological Water Regime Class	Murray River	Seasonal Wetland	Red Gum Swamp Forest	Red Gum Forest and Woodland Black Box Woodland
Operating scenario	Not applicable	Seasonal Fresh	Vinifera Intermediate	Vinifera Intermediate Vinifera Maximum
River flows equivalent (ML/d)	Not applicable	15,000	17,500	20,000+

Source: ER Section 9, Figure 9.16.

The likely response of each EVC within the MIA to the proposed operating scenarios was assessed in Specialist Assessment B, drawing on the Arthur Rylah Institute Technical Report 'A guide to water regime, salinity ranges and bioregional conservation status of Victorian wetland Ecological Vegetation Classes' by Frood and Papas (2016). For EVCs not covered by the latter report, information on flood tolerances of key species was sourced from 'Floodplain Wetland Biota in the Murray-Darling Basin: Water and Habitat Requirements' by Rogers and Ralph (2011) as well as the experience of lead R8 botanists. The likely responses of EVCs within the two projects' MIAs for the different inundation scenarios were rated as 'positive', 'neutral' or 'negative'. All EVCs were predicted to show a positive or positive-neutral response to flooding, with improved health, resilience, diversity or cover, compared to prevailing conditions.





Source: ER Section 9, Figure 13.18.

The benefit is expected to occur largely because of the increased availability to deep-rooted vegetation of fresh groundwater - as a result of raised groundwater levels across most of the MIAs – which will support increased evapotranspiration by vegetation and therefore its vigour or health. This shift will particularly benefit the dominant River Red Gums and wetland of EVCs including Spike-sedge wetland, Floodway Pond Heathland and Tall Marsh. Increased inundation could lift the abundance of wetland species such as *Typha spp.* (Cumbungi) and *Phragmites australis* (Common Reed), and potentially "provide valuable wetland habitat" in the Nyah-Vinifera Park.

In what are apparently separate and subsequent assessments of the hydrological responses of EVCs to those reported in Specialist Assessment B (and Specialist Assessment A), the Attachments V and VI to the ER present more detailed assessments of the effects of the different inundation scenarios on each EVC and the grouped EWRCs for the Vinifera and Nyah projects respectively. These reports address the potential project benefits. They include assessments of EVCs' preferred frequencies, durations and depths of inundation, as well as intervals between inundation events. Maps are provided of the extent of inundation of different EWRCs at different flow thresholds. Tables are provided of the percentage of each EVC would be inundated under different depth ranges, in the context of what is identified by Frood and Papas (2016) as the "maximum depth of sustained inundation" for each EVC (Attachment V, page 43):

For example, at the 17,500 ML/day threshold, Spike-sedge wetland (which is vulnerable), receives water at its maximum sustained inundation depth for 100% of its extent in the Maximum Inundation Area.

It is pointed out that as the projects would be able to control the duration of a managed inundation event, it would be feasible to minimise the time for which the "maximum depth" criterion was exceeded. Further, an assessment is provided of the extent of alignment of the different flow scenarios with the pre-Regulation flows that the EVCs would have been subject to.

Table 10 compares the water regime characteristics for EVCs in each EWRC for the Vinifera project. It shows that the frequencies and median durations of inundations under the "Basin Plan with VMFRP" scenario would be relatively close to the pre-regulation scenario, and to the guidelines of Frood and Papas (2016), compared to the Basin Plan and Regulated Rivers scenarios.

Figure 18 shows the extent of inundation of EWRCs within Vinifera MIA for a 17,500 ML/d Murray River flow equivalent operating scenario, while Figure 19 shows the areas of inundation of each EVC relative to their "*maximum depth of sustained inundation*". Figure 19 shows the areas of inundation of each EWRC group relative to their "*maximum depth of sustained inundation*" for their component EVCs, for different levels of flow.

Attachment V summarises its findings on the alignment of water regimes and EVC requirements as follows (at page 55):

As a result of the project, all of the flood-dependent EVCs would receive inundation more aligned with the frequency they would have experienced under pre-regulation flows. VMFRP with the Basin Plan (the project) also allows duration to be better managed and reduces duration of events closer to the pre-regulation regime. ...

Considering the more recent history of Murray River flows, and plausible climate change scenarios, the operation may need to rely more on flood generation events than the modelling using data to 2009 would indicate. In this situation, it is only the Basin Plan with VMFRP that has the infrastructure required to get water into the floodplain and retain it.

Adverse effects

In terms of the potential for adverse effects of managed inundation on vegetation communities, the ER identified the following main causal pathways:

- Increased inundation from inappropriate environmental watering, leading to the permanent or temporary loss of or damage to trees, vegetation or habitat values.
- Increased inundation increasing the height of saline groundwater, compromising the health of native vegetation.
- Increased inundation leading to the proliferation of weeds.
- Increased inundation leading to increased vegetation growth and, indirectly, bushfire risks to vegetation (and other values) from increased fuel loads.

In relation to the first pathway, the ER regards the retreat of *"terrestrial"* species that have *"colonised"* wetland EVCs as a positive outcome. However, it also acknowledges that increased inundation could lead to adverse outcomes for non-wetland EVCs if, for example, an extended duration of inundation impacted key species (Specialist Assessment B, page 248):

[The] adaptive management process will be key to identifying how frequently the upper margins of the Maximum Inundation Area are watered, to safeguard the Riverine Grassy Woodland and Sedgy Riverine Forest vegetation from being over-watered to the detriment of these EVCs.

	Ecological	Frequency of inundation (/10 year)			Median duration of inundation (months)						
Ecological Vegetation Class	Water Regime Class	DELWP (2016)	Pre-regulation	Basin Plan with VMFRP	Basin Plan	Regulated river	DELWP (2016)	Pre-regulation	Basin Plan with VMFRP	Basin Plan	Regulated river
Spike-sedge Wetland (EVC 819)	Seasonal Wetland	0-10*	10.1	10.0	8.6	8.1	1->6	5.7	4.9	4.4	2.7
Tall Marsh (EVC 821)	Seasonal Wetland	8-10	10.1	10.0	8.6	8.1	>6 - 12	5.7	4.9	4.4	2.7
Floodway Pond <u>Herbland</u> (EVC 810)	Seasonal Wetland	3-10*	10.1	10.0	8.6	8.1	1->6	5.7	4.9	4.4	2.7
Riverine Swamp Forest (EVC 814)	Red Gum Swamp Forest	3-10*	9.8	9.0	8.5	6.8	1 – 6 (>6)	5.2	3.9	3.6	2.8
Grassy Riverine Forest (EVC 106)	Red Gum Forest and Woodland	3-10*	10.0	9.0	7.9	6.1	1-6	4.7	3.9	3.1	2.4
Sedgy Riverine Forest (EVC 816)	Red Gum Forest and Woodland	0 – 7*	10.0	9.0	7.9	6.1	0-6	4.7	3.9	3.1	2.4
Riverine Grassy Woodland (EVC 295)	Black Box Woodland	0-3	10.0	9.0	7.9	6.1	1-6	4.7	3.9	3.1	2.4

Table 10 Water regime characteristics for EVCs in each EWRC for the Vinifera project

*Preferred inundation frequency for these EVCs is described by DELWP (2016) as a combination of several Frequency of Inundation categories including Seasonal (8 to 10 in every 10 years), Intermittent (3 to 7 in every 10 years) and Episodic (less than 3 in every 10 years

Source: ER Attachment V, Table 6.

Figure 18 Map of inundation of EWRCs within Vinifera MIA for 17,500 ML/d Murray River flow scenario



Source: ER Attachment V, Figure 15.



Figure 19 Areas of EVCs inundated within Vinifera MIA for 17,500 ML/d Murray River flow scenario







Source: Attachment V, Figure 18

Major adverse impacts from increased inundation are not expected for any EVCs, rather "*minor transitions in floristic composition are anticipated where terrestrialisation has occurred as a result of reduced flooding frequency*".

Some potential changes in EVCs may need to be moderated. The ER recognises that increased inundation could promote the growth of the wetland species such as *Typha spp.* and *Phragmites australis* and they could form dense patches crowding out other wetland plants. Consequently, the need for adaptive management is again recognised, in this instance to encourage a diversity of understorey wetland species.

A related risk recognised in the ER is that weeds already present within the MIA, or introduced during construction, might spread and increase in abundance as a result of managed inundation. This operational risk affecting native vegetation is the only one rated as 'high' before mitigation is applied, with the residual risk rated as 'medium'.

In terms other impact pathways, potential impacts of saline groundwater on vegetation during project operation were considered in section 3.5.

Mitigation measures

The Proponent's expectation is that the implementation of the Vinifera and Nyah projects will yield a net improvement in the health and diversity of vegetation communities within their MIAs. The respective mitigation measures EDS E4a and E4b for 'Overall biodiversity improvement' thus pivot on an overarching objective:

Operate the Vinifera project to better align the frequency, duration and timing of managed inundation events with the ecological needs of the floodplain, including to improve ecosystem function, threatened species' habitat and native vegetation.

They also list the key documents that are to underpin adaptive management, which include the OEMP and the Monitoring, Evaluation and Reporting Plan.

The OEMP is a requirement of the Incorporated Document, together with separate requirements for authorisation of native vegetation removal and for monitoring and evaluation of biodiversity improvement. How these various provisions interact in responding to potential adverse effects of project operation on vegetation communities is a critical consideration in Project success.

EDS E3 is another key mitigation measure, responding to the potential proliferation of weeds and animal pests. It requires a Pest Plant and Animal Monitoring and Management Plan, comprising a monitoring program and contingency measures.

(iii) Evidence and submissions

No submissions expressed views regarding the potential Project effects on specific vegetation communities in the Nyah-Vinifera Park.

Several submissions welcomed the prospect that the increased inundation of the Vinifera and Nyah floodplains from the Project would enhance the health of their River Red Gum forests and woodlands. Other submissions were ambivalent, acknowledging the potential ecological benefits for these floodplains but pointing out that other Murray floodplain ecosystems would not receive equivalent inundation.

The submission from Peta Thornton questioned the nature of the ecological outcomes:

Maintaining the ecological process of flooding is key. However this is more like dialysis for a few floodplains rather than restoration of the system. It is dubious to claim that "restoring a

more natural flooding regime" for these sites could equate to equivalent environmental outcomes. The "more natural" claim would seem to be only about timing and duration and exclusive of connectivity, natural hydrological cues and other important factors.

The submission from the ANU Fenner School was sceptical:

... no empirical evidence in the Environment Report is presented for the decline in condition ('health') of these floodplain wetlands, and therefore no attribution can be made as to causal factors.

Dr King responded to this submission by pointing to both the field assessments of vegetation conditions and the body of scientific work on the water needs of the vegetation communities, which together provide relevant evidence, as documented in Specialist Assessment B.

In his expert witness statement to the Roundtable, Dr King stated that:

The results of the proposed watering regime at each site are predicted to be overwhelmingly beneficial for vegetation communities present and for most threatened flora species identified as being present or having potential to occur.

He further noted that:

The inundation scenarios proposed are predicted to generally increase tree health across the MIA which consequently will increase longevity and persistence of these important components of the ecosystem. Such increases in health have been observed in the short time following the 2022-23 floods with flushes of new leaf growth and increased tree health and growth immediately apparent Exceptions to this conclusion are at the wetland areas that have been invaded by River Red Gums where the topography would indicate that inundation duration would be longest (i.e. at deeper sections) and it is likely that the trees will drown, though it should be noted that there are few Large Trees within such areas as they are mainly saplings and younger trees, which are only there because of the altered water regime.

DEECA's submission stressed the importance of considering the level of certainty associated with the ER's evaluation of an expected net improvement in biodiversity, since this will determine whether an exemption from off-setting requirements for native vegetation removal can be granted. DEECA drew attention to the outcomes of an expert elicitation process for the VMFRP that had considered the preferred inundation regimes of the relevant EVCs, producing some variances from the frequencies and durations modelled for the ER.

DEECA also stated that:

... it would expect that an operational plan would specify requirements for targets, objectives and indicators for monitoring and evaluation. This is to ensure that the delivery of targets and objectives to provide for overall improvement to biodiversity is embedded within and has sufficient connection to operational management.

In response, the Proponent's Final Day version of the Incorporated Document (D85) included a corresponding provision for the OEMP (previously 'Operating Plan').

(iv) Discussion

The Committee has considered several assessments (as part of the ER and other evidence and material presented by the Proponent) of inundation regimes and their relationship to vegetation communities at Vinifera and Nyah, including:

- Guidelines by Frood and Papas (2016)
- ER Specialist Assessment B
- Inundation mapping in ER Specialist Assessment C and associated documentation (especially the hydraulic modelling reports by Jacobs, D99 and D100)
- ER Attachments V and VI

- 'Expert Elicitation' report by Bruce et al (2022)
- Ecological Associates reports (2023a) and (2023b).

The Proponent did not present a consolidated interpretation of these various analyses, assessments and guidelines. Further, the methodologies and assumptions underpinning the hydrologic assessments were not clearly articulated in some instances, including in ER Attachments V and VI. The Committee is therefore not able to probe in-depth and reconcile these different assessments.

The ER did not identify risks that extended frequencies, periods or depths of inundation might have a substantial impact on specific vegetation communities, with the exception that the *"drowning"* of juvenile River Red Gums that have *"colonised"* former wetland areas is both anticipated and seen to be a desirable outcome. Attachment V notes:

Any risks associated with an EVC receiving greater than maximum sustained inundation depth for extended periods or being inundated for a longer than preferred duration are addressed in Section **Error! Reference source not found.** For the Vinifera project, no such adverse effects have been identified.

Section 9 of Attachment V provides a high level perspective on ecological risks of project operations, citing relevant literature, but does not address risks of over-watering of particular EVCs or species.

The EES Central Committee found that realising benefits of the Project may not be as simple as 'just add water'. This Committee agrees. The likely impact of the proposed managed inundation regime on the vegetation communities of the Nyah-Vinifera Park depends on the hydrological responses of key vegetation communities.

Terrestrialisation

The ER anticipates that an increased frequency and duration of inundation in former areas of wetland EVCs will lead to the loss of *"colonising"* River Red Gums. There is also a potential for some *"terrestrialising"* dryland chenopod species to be lost from upper floodplain EVCs. The ER contends that the loss of these *"terrestrialising"* plants would enhance the integrity of EVCs that were previously present in parts of the Vinifera and Nyah floodplains.

The EES Central Committee considered this issue and this Committee agrees with its conclusions. In summary, the EES Central Committee's view was that:

- The reversal of terrestrialisation for the EVCs in the MIA should generally be considered a benefit of the Project and not accounted for in native vegetation impacts.
- [It] does not agree that consideration of terrestrialisation cannot attach *any* biodiversity value to terrestrial species which have opportunistically inhabited the floodplain.
- If the Project was to result in a significant negative outcome to a vulnerable or endangered terrestrial species, then measures to avoid, minimise and mitigate that outcome warrant consideration in the context of predicted ecosystem benefits.

Need for further hydraulic analysis of vegetation impacts

A more refined and integrated characterisation of the vegetation communities of the Vinifera and Nyah floodplains is needed, including with respect to their hydrology, geomorphological setting and soils. Specialist Assessment B provides much relevant information, but a further level of integration is needed to better appreciate the likely impact of managed inundation on vegetation communities. The EES Central Committee recommended a new EDS SW4 to require a further hydraulic analysis to *"inform the floodplain vegetation assessment and the minimisation of erosion and sedimentation through design (EDS GS1) and operation (EDS GS3 and EDS SW2)"*. Further hydraulic analysis is needed for the same purposes in relation to the Nyah and Vinifera projects. However, this Committee favours separating the requirements for vegetation assessment and minimisation of erosion, since the focus and priorities of the analyses will differ.

Building on the commentary in the EES Central report, the purpose of further hydraulic analysis of vegetation inundation would be to:

- better understand the existing distribution of EVCs at Vinifera and Nyah in relation to historic patterns of inundation (frequency, duration and depth), including flow across the floodplains, relative to pre-regulation and regulated scenarios
- identify optimal inundation regimes to achieve specific outcomes for EVCs at Vinifera and Nyah, in the context of relevant Basin Plan flow scenarios
- assess potential losses of vegetation that could result from implementation of managed inundation regimes.

Specification of outcomes could include, for example:

- priorities for promoting River Red Gum vitality, recruitment or reduction in different EVCs
- re-establishing aquatic macrophytes and species diversity in wetland EVCs, or even reestablishing wetland EVCs
- promoting the diversity of transitional communities at the margins of the MIAs.

The aim would be to achieve an understanding of local EVC requirements, in contrast to the generalised or 'coarse' estimates of Frood and Papas (2016) and the uncertainties of the expert elicitation assessment (these are discussed in more detail in the EES Central report). This would provide greater clarity about the ecological outcomes at Nyah and Vinifera that managed inundation events might enable, if optimal feasible inundation regimes were applied.

The assessment should also clearly identify the locations of "terrestrialised" ecosystems where the selective removal of plant species through managed inundation is proposed.

Informing operations and adaptive management

While it is conceivable that this assessment could have implications for the detailed design of the Project, its primary significance is to tailor the operation of the Project to achieve optimal results that meet the Project objectives. Specifically, the assessment should be used to inform:

- development and implementation of the OEMP, including any necessary operational changes
- the assessment of any likely vegetation losses from the proposed regime of managed inundation, or any necessary update to likely losses, to be provided to the Secretary of DEECA under Clause 4.6.1 of the Incorporated Document
- the report on overall biodiversity improvements to be provided to the Secretary of DEECA under Clause 4.6.2c of the Incorporated Document.

Adaptive management based on monitoring and evaluating the effects of inundations over the life of the Project will be key in achieving optimal results that meet the VMFRP objectives. The definition of adaptive management adopted in the ER documentation (for example, in Specialist Assessment C) describes it as:

An iterative process of developing a conceptual model and management hypothesis and then implementing management actions and monitoring to identify which management actions are most effective at achieving specified objectives.

The 'VMFRP: Ecological monitoring, evaluation and reporting plan'¹⁸ provides a strong starting point for a systems approach for adaptively managed inundation of the VMFRP floodplains. It stresses the need for more detailed work, and observes (on page 49):

In some cases, flooding regime alteration will be sufficient in itself to reach targets, but in others, complimentary actions may be required, e.g. weed control, revegetation, pest animal control. It is currently unclear what the relative importance of different management actions (including floodplain inundation) and other factors (e.g. rainfall and soil type) for changing or enabling desired vegetation attributes.

Changes are recommended to the EDS and the OEMP requirements in the Incorporated Document to ensure the findings of the further assessment and adaptive management are implemented throughout the life of the Project.

(v) Findings

The Committee finds that:

- it is likely that an increased frequency and duration of inundation achieved through the implementation of the Vinifera and Nyah projects has the potential to improve the health of most floodplain EVCs but uncertainties remain
- a more refined analysis of patterns of inundation of EVCs at Vinifera and Nyah is needed to provide a more confident basis for assessing likely effects on vegetation, and guiding adaptive management
- this analysis will need to:
 - be based on the refined hydraulic modelling recommended in Chapter 3.3
 - better characterise the ecological outcomes that are sought, including maps showing the locations where particular outcomes are expected
 - provide a clearer articulation of vegetation-hydrology-soil-management interactions in the specific context of the Vinifera and Nyah floodplains.
 - identify the locations of "terrestrialised" ecosystems in which the selective removal of plant species through managed inundation is proposed.
- the analysis should be used to inform the OEMP and the adaptive management of the Project throughout the Project life. Changes are needed to the Incorporated Document and the EDS to implement this.

(vi) Recommendations

The Committee recommends:

Revise the Environmental Delivery Standards to include a new EDS SW4 'Surface water – Further hydraulic assessment of operational impacts on floodplain vegetation'.

The change is shown in Appendix F.

The Committee recommends:

¹⁸ A. Sparrow, C. Jones, K. Bennetts, A. Bush, S. Harrow, L. Lumsden, P. Menkhorst, J. Nelson, P. Papas, M. Scroggie, S. Sinclair and M. White (2021). *Victorian Murray Floodplain Restoration Project: Ecological monitoring, evaluation and reporting plan*. Report for Mallee and North Central Catchment Management Authorities. ARI, DELWP, Heidelberg, Victoria.

Revise the Incorporated Document to amend the requirements for an Operational Environmental Management Plan to include:

- a) the objectives, targets and indicators that are to be used for the monitoring and evaluation of biodiversity responses
- b) the conceptual framework of environmental system interactions that will guide adaptive management of both managed inundation and land management
- c) a requirement to consult Swan Hill Rural City Council, as well as other nominated parties, with respect to the development and implementation of the OEMP.

The changes are shown in Appendix E.

6.3 Effects on threatened flora species and communities

(i) The issue

The issue is what are the likely beneficial and adverse effects of Project operation on threatened flora species and communities within the Project area.

(ii) What did the ER say?

No ecological communities listed as threatened under the EPBC Act or FFG Act were identified or considered to possibly occur within the MIAs for Vinifera and Nyah. Consequently, the two projects would not affect any listed ecological communities.

Vinifera

Flora surveys within the MIA were less intensive than within the AOI. Of the four species listed under the FFG Act that were found within the AOI, three were either found or considered to possibly occur within the MIA: *Senecio cunninghamii var. cunninghamii* (Branching Groundsel), *Sida intricata* (Twiggy Sida) and *Vittadinia pterochaeta* (Winged New Holland Daisy). While the critically endangered *Acacia oswaldii* (Umbrella Wattle) was present in the AOI, it was considered unlikely to occur within the MIA. Another 20 listed species were considered to possibly occur within the MIA. Another 20 listed species were considered to possibly occur within the MIA, due to the presence of potentially suitable habitat. All of these species were either present or considered possible within the AOI. These species include semi-aquatic, moisture-dependent, floodplain and mudflat, as well as terrestrial dry flora.

Lepidium monoplocoides (Winged Peppercress) is the only flora species listed under the EPBC Act considered to have suitable habitat within the MIA, though it wasn't recorded in targeted surveys. As a moisture-dependent species, the area of suitable habitat is expected to expand because of increased inundation. The ER also suggests that "[t]*he proposed inundation regime is not expected to exceed the inundation thresholds to the point that the species would decline (if present)*". At the same time, Specialist Assessment B observed (on page 250) that:

The water requirements of *Lepidium monoplocoides* are not well understood, and Bennetts and Freestone (2016) recommended it would be beneficial to undertake germination experiments to better understand the conditions under which the species germinates and determine watering regimes that promote optimal plant growth.

Attachment V, the Vinifera AOIB describes the expected impacts on threatened species from both project construction and operation, drawing heavily on Habitat Importance Maps (**HIMs**), prepared by DELWP. These maps are based on modelling of the relative importance of habitat for

each species within existing native vegetation. They have been used to identify the areas of varying levels of habitat importance or quality for species either recorded or considered possible to occur in the Construction Footprint and the MIA respectively. On the basis of the HIM assessment for threatened flora species, any potential losses of habitat within the Construction Footprint would be outweighed by the expected gains of habitat within the MIA if managed inundation were to be successfully implemented.

Nyah

The Nyah MIA was found to be more floristically diverse than Vinifera with 172 native species recorded in project surveys between 2015 and 2022. As at Vinifera, the Winged Peppercress was the only EPBC Act listed flora species considered to possibly occur within the Nyah MIA.

There were 26 threatened flora species listed under the FFG Act that were recorded or considered to potentially occur within the MIA. Most of these species are moisture-dependent and are expected to benefit from the proposed environmental watering regime. Eleven species of "terrestrial dry flora" that don't require wet/dry cycles could be "negatively impacted" within the MIA but benefit from environmental watering where they adjoin the MIA. However, none of these latter species were recorded in the MIA.

(iii) Submissions and evidence

There were no submissions that raised concerns about specific flora species.

DEECA stated that it "does not consider the Project to pose an unacceptable risk or consequence to the State-wide population of any FFG listed flora". Repeating a statement made in relation to other categories of risk:

To ensure certainty that residual risks are mitigated DEECA recommends that the draft Incorporated document is amended to include a condition at 4.4 'Environmental Management' which explicitly requires the inclusion of proposed EDS that are applicable to the design, construction and operation of the Projects.

This provision has been adopted in the Final Day version of the Incorporated Document (D85).

According to Dr King's expert witness statement:

The threatened flora species found most commonly at Vinifera, Branching Groundsel, is predicted to respond positively to the proposed inundation and expected to thrive at a site where it is already doing very well. One species, Fuzzy New-Holland Daisy, that is present at the site may be adversely impacted by inundation, however, this is a species that currently occurs at many disjunct locations and as a wind-spread and short-lived small shrub, has potential to also thrive at the margins of the MIA due to the increased water availability.

Dr King stated that Fuzzy New Holland Daisy as well as another 10 species could be adversely impacted by inundation at Nyah, though he also identified the potential for them to thrive at the margins of the MIA. In addition:

Pale Flax-lily is already known to occur at the margins of the MIA and near the Murray River, with some in the Construction Footprint, and an increase in available habitat is likely to occur for this species.

(iv) Discussion

The HIM assessments for individual listed flora species suggest the area of habitat within the MIAs that will benefit from a managed inundation regime will, in most instances, greatly outweigh the losses of habitat from construction works. At a qualitative level, this claim is generally persuasive since if a moisture-dependent species is present within the MIA, or if its propagules are

transported to the MIA by floodwaters, wind or animals, the larger habitat areas could support larger populations once the hydrological regime becomes suitable. However, most of these species weren't recorded in surveys and may or may not be present. The quantitative contrast between the likely impacts of construction and the less certain benefits of operation for individual species is therefore somewhat speculative as presented.

Some of the information in the AOIB reports regarding particular species points to uncertainties:

- Umbrella Wattle *"it is considered unlikely to occur in the MIA",* yet the HIMs identified 96 hectares of suitable habitat within the MIA
- Branching Groundsel "impacts from the Vinifera project are likely to be outweighed by the benefits" and yet "it is considered unlikely to occur" in the MIA
- Winged New Holland Daisy over 1,000 plants were found in the MIA in the Spring 2021 surveys, yet "habitat for the species is associated with areas of higher elevations, where inundation during environmental watering is likely to be infrequent and shallow".

The ER documents point to various EDS as providing the basis for mitigation of adverse effects on threatened flora, including EDS E4a and E4b (which direct project operations be managed to achieve an 'Overall biodiversity improvement'), EDS EMF3 'Operational Management' and EDS E3 'Pest Plant and Animal Monitoring and Management Plan'. These EDS are broad. The ER does not clearly outline specific means by which risks of adverse effects of inundation on threatened flora species might be mitigated.

However, monitoring requirements M TAE2 and M TE6 are intended to assess improvement in response to environmental watering in water-dependent vegetation in wetlands and floodplain lakes, and in the understory in forests and woodlands. They require quadrat sampling of wetland vegetation to document species diversity and cover-abundance, including of threatened flora. This is to occur annually for at least 15 years. Sufficient quadrats are to be sampled to evaluate the significance of watering effects.

Presumably the implementation of this measure by ecologists will make appropriate adjustments, consistent with the adaptive management approach required under a final VMFRP Ecological Monitoring Evaluation and Reporting Plan, to evaluate the effectiveness of inundation events.

The Committee notes the desirability of the monitoring of threatened terrestrial dry flora at the fringes of the inundated area, including adjoining the MIA, where some of these species may benefit from increased groundwater levels and soil saturation. Some flexibility of timing of quadrat surveys may be appropriate to record the maximum diversity of species after inundation events.

(v) Findings

The Committee finds that:

- the proposed operation of the project is unlikely to have a significant adverse effect on any threatened flora species listed under the EPBC Act or the FFG Act, having regard to:
 - the possible absence of species for which suitable habitat has been identified
 - the opportunity for a number of threatened species to recolonise the MIA when a more suitable hydrologic regime is established
 - the likelihood that if some threatened terrestrial dry flora species are lost within the MIA they may increase in abundance in adjoining areas.

• the monitoring requirement M TAE2 should require, in addition to annual quadrat sampling, surveys at appropriate times following inundation events to detect any presence of threatened flora species either within or adjoining the inundated area.

(vi) Recommendation

The Committee recommends:

Revise the Monitoring Requirements M TAE2 'Terrestrial and aquatic' to require transect surveys following inundation events to detect any presence of threatened flora species either within or adjoining the inundated area.

The change is shown in Appendix F.

6.4 Effects on threatened terrestrial fauna species and communities

(i) The issue

The issue is what are the likely beneficial and adverse effects of Project operation (inundation) on threatened terrestrial fauna species or communities within the Nyah-Vinifera Park.

Threatened aquatic fauna will be considered in section 6.6.

(ii) What did the ER say?

Threatened terrestrial fauna within the MIAs

The occurrence and habitat suitability for threatened fauna species at Vinifera and Nyah was summarised in Section 5.4.

At Vinifera, a total of 25 fauna species listed as threatened under the FFG Act were identified as either being present (2) or to have suitable habitat and possibly be present within the MIA (23). Only the two bushbirds Grey-crowned Babbler and Major Mitchell's Cockatoo were detected within the MIA. In addition, another nine bushbirds, 11 wetland-dependent birds, one bat, one frog and one reptile were considered to possibly occur. Of these 25 species, six are listed as threatened under the EPBC Act and were considered to possibly occur:

- Corben's Long-eared Bat/South-eastern Long-eared Bat
- Painted Honeyeater
- Regent Parrot
- White-throated Needletail
- Australian Painted Snipe
- Growling Grass Frog.

At Nyah, a total of 27 fauna species listed as threatened under the FFG Act were identified as either being present (4) or to have suitable habitat and possibly be present within the MIA (23). As well as Grey-crowned Babbler and Major Mitchell's Cockatoo, which were found at Vinifera, Regent Parrot and Lace Monitor were detected within the Nyah MIA. In addition, another 19 birds, two bats, one frog and two reptiles were considered to have suitable habitat. The same species listed under the EPBC Act considered to possibly occur at Vinifera were also considered to be possible at Nyah, except for White-throated Needletail. While several impact pathways related to increased inundation from project operation were identified, the consequences of changes to species' habitats were highlighted. Some of the species listed under the FFG Act could be subject to minor or insignificant adverse effects:

- Bushbirds would be unable to forage on the ground during inundation events, but would still be able to forage in trees in and beside each MIA. Such a temporary loss of foraging habitat would be inconsequential, while any long-term habitat changes due to increased inundation are expected to have an insignificant adverse impact on these species. As the South-eastern Long-eared Bat also flies it is unlikely to be affected by occasional flooding.
- The Carpet Python could be subject to a short-term loss or fragmentation of habitat, but this would be unlikely to have a significant impact.

In contrast, the listed threatened birds that are wetland-dependent as well as the Growling Grass Frog are expected to benefit from an increase in floodplain inundation, which would improve the availability and condition of their required foraging and breeding habitats. In addition to the listed individual bird species, various associated species of the Victorian Temperate Woodland Bird Community would also likely benefit.

In relation to the EPBC Act listed species that may be present in the Nyah-Vinifera Park:

- South-eastern Long-eared Bat has been noted above
- Painted Honeyeater is expected to benefit from increased inundation as floodplain woodlands flower more frequently and insects become more abundant
- Regent Parrot may be subject to insignificant or minor adverse effects, but increased inundation of floodplain habitats is expected to be beneficial in terms of foraging resources and the eventual production mature trees with nesting hollows. The production of nesting hollows would also benefit South-eastern Long-eared Bat (and many birds as well as other species not listed under the EPBC Act)
- White-throated Needletail is an aerial insectivore that is likely to benefit from increased insect abundance resulting from environmental watering
- Australian Painted Snipe is a rare, nomadic bird species that may appear at suitable wetland when conditions are favourable and hence would benefit from increased habitat availability resulting from project operation
- Growling Grass Frog is likely to benefit from the increase in habitat opportunities that managed inundation would produce, potentially enabling it to recolonise the area.

The AOIB reports for Vinifera and Nyah provided contextual information on the significance of impacts on habitats of species listed under the EPBC Act or FFG Act that are of particular interest:

Regent Parrot – the HIMs indicate that while the Construction Footprint is of marginal significance, the MIA contains a much larger area of potential habitat, albeit of a moderate quality. The latter could be enhanced by environmental watering. At the same time, the overall project area constitutes a "negligible percentage of the species habitat in Victoria". According to the Vinifera AOIB, in a phrase echoed for several species:

The HIMs for Regent Parrot, prepared by DELWP, support the claim that the Vinifera project would be overwhelmingly positive for the species

• Painted Honeyeater – its HIM profile is similar to that of the Regent Parrot. This species mostly feeds on the fruits of mistletoes growing on eucalyptus and acacias, which are expected to increase in productivity with environmental watering

- Grey-crowned Babbler its HIM profile is like that of the Regent Parrot. As it has disappeared from much of Victoria, the enhancement of its habitat within the MIA would contribute to its conservation
- Major Mitchell's Cockatoo the HIM indicates that there is very little suitable habitat within the Construction Footprint and a small amount of moderate quality within the MIA. Near the Murray River, the species is mainly associated with Black Box woodlands, outside the MIA. A net benefit is expected
- Black Falcon the HIM indicated that there is very little suitable habitat within the Construction Footprint but a substantial area within the MIA. It is anticipated that environmental watering would enhance the MIA habitat for the Black Falcon by increasing the productivity of the floodplain and hence the abundance of prey
- White-bellied Sea-Eagle its HIM profile is similar to that of the Black Falcon. As its diet consists of fish, aquatic birds and turtles, and it nests near water, it is anticipated that environmental watering would enhance the MIA habitat for this species by increasing food resources and improving nesting opportunities in the longer-term
- Carpet Python similar to the Regent Parrot, the HIMs for this species indicate that the Construction Footprint is of marginal significance, but the MIA contains a much larger area of potential habitat, albeit of a moderate quality. Again, the overall project area constitutes a "negligible percentage of the species habitat in Victoria".

Several migratory species listed under the EPBC Act that visit the area may benefit from environmental watering at Nyah-Vinifera. Four species were identified as potentially occurring at Vinifera:

- Glossy Ibis (Plegadis falcinellus)
- Common Greenshank (Tringa nebularia)
- Latham's Snipe (Gallinago hardwickii)
- Fork-tailed Swift (Apus pacificus).

The first three species might visit the Vinifera MIA during inundation events but are considered unlikely to occur within the Construction Footprint. These species plus an additional four possible species could occur within the Nyah MIA but are considered unlikely to occur within the Construction Footprint:

- Marsh Sandpiper (*Tringa stagnatilis*)
- Sharp-tailed Sandpiper (Calidris acuminata)
- Australian Gull-billed Tern (Gelochelidon nilotica macrotarsa)
- Caspian Tern (*Hydroprogne caspia*).

The Fork-tailed Swift is an aerial species is unlikely to forage in the terrestrial habitats within either the Construction Footprint or the MIA. The ER states:

There is no indication that the [MIA] constitutes important habitat for any migratory species or supports an ecologically significant proportion of a population of any migratory species.¹⁹

Finally, in terms of outcomes for threatened terrestrial fauna more broadly, the ER anticipates that with the implementation of EDS including EMF3, E3 and SW2 any residual adverse effects of project operations, such as from applying an inappropriate hydrological regime, will be mostly "low", and "positive" or "strongly positive" outcomes in terms of habitat suitability and species populations (either seasonal or resident) would be expected. The one exception for residual risks

¹⁹ ER Section 9, Table 9-16

is the "potential introduction or spread of weeds, pest species or pathogens during or as a result of the operating phase of the project", for which the mitigation measures are expected to reduce the risk from "high" to "medium".

(iii) Evidence and submissions

As noted earlier in this chapter, some submissions welcomed the benefits to habitats that would result from implementation of the Nyah and Vinifera projects.

FoNVP's submission drew attention to the potential loss of habitat for Regent Parrot and Painted Honeyeater as a result of project works. It also acknowledged that:

Important breeding habitat [for Regent Parrot] is present within the inundation area and will benefit from watering, but contrasting to this many areas will perish with no watering.

A similar argument was put forward in relation to Growling Grass Frog, also contending that the species is actually present:

Growling Grass Frog does occur in the area, and habitat for this species within the floodplain complex must be prioritised across all riverine areas, not solely the chosen project areas.

The concern that some other floodplain habitats might be neglected if environmental water is directed preferentially to Nyah-Vinifera is outside this Committee's Terms of Reference.

Mr Watson, in his expert witness statement, responded in relation to Growling Grass Frog:

It is acknowledged that not all of the stated habitat at Vinifera and Nyah is necessarily used by the Growling Grass Frog (noting that the species is considered to be currently absent from the three project areas), but the entire area could be used by the species in the right conditions, so it is considered as potential habitat. By the same token, the stated area of impact is not necessarily all used by the Growling Grass Frog, but it could be, so is included in the assessment and calculations. Thus, while the anticipated benefits may be seen as overstated and ambitious, the potential impacts are also likely to be overstated.

(iv) Discussion

The Committee accepts that the proposed managed inundation regime is likely to have a generally beneficial effect on threatened terrestrial fauna within the Nyah-Vinifera Park, subject to effective control of risks posed by pest animals, plants and pathogens that may be promoted by increased inundation. That said, the AOIB reports provided a limited consideration of uncertainties, relying largely on literature references on similar ecosystems in the Murray-Darling Basin.

Some statements of project benefits in the ER documentation appear to be overstated, for example in terms of quantitative estimates of areas of habitat gains. Further qualification regarding timeframes of habitat improvements and relevant uncertainties is needed, including in the context of the Scope for the ER.²⁰

(v) Findings

The Committee finds that:

• the proposed operation of the Project would not have a significant adverse impact on any threatened terrestrial fauna species listed under the FFG Act or any threatened or

²⁰ Scope for the environment report under EPBC Act Bilateral (Assessment) Agreement 2014 and EE Act Nyah, Vinifera and Burra Creek Floodplain Restoration Projects', DELWP, July 2021. The Committee notes that the Scope required: Evaluation of the feasibility and limitations (including affordability) of implementing mitigation measures proposed and describe and justify the level of uncertainty associated with whether they are expected to achieve their desired outcomes; and Present detailed evidence that supports the predicted benefits of the project, with explicit consideration of uncertainties associated with predictions made.

migratory terrestrial fauna species listed under the EPBC Act, or on any faunal ecological community listed under either Act

• additional work to better address uncertainties in Project design would have been useful in this assessment and for future VMFRP Project assessments.

6.5 Effects on weeds, animal pests and habitat degradation

(i) The issue

The issue is the likely effect of Project operation on terrestrial weeds, animal pests and associated habitat degradation within the Nyah-Vinifera Park.

Aquatic weeds and pest fish species are considered in Chapter 6.6.

(ii) What did the ER say?

Introduced pest plants and animals have had a significant impact on biodiversity in Australia since European settlement, contributing to the decline of native species. Their impact on the ecosystems of the Murray River floodplains is marked.

The ER comments that the proposed inundation regime "*is expected to reduce the suitability of habitat for many environmental weeds*", but some species "*could extend their current distribution within the {MIA] with more frequent flooding*".

Five weeds that are listed as Restricted and Regionally Controlled under the *Catchment and Land Protection Act 1994* were identified as occurring within the Vinifera AOI and MIA:

- Bridal Creeper (Asparagus asparagoides)
- African Box-thorn (Lycium ferocissimum)
- Spear Thistle (Cirsium vulgare)
- Paterson's Curse (Echium plantagineum)
- Horehound (Marrubium vulgare).

Other listed species recorded at Nyah were Great Brome (*Bromus diandrus*) and Red Brome (*Bromus rubens*).

It is understood that the only pathogen of concern in the Nyah-Vinifera Park is *Phytophthora cinnamomi*, and the current priority is to prevent its spread. A root parasite of concern is *Exocarpos strictus* (Pale-fruit Ballart), which has proliferated in the forest in recent years. The restoration of winter floods has been identified as a means of "increasing River Red Gum health and incidentally achieving limited reduction in the vigour of *Exocarpos strictus*".

Field surveys for the ER detected three Priority Pest species under the Catchment and Land Protection Act at both Vinifera and Nyah:

- European Rabbit (Oryctolagus cuniculus)
- European Brown Hare (Lepus europaeus)
- Red Fox (Vulpes vulpes).

In addition to these Priority Pest species, a wider management challenge from introduced animals is recognised:

Grazing, browsing and/or trampling pressure by rabbits, feral goats, pigs, sheep and deer, as well as disturbance by carp and other pest fish, have been identified as a risk to all River Red Gum parks and reserves along the Murray River, including Nyah-Vinifera Park (Parks Victoria 2019b).

Several threatening processes as listed under the FFG Act and EPBC Act respectively are linked to pest animals that could increase in response to the proposed projects' operation: Cat (*Felis catus*), Red Fox, European Rabbit, Goat (*Capra hircus*). Pig (*Sus scrofa*) is not currently listed in this way.

Specialist Assessment B cites a perspective from Parks Victoria, which is responsible for managing weeds and pests within the Nyah-Vinifera Park:²¹

Pest species are a key threat in the operations phase of this project, because they threaten the achievement of the ecological objectives set for this project, particularly those related to restoration of vegetation health. Environmental watering is expected to increase the number of pest plants and animals present due to the creation of more favourable conditions (Program Leader - Ecological Water, Parks Victoria, December 2021 *pers. comm.*).

Consultation with Parks Victoria revealed the key management actions currently being undertaken within the Nyah-Vinifera Park included opportunistic spraying of *Lycium ferocissimum* (African Box-thorn) primarily in Autumn and Spring, opportunistic spraying of *Silybum marianum* (Variegated Thistle) and fumigation of rabbits in autumn, winter and spring (Josh Cameron, 13 January 2022, *pers. comm.*).

Control of pest animals and weeds in the Park is guided by the Parks Victoria Conservation Action Plans (Parks Victoria 2019a, 2019b).²² In the context of the two projects, implementation of EDS E3 'Pest Plant and Animal Monitoring and Management Plan" will be crucial.

(iii) Evidence and submissions

The submissions from Environment Victoria and FoNVP made brief reference to concerns about impacts of weeds and pests being exacerbated by Project operation. FoNVP commented:

The residual risks of project, in particular blackwater events, weed and carp invasion, have not been adequately dealt with and are rated as 'medium'.

FoNVP further commented:

The River Red Gum Management Plan 2018 (Parks Victoria) and the VEAC 2008 River Red Gum Forests Investigation ... should inform this project.

In his expert witness statement, Dr King included as an observation from a brief inspection of the Nyah-Vinifera Park following the 2022/23 floods:

Relatively little weed growth was observed in flooded areas. At Vinifera in particular, the areas visited had previously supported significant amounts of introduced Mustards that appeared to have been drowned and were observed at very low abundance. Weeds were noted to be prevalent along existing tracks though in areas that were weedy before the floods.

Dr King also recommended:

For EDS E2e, I recommend that weed monitoring and control be included as part of the final paragraph such that it reads "Rehabilitation should include as appropriate topsoil, leaf litter, log reinstatement, targeted revegetation and weed monitoring and control as agreed with the land manager."

The Proponent included this change in the Final Day version of the EDS.

(iv) Discussion

In addition to weeds and animal pests, other management issues in the Nyah-Vinifera Park include managing impacts of recreational activities, control of over-grazing by both hoofed, introduced

²¹ Specialist Assessment B page 284.

²² 'Parks Victoria (2019a). Conservation Action Plan for Parks and Reserves Managed by Parks Victoria', Parks Victoria (2019b) 'River Red Gum Parks Management Plan'.

animals (deer, pigs, goats, sheep) and native herbivores (kangaroos), illegal timber harvesting and fire hazards, all of which can pose threats to the habitats and viability of threatened species.

The evidence suggests that some impacts from the Project may be positive such as the drowning of invasive weeds due to increased inundation. However negative impacts are also expected as the overall ecosystem improves and productivity increases, potential leading to increased populations of pest flora and fauna.

Specialist Assessment B observes (on page 155):

Specifically, the Nyah-Vinifera Park is identified as a priority location to control grazing from rabbits and pigs (Parks Victoria 2018). Actions include establishing and maintaining rabbit densities of less than one per spotlight kilometre as well as to work with Traditional Owners to employ culturally appropriate control methods. Kangaroos can also become problematic under favourable conditions, when they undergo significant population increases.

The constraints on Parks Victoria's capacity were acknowledged in Specialist Assessment B (on page 284):

Current pest plant and animal programs delivered by Parks Victoria are carried out as funding becomes available and may or may not occur annually or on a regular schedule or be done to complement other programs (such as environmental watering programs) (Program Leader – Ecological Water, Parks Victoria, December 2021 pers. comm.).

Adequate resources for the land manager as well as effective controls through Project implementation will be essential to improve the outcomes for limiting or reducing invasive flora and fauna.

(v) Findings

The Committee finds that:

- the operation of the Vinifera and Nyah projects may supress some terrestrial weeds but also potentially cause the proliferation of others. Animal pests are likely to increase in abundance in response to a lift in both vegetation productivity and the abundance of prey
- the monitoring and effective mitigation of any significant increase in weed and animal pest abundance will be critically important to the success of the Projects. While EDS E3 provides a framework for this, the capacity of Parks Victoria to respond effectively will be vital.

6.6 Effects on aquatic ecology

(i) The issue

The issue is what are the likely beneficial and adverse effects of Project operation on the aquatic ecology of the Nyah-Vinifera Park.

(ii) What did the ER say?

Current aquatic ecology

Specialist Assessment A (on pages 63-64) stresses the impact that the reduction of Spring floods has had on seasonal wetland habitats:

Seasonal wetland habitat has been lost from the Vinifera floodplain through a reduction in the duration of spring flow peaks. High river levels now inundate wetlands only briefly. This reduction in inundation events has promoted the establishment of River Red Gum

(*Eucalyptus camaldulensis*) on former wetland beds. Flood duration is too short to support aquatic marshland vegetation and the understorey is now dominated by grasses and seasonal floodplain herbs. The decline in wetland habitat means the floodplain now only provides opportunistic habitat for aquatic fauna that recolonise the system when water is available. ... However, the connection between the creek and the Murray River has been blocked and as a result Vinifera Creek now functions as a backwater wetland (Harrow and Thomas 2018).

Specialist Assessment A describes the aquatic habitats of the Nyah floodplain in very similar terms, noting that it primarily consists of Parnee Malloo Creek, an intermittently flowing anabranch of the Murray River, and shallow wetland depressions adjacent to the creek that under a natural flow regime would have been flooded almost annually. Parnee Malloo Creek has been highly modified by past developments and does not provide continuous flowing habitat.

The Vinifera and Nyah floodplains fall within a section of the central Murray River valley that was assessed through the MDBA's Sustainable Rivers Audit as having "poor" overall ecosystem health, particularly for fish and macroinvertebrates. The hydrological interaction of the river and its floodplains means that their ecological status is closely linked.

Fish surveys for the ER found no fish species of conservation significance in the Vinifera project area. Only two species were identified:

- Carp Gudgeon (Hypseleotris klunzingeri)
- Common Carp (*Cyprinus carpio*).

The introduced Carp comprised nearly 95 percent of sample catches, reflecting its breeding on the flooded floodplain in December 2021. Flooding is thought to have enabled Carp Gudgeon to move from the river, an opportunistic response that other small-bodied fish may also adopt. At Nyah, only Carp were found in Parnee Malloo Creek in late 2021.

During floods, the Vinifera and Nyah floodplains provide extensive ephemeral aquatic habitat. Aquatic fauna of the Project areas include fish species that are members of the FFG Act listed 'Lowland Riverine Fish Community of the Southern Murray- Darling Basin'. Four fish species listed under the FFG Act are considered to have a high likelihood of occurring within the Vinifera and Nyah floodplains or the adjacent section of the Murray River:

Murray Cod (*Maccullochella peelii peelii*) - is likely to be present in the adjacent Murray River Silver Perch (*Bidyanus bidyanus*) - is likely to be present in the adjacent Murray River Murray-Darling Rainbowfish (*Melanotaenia fluviatilis*) - is possibly present in floodplain waterbodies

Freshwater Catfish (Tandanus tandanus) - is patchily distributed upstream and downstream.

Both Murray Cod and Silver Perch are listed under the EPBC Act. Several other small native fish are either present (Australian Smelt) or likely (Golden Perch, Unspecked Hardyhead, Flathead Gudgeon, Dwarf Flathead Gudgeon, Bony Herring) at both Vinifera and Nyah. In addition to Carp, other non-native fish are also considered likely (Goldfish, Redfin Perch, Gambusia).

Murray spiny crayfish (*Euastacus armatus*) were previously present nearby in the Murray River but appears to have disappeared since the blackwater event of 2011.

It is considered likely that the non-threatened Eastern Snake-necked Turtle would occur in the Nyah-Vinifera area, as it is known to utilise ephemeral wetland habitats, to be able travel overland between waterbodies and to withstand extended dry periods. Broad-shelled Turtle (*Chelodina expansa*) and Murray River Turtle (*Emydura macquarii*), respectively listed as Endangered and Critically Endangered under the FFG Act, are considered to possibly occur.

While Platypus (*Ornithorhynchus anatinus*) has been recorded in the past, it is considered to no longer be present in the area.

Beneficial operational effects

ER Sections 9 (page 85) and 13 (page 80) summarise the relevant content of Section 3 on Project Benefits and ER Attachments V and VI to identify highlight these *"benefits of flooding for aquatic ecology"*:

- Increased breeding habitat for native small-bodied fish, and nursery habitat for large-bodied native fish
- Increased connectivity and additional habitat for the Eastern Snake-necked Turtle, the Murray River Turtle and the Broad-shelled Turtle
- Recruitment of aquatic and amphibious flora species due to increased availability of water in wetlands
- Growth of wetland vegetation, providing foraging and breeding habitats for wetland fish, birds, turtles and frogs
- Return of organic carbon and nutrients from organic matter deposited on the floodplain to the river, providing food resources for aquatic fauna
- Improved riparian vegetation quality due to more frequent and extensive flooding, which provides food for aquatic fauna, cover and refuge from predators from overhanging and submerged branches, shrubs and woody debris, and bank stability.

Specialist Assessment A identified the potential of small-bodied native fish to benefit from managed inundation at both Vinifera and Nyah, especially at "intermediate" and "maximum" passing flows in excess of 17,5000 ML/day and 20,000 ML/day respectively. It is expected that medium to large fish would use the floodplain for short-term foraging, but not for breeding.

The assessments for Vinifera and Nyah closely aligned. Table 11 provides a useful summary, which applies to both projects.

Adverse operational effects – water quality

The potential for managed inundation, especially if relying on pumping rather than flood capture, to lead to hypoxic or anoxic conditions in floodplain wetlands was considered in section 3.4. This can have a direct impact on aquatic fauna including fish and invertebrates. Variations in DO levels across the floodplain may enable larger fauna to move to less DO-depleted conditions, and potentially to exit the floodplain if the infrastructure allows this. Carp are relatively tolerant of low DO conditions, which can assist their competitive advantage.

The ER expresses confidence that the EDS SW2 and SW3 will limit the residual risk of anoxic events to aquatic fauna to a "low" level.

	Predicted response						
Species	Current Trajectory ^a	Seasonal Fresh	Vinifera Intermediate	Vinifera Maximun			
Native Fish							
Freshwater Catfish	+	1	1				
Golden Perch	+	1	1				
Murray Cod	$ \blacklozenge$		1				
Murray-Darling Rainbowfish	+	1	1				
Silver Perch	$ \blacklozenge$	1	1				
Unspecked Hardyhead	➡	1	1				
Carp Gudgeon		1	1	1			
Bony Herring	+	1	1				
Flathead Gudgeon	+	1	1				
Dwarf Flat-headed Gudgeon	+	1	1				
Australian Smelt	➡	1	1				
Eastern Snake-necked Turtle	+	1	1				
Murray River Turtle	➡	1	1				
Broad-shelled Turtle	➡	1	1				
populations decreasing	1	. et al (1)	urrent population stable	•			
slight improvement in popula	ations		arge improvement in no	nulations			

Table 11 Expected responses of fish and turtle species to operation of Vinifera project

Source: Specialist Assessment A, Table 7-2 page 132.

Adverse operational effects – weeds and Carp

Specialist Assessment A identifies two key risks that are only partially amenable to mitigation and that involve a "medium" level of residual risk:

- spread of weeds, pest species or pathogens, especially if project operation leads to habitat and water quality conditions suitable for breeding or dispersal of invasive species either on the floodplain or in receiving waterways
- loss of connectivity and impeded passage for native aquatic species, especially due to draw down of wetlands resulting in stranding of aquatic species on floodplain (EDS, SW2).

In relation to the weed risk, Specialist Assessment A points to the impact of managed inundation (on page 116):

The proposed floodplain inundation scenarios would greatly increase the extent and quality of potential habitat suitable for aquatic weed species within the Vinifera floodplain complex and at least some of this habitat, particularly within the creek channel, would be inundated in most years.

The potential for aquatic weeds to proliferate within floodplain surface water habitats and receiving waterways as a result of the operation of the Vinifera project has the potential to significantly influence the ecological responses and outcomes to the managed watering scenarios.

An equivalent risk of proliferation of aquatic weeds would apply at Nyah.

Notwithstanding these strong statements of potential impacts, the residual risk was seen to be low. Two main arguments were offered:

- mitigation through implementation of EDS E3 'Pest Plant and Animal Monitoring and Management Plan', which provides for the specification of monitoring as well as contingency measures, will be effective
- any adverse impacts due to project operation "are unlikely to be significantly different to natural flood events".

The potential proliferation of Carp from managed inundation was seen to be a greater risk. Goldfish and Gambusia could also proliferate under the proposed operating conditions.

Carp favour still or slow-flowing waters, well vegetated areas and disturbed environments, and spawn in shallow water when water temperatures are between 17 and 25 degrees centigrade. Consequently, inundation of the Vinifera-Nyah floodplains during Spring and Summer would provide ideal conditions for their breeding, potentially contributing to stocks in the Murray River (Specialist Assessment A, page 119):

[R]epeated managed inundations makes them higher risk than natural inundations, as Carp may be able to more [move?] regularly and take advantage of the ideal spawning conditions present on the floodplain (Koehn et al. 2016). Hence, any managed inundation of floodplains needs to balance the possible ecological benefits of environmental watering against the potential negative impacts ...

The proposed floodplain inundation scenarios would greatly increase the extent and quality of potential Carp breeding habitat within the Vinifera floodplain complex and at least some of this habitat, particularly within the creek channel, would be accessible most years

In particular, the implementation of the seasonal fresh scenario (preferred frequency and maximum interval of 9 years in 10 with maximum interval 2.5 years, with a holding duration 4 to 6 months). If seasonal or semi-permanent habitat were reinstated within Vinifera Creek, it would be possible for some fish to persist between inundation events within deeper sections of the creek following drawdown of the floodplain.

These extracts from Specialist Assessment A point to the challenge of operational management. Potential effects of Carp are proposed to be managed using EDS SW2 'Surface water – Operation'. Two mitigation measures are proposed in EDS SW2:

- Factor seasonal implications in the timing of filling and drawdown
- Develop and test a strategy to retain carp on the floodplain ...

These measures are intended, first, to target early to mid winter (June and July) for floodplain inundation to reduce Carp breeding, and secondly, to preferentially strand Carp on the floodplain during the drawdown of an inundation event.

A "medium" risk was anticipated after mitigation, "being likely to occur and of moderate consequence". Similar to the reasoning with respect to weeds, the widespread abundance of Carp in the river system was seen to limit the significance of any proliferation on the floodplain.

Adverse operational effects – loss of connectivity

The effects of the project infrastructure and its operation of on the movement of fish and turtles was considered in Specialist Assessment A in terms of both potential adverse impacts and management implications.

The design of regulators is intended to enable passive fish passage, rather than being specifically designed to facilitate fish passage. The designs are similar to those used elsewhere in the Murray-Darling Basin and the ER indicates a high degree of confidence that fish passage would be maintained. However, as smaller fish are generally weaker swimmers, flow velocities through regulators will determine the ability of fish of different sizes to pass through. This will need to be confirmed in the final designs. It is proposed to install inflow screens for pumped inundation events to exclude small fish and turtles, but there is no stated intention to install carp exclusion screens on outlet regulators (presumably because they would be impractical).

Fish are expected to opportunistically enter the Nyah and Vinifera floodplains during inundation events, but once the regulators are closed to maintain inundation water levels fish would be

unable to exit the MIAs other than during a major flood event. At Nyah (Specialist Assessment A, page 175):

For the fish to then exit the system, they would require passage through either the N5 regulator (moving upstream) or N2 regulator (moving downstream). The proposed N2 and N5 regulator structures will allow for passive fish passage from upstream and downstream.

At Vinifera, safe downstream passage would be provided at regulator V2.

Some fish and turtles may be able to persist in deeper pools within Vinifera Creek and Parnee Malloo Creek between inundation events, following the drawdown phase. However, there is a significant risk that many fish could be stranded on the floodplain.

The most likely turtle to be present, Eastern Snake-necked Turtle, is unlikely to be impeded by the containment banks in moving between the river and the floodplain. In contrast, fish are at risk of being stranded on the floodplain during the drawdown of managed inundation events, especially if this is rapid. To mitigate this risk, EDS SW2 provides for the development and testing of a native fish exit strategy to allow native fish (and turtles) to migrate from the floodplains. In Specialist Assessment A (page xix) this proposed strategy is acknowledged to be 'experimental'. It would involve "monitoring to assess the potential and extent of stranding" and adaptive management responses "In part due to the uncertainty, the significance of the residual effect to fish and turtles is considered medium."

(iii) Evidence and submissions

The submission from DEECA states that it "does not consider the Project to pose an unacceptable risk or consequence to the State-wide population of any aquatic FFG listed fauna species".

The submission from Nicole McKay largely focused on potential impacts on aquatic ecology, expressing scepticism that the project will offer benefits in the context of regional decline:

Water plant life has been devastated by the increase in hypoxic water and cyanobacteria. The floodplain in this region had flourishing and diverse wetland plant ecology across the region, that was intact and functional until the mid 90's. The combination of reduced flooding during the [Millennium] Drought, and then reduced flooding caused by river managers limiting river flows, (constraints) has devastated this ecology.

Ms McKay highlighted the impacts of past blackwater events on fauna including the Murray Crayfish as exemplifying the risk that managed inundation could exacerbate these impacts.

During the recent 2022-23 [flood] another devastating systemic blackwater event occurred. Crayfish were again seen to crawl out of the water, but in far lower numbers. Why? Not because the event was less significant, but because there are hardly any left.

The submission from Rodney Duffy had the same concern:

The biggest problem for the [authorities] responsible for operating these watering events is going to be managing movement of the water to mimic a natural flood. If the water is not moving we will have black water events. Fish and Crayfish have been decimated from our local area by a couple of these events that are becoming more frequent.

FoNVP submitted that:

The residual risks of [the] project, in particular blackwater events, weed and carp invasion, have not been adequately dealt with.

The submissions from FoNVP and Environment Victoria drew attention to the risk of reduced connectivity for native fish, including of stranding during inundation drawdown. Both submissions also raised concerns about the cumulative impacts of the VMFRP projects on aquatic ecology, making specific reference to cumulative salinity impacts. Environment Victoria queried whether

the effects on aquatic biota of the cumulative effects of the VMFRP projects on increased salinity have been assessed.

In relation to the risk posed by blackwater events, Mr Benier advised that:

The most severe hypoxic blackwater events in recent times have been associated with widescale natural flooding.

He gave evidence that flood capture events are unlikely to pose a significant hypoxic/anoxic risk to floodplain fish species if throughflow is maintained because fish would be able to exit the floodplain if the DO levels were unsuitable. In relation to pumped events, the use of pump screens would minimise impacts of low DO conditions on fauna, because the riverine fauna's access to the floodplain would be limited.

In relation to the risk of algal blooms, Mr Benier gave evidence that (expert statement pages 9-10):

There is no specific record of previous managed or natural flood events at the Projects triggering algal blooms on the floodplain or in the Murray River.

For the Projects, managed events are proposed to occur in winter/spring with water held on the floodplain into early summer before drawdown (depending on scenario). Inundation that extends into summer may coincide with conditions that are more favourable to algal growth, increasing the potential for algal growth on the floodplain to occur. However, the conditions in terms of the timing and duration of inundation are expected to be similar to natural inundation at the same time.

In relation to weeds, Mr Benier gave evidence that (expert statement page 8):

The proposed floodplain inundation regimes would create large areas of shallow, largely still water that would greatly increase the extent and quality of potential habitat suitable for aquatic weed species and also the potential for the propagules (e.g., seeds or vegetative parts) of aquatic weed species to be spread ...

However, he also considered that "it is unlikely that significant proliferation of aquatic weed species abundance or distribution will result from operation of the project" because "field surveys ... did not identify any areas of existing weed species infestations", while "the proposed watering scenarios will reinstate a more natural flow regime".

Mr Benier advised that "Carp are an existing environmental threat to aquatic ecology in the Murray River system and there are presently a limited number of options in terms of how they can be managed as part of the Projects." He also advised (expert statement page 7):

The Operating Plan states that increases in Carp populations can be avoided by considering seasonal implications in the timing of filling and drawdowns to reduce likelihood of creating optimum breeding conditions and implementing a fish exit strategy to strand carp on the floodplain. Winter fills – June and July (or when water temperatures are less than 16°C) provide the lowest risk conditions for filling. Implementation of the MER (Monitoring Evaluation and Reporting) plan would allow for monitoring of fish population response (including Carp) to inundation and drawdown events and inform adaptive management during future environmental watering events.

In relation to habitat connectivity, Mr Benier gave evidence that, as a result of the projects:

An increased frequency of flowing habitat in creek habitats would provide greater connectivity for fish populations and improved habitat for aquatic species.

Moreover, passive fish passage at regulators would allow large fish (such as Murray cod and Silver perch) to exit to the Murray River if they do enter floodplain habitat.

In relation to fish stranding, Mr Benier gave evidence that:

Stranding is an inevitable and natural hazard for fish that use floodplain habitats. Stranded fish are an important food source for predators and carrion feeders and contribute to the nutrient dynamics of the floodplain. ...

He further explained that (expert statement page 6):

The native fish exit strategy is likely to be based on the approach of the native fish exit strategy trialled and demonstrated at Gunbower Forest, where wetland water levels have been deliberately dropped in stages, using rapid falls between stages to stimulate a migration response with stable phases in between, with fish passage being maintained at exit points throughout. Native fish have responded strongly to water level cues and fish migration has increased.

The most appropriate operational settings to promote migration will vary between sites according to their hydraulics, including the connectivity of fish habitats within the site and relationship between regulator discharge and wetland water level. Accordingly, the specific management measures which will provide for optimal environmental outcomes at the Projects will be developed over the course of multiple watering events, in accordance with the principle of adaptive management.

Mr Benier stated that the Project would have beneficial effects (expert statement page 3):

Operation of the Projects will mean the floodplain inundation regime for these sites will more closely match the natural inundation regime and result in beneficial effects to floodplain plant and animal communities. An increased frequency of flowing habitat in creek habitats would provide greater connectivity for fish populations and improved habitat for aquatic species.

However, Mr Benier was unable to provide evidence in relation to the assessment of project benefits in Attachments V and VI to the ER, since he had not contributed to this.

Mr Benier acknowledged the complexity of competing objectives in managing inundation events (expert statement pages 6-7):

...flexibility during operation and the reliance [on] relatively high Murray River flows, or the requirement to meet ecological objectives related to native vegetation, birds and fish, means that the floodplain inundation scenarios may coincide with the Carp breeding window (late winter to summer).

Environment Victoria highlighted the practicability of the mitigation measures and the cumulative impacts of VMFRP projects, as well as the implications of potential tensions between different management objectives:

The extent to which measures and strategies in the EMF and EDS, and adaptive management approaches, can and will be delivered remains unclear. For example, the strategies advise against inundating the nine VMFRP sites at the same time, in order to avoid adverse impacts to water quality (including low dissolved oxygen, elevated nutrients or elevated salinity in return flows) and risks associated with water availability. This anticipated staggered watering may conflict with other management approaches, for example, avoiding inundation during warmer months which is recommended to reduce the risk of blackwater events and carp infestation.

(iv) Discussion

Managing aquatic ecology outcomes - overview

Overall, the ER has a strong emphasis on achieving improved outcomes for flood-dependent terrestrial vegetation and associated fauna by enabling managed inundation, with secondary benefits to aquatic vegetation and fauna.

The ER states that in terms of ecosystem function, both the Vinifera and Nyah projects are (page 3.16):

.. expected to protect and restore floodplain ecosystems' function and habitat components, and deliver benefits to aquatic ecosystem flows, connectivity, biophysical functions and lifecycle functions.

To facilitate these benefits, a range of related outcomes of the operation of the Projects will be required:

- maintaining suitable water quality especially DO for aquatic fauna
- enabling the recovery of more persistent, diverse wetland and riparian habitats while also containing any outbreak of aquatic weeds or excessive dominance of native macrophytes
- enabling small-bodied native fish, as well as large-bodied native fish, to enter and exit the floodplain during inundation events
- limiting the proliferation of Carp on the inundated floodplains such that they do not outcompete native fish species and disrupt aquatic habitats.

Other outcomes include restoring and sustaining terrestrial vegetation and fauna, and minimising erosion.

There are two key challenges in the context of aquatic ecology outcomes of Project operation:

- If suitable passing flows to achieve floodplain inundation via flood capture do not occur until after early-mid winter, how are elevated risks of generating hypoxic/anoxic conditions and/or mass spawning of Carp to be managed while *also* achieving the extent and duration of inundation that is considered necessary to enable the recovery and health of both wetland and floodplain EVCs?
- If Carp do proliferate, how certain is it that a drawdown strategy to enable the exit of small-bodied native fish, while stranding Carp, would work?

In relation to the first challenge, while the ER does offer broadly appropriate EDS relating to aquatic ecology, as part of the proposed EMF, it does not clearly address how apparent tensions between some outcomes or objectives would be tackled. It would have been helpful if the ER had presented clearly integrated strategies, or even potential scenarios, for simultaneously managing these risks and outcomes.

As for the second dilemma, the answer suggested by the expert evidence would appear to be "moderately" - although this may be optimistic.

Partial integrated, conceptual models with respect to fish management are provided in the 'SDL Fish Management Plan Nyah Floodplain' and the corresponding plan for Vinifera prepared for the Mallee CMA in 2018. These plans were submitted as part of the EES Referral documentation. They did not form part of the ER documentation but were tabled (D69, D70) at the Roundtable in response to questions from the Committee regarding the use of conceptual models in the project investigations.

These plans provided explicit design criteria for the project infrastructure, operational requirements to benefit native fish for inclusion in the SDL site Operating Plans, together with *"prioritised ecological objectives and targets for fish at the site"*, and finally understanding of *"the context of site operations and to maximise the ecological outcomes on a reach scale"*. To support these outputs, conceptual models were developed, based on the scientific literature. These models were presented in appropriate formats, including textual descriptions of species' requirements, diagrammatic representations of ecosystems and temporal phasing of operations. Figure 21 from the Nyah plan provides a simple, phased operational model for managing

populations of small-bodied native fish during floodplain inundation. Figure 22 provides a diagrammatic conceptual model of the habitat requirements of small-bodied native fish.

Figure 21 Operational model - managing populations of small-bodied native fish

TEMP. MANAGED FLOODPLAIN OPERATIONS MODEL: Small-bodied wetland generalists (SBWG)



Source: Simon Harrow (2018) 'SDL Fish Management Plan Nyah Floodplain', page 76.



Wetland fish model: regulated flow conditions



Source: Simon Harrow (2018) 'SDL Fish Management Plan Nyah Floodplain', page 49.

The Committee has not reviewed these plans in detail but it considers that they provide clarity about key aspects of the proposed management of floodplain restoration at Vinifera-Nyah, which could have further informed aspects of the ER not limited to aquatic ecology.

Another, related document that provides valuable but under-utilised clarity is the 'VMFRP Ecological Monitoring, Evaluation and Reporting Plan' by Sparrow et al (2021). One aspect of its

clarity is the inclusion of conceptual models of environmental system relationships that capture core understandings. The Committee considers that while the ER incorporated some simple conceptual models, further refinement and integration of these models could have strengthened the "environmental logic" underpinning the ER (not just in relation to aquatic ecology). In response to a question from the Committee, the Proponent provided a Technical Note (D25) that addressed the future role of conceptual models in informing adaptive management during project implementation. They can encapsulate predictive hypotheses that can be tested and refined through interventions, monitoring and evaluation within an adaptive management cycle. One of the challenges, as highlighted by Sparrow et al (2021), is to effectively link scientific inputs and governance processes in adaptive management. This linkage was not clearly articulated in the EMF for the current projects.

Managing Carp and native fish

The Committee notes that Carp are already present in the Project areas, and that the recent floods are likely to have boosted Carp populations.

The Committee infers from Mr Benier's evidence that the proliferation of Carp on the floodplain because of project operations would be impossible to avoid, but its impacts could be mitigated, in part by managing the timing, extent and duration of inundation events, as well as through a drawdown strategy to strand Carp.

The Committee recognises that this Carp stranding strategy is experimental and it is unclear how effective it could be. The Committee was not provided with any material that demonstrated whether the drawdown rates necessary for Carp stranding are compatible with release requirements to address other management objectives, including creating conditions suitable for the exit of native fish, and minimising shear stresses to maintain waterway stability.

Until an effective general Carp control measure is established, Carp will pose an ongoing threat to achievement of the Project's benefits for aquatic ecosystems and would require ongoing active management. General developments in Carp control measures should be monitored and the Operating Plan should be periodically reviewed in relation to any new developments. This requirement should be referenced in the EMF.

Having regard to these ecological and practical realities, the Committee concludes that the likely proliferation of Carp in response to managed inundation at Vinifera and Nyah is not a sufficiently serious risk, in terms of cumulative impacts, for the Projects to be unacceptable. At the same time, there is uncertainty in terms of the Projects' ability to re-establish at least seasonal populations of small-bodied native fish. Some success seems likely but not assured.

On balance, the Committee considers that the prospective benefits of the Projects' operations in restoring the health and diversity of terrestrial floodplain ecological communities would outweigh the closely associated risk of Carp proliferation and dominance of floodplain wetland communities.

The monitoring requirements in the EMF do not make any specific reference to Carp and the VMFRP 'Ecological Monitoring, Evaluation and Reporting Plan' (D44 for EES Central) does not propose any monitoring of Carp. This Committee agrees with the EES Central Committee that information on the effects on Carp is required to determine whether the EDS are effective and to enable adaptive management.

The Final Day version of EDS E3 'Pest Plant and Animal Monitoring and Management Plan' does not specifically refer to Carp. EDS E3 should be amended to clarify that both aquatic and terrestrial
pest species should be covered by the Pest Plant and Animal Monitoring and Management Plan, including Carp, Gambusia and Goldfish.

Monitoring requirement M AE1, which requires fish surveys of wetlands in the Project areas to assess the effects on small-bodied native fish populations, should be amended to also require monitoring of pest species. Specification of 'terrestrial and aquatic' species in EDS E3 would encompass consideration of aquatic weeds during Project operation. M TE3 should be modified accordingly to require monitoring of aquatic weeds.

In addition, monitoring of the recruitment, seasonal populations and exit of small-bodied native fish is needed to inform adaptive management. The 2018 'SDL Fish Management Plan Nyah Floodplain' report (at page 64) provides a helpful perspective:

The approach to address these knowledge gaps and uncertainty is to use adaptive management. The objective is to maximise spawning and recruitment of small-bodied fish on the Nyah floodplain. The response of fish will be totally reliant on the inundation regime and may not be fully planned for until the event and monitoring are underway. Hence, adaptive management as the event unfolds would be the most effective method to minimise risks and optimise outcomes. This adaptive management will require data on entry success, fish growth and survival and exit success from the floodplain to provide guidance on flow management and in particular, timing and duration of watering to give fish appropriate growing conditions and exit pathways back to Parnee Malloo Creek and the Murray River. These aspects require responsive management and co-operation with fish biologists and the asset/regulator operators.

This Committee agrees with the EES Central Committee that fish strandings should be monitored as well as the monitoring of fish populations. The monitoring should inform any necessary review of operational practices and any design issues, including if large-bodied native fish (such as Murray Cod) were found to be commonly stranded on the floodplain. It will be appropriate to amend EDS M AE7 to require this monitoring.

Habitat connectivity

Since the stranding of fish on floodplains is a commonplace feature of their ecological functioning, the ability of different fish species to exit the MIA will be a critical factor. Their ability to enter the MIA is similarly important.

The proposed Project is designed so that fish entry to and exit from the floodplain will be primarily via the regulators, with limited scope for movement via the spillways on the containment banks. Turtles will be less constrained. In the past, much fish and turtle access (and spread of plant seeds) would have been via flood runners, many of which have now been blocked. The Committee notes that the prevention of passage of aquatic biota from instream structures is a threatening process under the FFG Act.

The Committee understands from Mr Benier's evidence that both large and small-bodied native fish could exit the MIA through the proposed regulators, in response to hydraulic cues, whereas Carp are more likely to be stranded on the floodplain. However, the ability of different fish species to pass through the proposed regulators, which are not designed to directly facilitate fish passage, will be strongly influenced by their size and swimming strength.

In light of the need for further hydraulic analysis to confirm, among other matters, the flow velocities and shear stresses near the regulators, the conclusion in Specialist Assessment A that their designs are compatible with fish passage should be confirmed. For avoidance of doubt, the EMF should include a requirement to ensure that the detailed design of the regulators provides suitable velocities for the passage of all target species of native fish to the extent reasonably

practicable. The Committee proposes a new EDS SW5 to reflect this, consistent with the recommendations of the EES Central Committee.

(v) Findings

The Committee finds:

- low DO (as was discussed in Chapter 3.4) is a significant risk to aquatic fauna and floodplain inundation and will need to be carefully managed to minimise risks
- aquatic weeds or excessive dominance of native macrophytes will need to be monitored and appropriate responses put in place including land management measures
- Carp are already abundant through the Murray-Darling system and will be a risk to the feasibility of restoring small-bodied native fish populations in the Project but the projects should not have a significant, adverse cumulative impact
- it is likely that the project operation will contribute to spawning opportunities for Carp but the risk can be mitigated to some extent by the timing and duration of inundation events and stranding strategy can be implemented
- likely aquatic ecological responses should be clarified for different scenarios to address uncertainty
- well-researched conceptual models, which are a foundational element of adaptive management, could play a useful role in integrating strategies and scenarios to better manage risk and achieve desired outcomes
- several adjustments to the EDS are needed to address the issues identified in this section relating to aquatic ecology.

(vi) Recommendations

The Committee recommends:

Revise the Environmental Delivery Standards and Monitoring Requirements to include the following changes:

- a) Revise EDS SW2 in relation to:
 - timing of inundation events to reduce carp breeding
 - clarifying the purpose of the requirement to factor seasonal implications in the timing of filling and drawdown.
 - b) Include a new monitoring requirement M AE3 for assessing the effects and benefits of floodplain watering for small-bodied native fish and control of Carp.
 - c) Include a new EDS SW5 in relation to:
 - the design of regulators and the passage of native fish
 - the design of containment banks and spillways and the passage of turtles.
 - d) Revise EDS E3 that requires the Pest Plant and Animal Monitoring and Management Plan to address both 'terrestrial and aquatic' pests, including Carp.
 - e) Revise M AE7 to include monitoring and evaluation of fish strandings associated with the Project.

These changes are shown in Appendix F.

The Committee recommends:

Amend Section 20.8.3.4 Operating Plan of the Environmental Management Framework (page 20.32) to state:

The Operating Plans are not intended to prescribe particular watering events. They are a 'living document' that would be further refined and updated over time if legislation changes or operations in the major river systems require it or outcomes of monitoring identify an issue that requires rectification <u>or there are significant advances in science or technology.</u>

7 Ecological effects and offsets

7.1 Introduction

This chapter summarises the potential biodiversity benefits and impacts of the Projects which are articulated in the previous chapters and considers the implications for offset provisions in the Incorporated Document. The implications with respect to MNES under the EPBC Act are considered in Chapter 10.

(i) Issues arising from Terms of Reference

Clauses 47(b) and (c) of the Committee's TOR require it to advise on whether:

- the Project is expected to result in an overall improvement to biodiversity values in the Nyah and Vinifera floodplain ecosystems
- the proposed alternative arrangement to compensate for loss of native vegetation and the associated impacts on biodiversity are acceptable, and if not, whether biodiversity offsets are required.

(ii) What is proposed?

The proposed Incorporated Document provides for an exemption from requirements for both a planning permit and an offset for native vegetation removal, based on the Conservation Work Exemption (CWE). In relation to offsets, the Secretary of DEECA would need to agree that:

...it has been demonstrated that the removal of native vegetation [is] necessary to enable the use and development of the Projects for an overall improvement in biodiversity.

The key documents addressing Project benefits are the AOIB reports.

(iii) Policy context

The policy framework for offset requirements and CWEs is set out in Chapter 7.4 of the EES Central report. In summary, state planning policy includes the objectives to:

- protect and enhance Victoria's biodiversity (Clause 12.01-1S)
- ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation (Clause 12.01-2S).

Strategies include:

Ensure decisions that involve, or will lead to, the removal, destruction or lopping of native vegetation, apply the three-step approach in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP, 2017)

Clauses 52.16 and 52.17 of the Swan Hill Planning Scheme include a CWE:

A permit is not required for the removal of native vegetation that is to be removed, destroyed, or lopped to the minimum extent necessary to enable the carrying out of conservation work:

- which provides an overall improvement for biodiversity; and
- with written agreement of the Secretary to the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the *Conservation, Forests and Lands Act 1987*).

To facilitate decision-making on CWEs, DEECA has issued two relevant guidelines:

• Conservation Work Exemption - Application guidance (DELWP, 2021)

• Conservation Work Exemption - Further Guidance (Large and/or Complex Projects) (DELWP, draft 2021).

The latter document is unpublished, but was tabled at the EES Central hearing (D172a).

7.2 Evidence and submissions

Ms Hilary Chapman, the lead author of the AOIB reports, made a presentation to the Roundtable regarding these reports but did not present expert evidence.

Dr King's expert witness statement commented that while he was not responsible for the analysis underpinning the AOIB reports, he considered their approach to assessing biodiversity losses and gains to be *"appropriate in addressing the requirements of policy"*. However:

...drawing on modelled data for both impacts and benefits does result in some conflict with the findings of the Specialist Assessment Ecology – Terrestrial, which uses field data of the values and habitat present to assess likely benefits and impacts.

Dr King considered that:

The results of the proposed watering regime at each site are predicted to be overwhelmingly beneficial for vegetation communities present and for most threatened flora species identified as being present or having potential to occur.

He also noted "key assumptions" underlying the Specialist Assessment of impacts and benefits:

- The inundation extents are accurate with regard to the scenarios included for Vinifera and Nyah and that sufficient water will be available to meet the scenarios
- The mitigation measures within the EDSs will be implemented in full.

The expert witness statement of Mr Benier regarding aquatic ecology recognised that benefits are dependent on successful of adaptive management:

A number of effects would require monitoring and implementation of adaptive management to allow for potential adverse effects to be managed and benefits to be realised.

Turning to submissions, Environment Victoria submitted to the Roundtable that (D41):

...it is inappropriate to rely on the [CWE] in circumstances where the assessment of overall benefits is uncertain and based on assumptions and adaptive management measures that may not be feasible. Further, due to the growth rate of particular trees in the floodplain, including Red River Gum and Black Box, overall benefits to flora in the project area could take decades to be realised. The need for a native vegetation offset should be considered in this context.

In its submission on the ER, Environment Victoria expressed concern that traditional offsets might not be required on the basis of:

... general statements of overall project benefit which are predicted and currently unrealised ... and have co-dependencies on other river management solutions, such as sufficient allocation and capacity to deliver environmental water.

DEECA's submission, echoed in a letter from the Secretary of DEECA to the EES Central Committee (D190), stated:

...it is appropriate to have some safeguard mechanism in the incorporated document, against an otherwise unrestrained capacity to remove native vegetation without offsetting. The Secretary is best placed to administer such safeguards to ensure the 'no net loss' objective is met consistent with the role the Secretary plays in the planning framework in many other respects ... Impact and benefit assessment is complex, high risk, and technical. Providing a requirement for a secondary consent allows the incorporated document to respond to the complexity in risk and assessment, including scenarios/conditions where removal without offsetting may or may not be appropriate (which may be identified by this

committee, or the Minister for Planning) based on overall biodiversity benefit. Further, the inclusion of a secondary consent allows conditions around operation and management actions for the purpose of achieving 'no net loss' – common under the conservation works exemption and plausible here – to be administered by the Secretary.

DEECA's submission emphasised that the unpublished guidance on CWE for large or complex projects (D172a) requires:

- demonstration of a clear overall improvement in biodiversity through a comparison assessment which clearly provides the predicted benefits to biodiversity values
- monitoring to ensure the primary objectives of the conservation work are being achieved.

DEECA's submission noted that the Project has sought to demonstrate an overall biodiversity improvement primarily through the AOIB reports and the Expert Elicitation Report. It pointed to differences in the methodologies in these reports and encouraged the Committee to "consider if there are any site-specific factors" that impact on the application of the Expert Elicitation Report.

DEECA further observed that the exhibited Incorporated Document would require:

- the Secretary's agreement that offsets, which would otherwise apply, are not required (Clause 4.5.2)
- monitoring, evaluation and reporting to the satisfaction of the Secretary, including an evaluation of any unintentional impacts on biodiversity and proposed measures "to provide for an increase in overall biodiversity improvements" (Clause 4.6.1).

Related to this latter point, DEECA expressed its expectation that an operational plan would:

Include the objectives, targets and indicators to be used for the monitoring and evaluation of biodiversity response in accordance with Condition 4.6, as well as the process for preparation, approval and implementation of a Monitoring, Evaluation and Reporting Plan.

This was subsequently adopted in the Proponent's Final Day version of the Incorporated Document, in Clause 4.4.8(d).

DEECA's submission also drew attention to uncertainties regarding expected biodiversity gains in relation to water availability. In response to a question on notice from the Committee, DEECA clarified that (D65):

A degree of certainty is required regarding whether water will be delivered in a manner that enables achievement of the proposed benefits of the projects. Noting that certainty may be dependent on future regulatory decisions for water allocation, these could be matters that are addressed through monitoring and adaptive management conditions via the Incorporated Document (if approved), as part of the Environmental Management Framework, Environmental Delivery Standards and/or Operating Plan.

7.3 Discussion

(i) Likely Project benefits and impacts of Project operation

The Committee considers that the ER and expert evidence provided on behalf of the Proponent have demonstrated that the proposed operation of the Project would:

- restore a more natural frequency and duration of floodplain inundation within the MIA
- have a high likelihood of improving the health, productivity, diversity and resilience of most terrestrial vegetation within the Vinifera and Nyah MIAs

• enhance the functioning of ecological links between the floodplains and the Murray River, including increased availability of temporary floodplain habitat for aquatic fauna and the transfer of nutrients from the floodplain to the river.

The most compelling aspect of expected benefits of project operation is the likelihood that the managed inundation will increase the frequency and duration of floodplain inundation beyond the frequency and duration currently achieved by over-bank events, thereby directly supporting the health and functioning of floodplain/riverine ecosystems. The ER has established with a good level of confidence that the frequency and duration of floodplain inundation events could be shifted significantly towards pre-regulation patterns.

However, the assessment of potential benefits to EVCs is still subject to a range of uncertainties, including the hydrological requirements of different EVCs as well as the robustness and resolution of the hydraulic modelling that has been applied to date. The Committee considers the hydrological requirements need to be better characterised to enable more confident predictions of outcomes and to guide managed inundations.

(ii) Likely biodiversity impacts of project construction

The Committee considers that the potential impacts of project construction works are relatively well specified, except for areas near the river where further investigation is required. A high degree of confidence can be placed on the assessments of construction impacts on native fauna and fauna within the defined areas.

No species or communities listed as threatened under the EPBC Act are likely to be significantly impacted by construction works within the proposed Construction Footprints. Similarly, no significant impacts on populations of threatened species or communities listed under the FFG Act are expected. One notable impact would be the loss of three individuals of the critically endangered Umbrella Wattle within the Construction Footprint at Vinifera.

Considering the sensitivity and multiple values of the Murray River's riparian corridor, further examination of opportunities to avoid and minimise impacts on biodiversity and other values (cultural heritage, geomorphic risks, landscape amenity) within 30 metres of the Murray River bank is needed. The Committee has not endeavoured to estimate the scale of further investigations and residual uncertainties about the impacts of construction are a consequence.

(iii) Overall biodiversity outcomes and offset requirements

An accurate "accounting" of the comparative impacts and benefits of project construction and operation is not yet possible. It is likely but not certain that an "overall improvement in biodiversity" will be achieved. It will therefore be appropriate for the Secretary of DEECA to decide on this in due course, within the framework of the Incorporated Document.

Since it is possible that project operations will give rise to a different profile of ecological condition and diversity across different EVCs – in terms of improvement, decline or no change – than that predicted, an evaluation of actual outcomes across the MIAs could be appropriate to inform a deferred decision on offset requirements.

If a decision on offset requirements was to be deferred, a further consideration is the feasibility of achieving offsets. No evidence was provided to ER Central Committee in relation to this point. While the circumstances may not be transferable, the issue was discussed at the EES Central hearing. The Proponent submitted there that offsets provided by a "third-party" at other sites might not be readily available. There was some discussion of the option of the Proponent

implementing "first party" offset via an "offset management plan". Difficulties with this option included the feasibility of securing suitable sites and the necessary funding. Notwithstanding any such practical difficulties, the Committee considers that applicable policy requires that accountability must be established for ensuring "no net loss to biodiversity", and hence responsibility for necessary offsets.

This Committee, in common with the EES Central Committee, has found that because of current uncertainties, the assessment of EVC outcomes of managed inundation regimes in the ER/EES needs to be revised on the basis of a refined hydraulic analysis. The EES Central Committee recommended that such an analysis should inform an updated assessment of overall biodiversity improvement, to be provided to the Secretary of DEECA to inform their decision under clause 4.5.1²³ of the Incorporated Document on whether to approve the removal of native vegetation; it would also inform the subsequent decision under Clause 4.5.2 on whether to require offsets.

As a further measure to address remaining uncertainty about actual outcomes, the EES Central Committee supported Clause 4.6.1 of the Incorporated Document, which requires monitoring to "to evaluate the extent to which an overall improvement for biodiversity has been achieved must be carried out during operation of the Projects". The reporting of monitoring results:

...must identify any unintentional impacts on biodiversity values, and any adaptive management proposed to be undertaken to provide for an increase in overall biodiversity improvements.

This Committee has found that a range of factors will influence outcomes for EVCs as well as individual species of flora and fauna, and that there is uncertainty in both the extent and timeframes of beneficial outcomes that may be realised. In this context, there is merit in a two-stage approach to resolving current uncertainties which varies from the approach of EES Central Committee:

- the Secretary might agree to defer a decision on whether an offset is required, if they are satisfied that the project "is reasonably likely to achieve an overall improvement for biodiversity"
- a later decision by the Secretary on whether an offset is required would be informed by a report on the monitoring and evaluation of *actual* biodiversity outcomes.

The Committee considers that this approach would provide an enhanced level of accountability and transparency in terms of offset requirements that comply with the "no net loss" policy objective. It therefor provides an incentive to deliver "an overall improvement for biodiversity". The Secretary of DEECA could determine whether the "further hydraulic assessment of operational impacts on floodplain vegetation" (in accordance with the EDS SW4 recommended here) is required at the first or second decision point.

The Committee considers that a deferred offset obligation would be practicable since:

- if the evaluation of actual biodiversity outcomes finds that there has been an overall improvement, then no offset obligation would apply
- if the evaluation finds that there has been a partial but insufficient improvement in biodiversity (relative to losses from construction works), then a commensurate offset obligation would apply
- these potential outcomes would provide incentives for applying necessary measures to ensure that an overall biodiversity improvement is achieved.

²³ Exhibited document numbers.

The implication is that decision-making under the Incorporated Document for the approval of required native vegetation removal and determination of offset requirements might proceed as follows:

- The Secretary of DEECA would consider whether there is a reasonable likelihood that biodiversity improvements attributable to project operation over the medium-term (5 to 10 years) could significantly exceed the adverse impacts of project construction works.
- II. If the Secretary considers that an overall biodiversity improvement is reasonably likely within a defined, medium-term period, the Secretary could:
 - a) Authorise the vegetation removal to proceed, subject to an obligation to comply with any future offset requirement
 - b) Require monitoring and evaluation of biodiversity outcomes on the basis of objectives, indicators and targets for a defined period as agreed by the Secretary, and subject to the submission of an assessment report to the satisfaction of the Secretary within a specified timeframe
 - c) Decide whether or not to impose an offset requirement, and the nature of that offset, having regard to:
 - initial losses and any recovery of biodiversity values within the Construction Footprint
 - changes to biodiversity values within the MIA that are attributable to the project operations
 - practicable measures that could be implemented either on-site or off-site
 - relevant policy guidelines.

The Committee considers that this approach can be given effect through changes to the exhibited wording of Incorporated Document Clause 4.5 'Native vegetation' with minor consequential changes elsewhere in the document.

(iv) Findings and recommendation

Findings

The Committee finds:

- there is remaining uncertainty in ensuring the policy objective of *ensuring* "there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation" can be achieved for ER Central
- the core uncertainties could be resolved by monitoring of outcomes some years after environmental watering commences
- there is merit in having a process whereby the final decision on ecological offsets can be made based on the actual environmental benefits achieved from the Project.

Recommendation

The Committee recommends:

Revise the Incorporated Document to provide that the Secretary of Department of Energy, Environment and Climate Change may authorise the removal of native vegetation for the purpose of project works, subject to a deferred decision on offset requirements that would consider an evaluation of actual biodiversity outcomes.

The proposed changes are included Appendix E.

8 Aboriginal cultural heritage

8.1 Introduction

Aboriginal cultural heritage is discussed in:

- ER Sections 11 and 15
- Specialist Assessment F Aboriginal Cultural Heritage
- Attachment IX Stakeholder and Community Engagement.

The exhibited EMF includes the following EDS:

- ACH1 Cultural Heritage Management Plan
- ACH2 Connection to Country
- ACH3 Cultural Heritage Management Operation.

Additionally, the Committee had regard to:

- relevant submissions
- Traditional Owner Consultation Update (D32)
- updates on the Cultural Heritage Management Plans (CHMPs) (D33 and D34).

The CHMPs will be important in managing Aboriginal cultural heritage for the Project. They are prepared under the *Aboriginal Heritage Act 2006* as the Project constitutes a high impact activity in an area of cultural heritage sensitivity. The CHMP is prepared by an expert heritage advisor and must involve the Registered Aboriginal Party (**RAP**) for an area. Where there is no RAP, as is the case for Nyah and Vinifera, responsibility for decision making around the CHMP rests with the Secretary of the Department of Premier and Cabinet. The absence of a RAP for an area does not remove the need to consult and engage with First Peoples in the preparation of the CHMP.

8.2 Traditional Owner consultation

(i) The issue

The issue is whether consultation with Traditional Owner groups and interested parties has been adequate.

(ii) Background

Clause 38(d) of the TOR states the Committee must review and consider:

any known views of the Registered Aboriginal Parties (RAPs)/Traditional Owner groups or seek the views of the RAPs/Traditional Owner groups if they are not already known.

The ER outlines the process of engagement with Traditional Owners over a number of years in developing the Project. The Proponent provided an update on this consultation in Document 32 including:

- the groups consulted
- the nature, quantity and timing of consultation including phone calls, emails, formal and informal meetings, house visits, site visits and correspondence
- how the views of Traditional Owners were incorporated into the Project; and
- an outline of ongoing consultation.

The Proponent stressed the need for confidentiality in consultation and communications with Traditional Owners.

There is no approved RAP for either of the Project areas and there were no submissions from Traditional Owner groups during exhibition of the ER.

The Committee wrote to the Proponent (D9) asking them to invite Traditional Owners to participate in the Roundtable on the basis that it had better established connections to the Traditional Owners in the Project area.

The terms 'RAP' and 'Traditional Owner' are defined in the *Aboriginal Heritage Act 2006*. In reality there are many different views among Aboriginal Victorians about the terms.²⁴ This report uses the terms as they are used in the TOR, but the Committee acknowledge that there may be disagreement among First Peoples about the use of the terms, including who is a Traditional Owner in any specific circumstance or area.

The ER uses the broader expression Traditional Owners and Interested Parties to refer to Aboriginal people who may have an interest in the cultural heritage of the Project area.

(iii) The Roundtable meeting

On Day 5 of the Roundtable, a session was held for Traditional Owners to attend to discuss First Peoples' issues and concerns with the Project. While this session was to specifically discuss Aboriginal heritage and values and the Project, First Peoples were in attendance for most days of the Roundtable whether participating or observing.

Ian Hamm, a member of the SIAC and a Yorta Yorta man, attended the Roundtable session on Aboriginal cultural heritage via videolink.

The Proponent made available James Kellerman (Manager - Community Engagement, Mallee CMA) and Craig Watson (former Aboriginal Engagement Officer, Mallee CMA) who provided an overview of the consultation and engagement work undertaken by Mallee CMA on behalf of the Project over a period of several years.

A brief confidential session on Aboriginal cultural heritage was held with one person on request with the Committee and the Proponent's senior Counsel present.

The Roundtable session on Aboriginal cultural heritage was a valuable and at times robust discussion which greatly assisted the Committee with diverse views expressed about the Project and its impact. A high level summary of points discussed includes:

- protection of Aboriginal cultural heritage on the floodplain is of paramount importance to First Peoples, regardless of whether they were involved in Project consultation
- the Project and its impact on Aboriginal cultural heritage must be seen in the broader context of the river system and land as a whole; it is an interconnected system not just a place
- some First Peoples chose to be involved in consultation and others did not; some criticised the level of consultation undertaken and suggested they were not contacted

²⁴ A discussion on this topic can be found here: <u>https://www.firstpeoplesrelations.vic.gov.au/be-heard-and-words-have-actions/language-statement.</u>

- involvement in consultation did not mean the Project was supported; some people engaging with the Proponent expressed the view that they did not support the Project but if it going to go ahead they wanted to be involved to protect Aboriginal heritage
- higher order issues around the determination of the RAP and Native Title will not, and should not, be part of the Project assessment process
- the work done on assessing and recording Aboriginal cultural heritage through the Project is valuable and will assist in future management by Aboriginal custodians
- concern was expressed that not all Aboriginal cultural heritage has been properly identified or will be protected through Project implementation
- Aboriginal people must be involved in future land management and water allocation including traditional practices such as cultural burning
- there are significant expectations around Treaty and self-determination and its role in connecting back to Country.

(iv) Discussion

Consultation with Traditional Owners in the area is complex as there is no declared RAP and there are ongoing Native Title claims to be resolved. The Aboriginal community, as with any community, has a diversity of views and opinions and that includes around the consultation process for the Project.

Whilst not all Traditional Owners may have been consulted, the Committee is satisfied that there have been significant opportunities for involvement and many people have taken up those opportunities, just as some have not.

Ongoing engagement with Traditional Owners will be critical through Project development and operation and the Committee notes that consultation with Traditional Owners is proposed through the EMF including the development of the various plans required (for example the OEMP, the Seasonal Watering Proposal and Plan and others).

The EDS (ACH1-ACH3) require various levels of consultation and input from Aboriginal people and the Committee is satisfied that suitable consultation and engagement can be undertaken through Project implementation.

(v) Finding

The Committee finds:

• The Proponent has undertaken a comprehensive program of engagement with Traditional Owners, and Traditional Owners groups should continue to be consulted in the development and operation of the Project.

8.3 Aboriginal cultural heritage

(i) What did the ER say?

Specialist Assessment F in the ER describes the investigations, surveys and methodology that informed the Aboriginal cultural heritage assessments for the Project. This work has also informed the development of the CHMPs being prepared.

In Vinifera the assessment identified three Aboriginal places that may be impacted by the construction footprint and in Nyah seven were recorded. The residual effects of construction will depend on management conditions to be negotiated as part of the assessment of the CHMPs.

The effects of operation for Nyah and Vinifera are reported to be indirect and related to:

...altered erosion patterns, fluctuating moisture content/increased water availability, and altered pest and overabundant native animal activity all needing to be considered.

The initial impact significance from operation is rated low to medium for Nyah and Vinifera with the medium impact being related to wetting/drying and erosion of earth features. Impacts significance drops to low when mitigation measures are in place.

The ER Specialist Assessment identified the following EDS to mitigate potential impacts on Aboriginal cultural heritage:

ACH3: requires measures to be implemented to avoid and minimise risks to Aboriginal cultural heritage in consultation with Registered Aboriginal Parties/Traditional Owners and Interested Parties (as applicable), including monitoring of culturally sensitive locations which are observed or reported to be at risk from pest or overabundant native species or human activity (such as visitation)

E3: involves the preparation and implementation of a Pest Plants and Animals Monitoring and Management Plan to detect and manage pest presence and activity due to managed environmental watering events

GS1: requires soil characterisation to inform design with the objective of reducing the potential for erosion and sedimentation, thereby reducing the likelihood of erosion and sedimentation impacting on Aboriginal cultural heritage places

GS3: involves the monitoring of erosion and sedimentation at infrastructure locations to inform adaptive management practices

SW2: seeks to avoid excessive erosion during drawdown by managed drawdown rates, thereby reducing the adverse impacts on Aboriginal cultural places resulting from increased water velocity and shear stress downstream of infrastructure locations (for example, regulators)

SW3: requires monitoring of the volume, duration, frequency and surface water quality of managed environmental watering events to inform adaptive management practices, including adaptive management practices involving the impacts of surface water on Aboriginal cultural heritage places.

Impact on ancestral remains if it occurred would be of extreme significance in the ER but risks should be minimised by avoidance during construction and the likelihood of burial being in higher country off the floodplain and out of the MIA.

Impact on ancestral remains was identified in the ER as being of extreme significance if it occurred but risks should be minimised by avoidance during construction and the likelihood of burial being in higher country off the floodplain and out of the MIA.

(ii) The issues

The issues are whether:

- Aboriginal cultural heritage impacts were appropriately assessed in the ER
- effects on Aboriginal cultural heritage can be satisfactorily managed through the EMF and CHMPs.

(iii) Submissions

A number of submitters raised the issue of Aboriginal cultural heritage. Environment Victoria noted that the Minister had identified this as an area of uncertainty and highlighted current events such as the Treaty development process.

DEECA in their submission requested specific mention of Aboriginal cultural heritage (and other matters) in Section 4.4 of the Incorporated Document.

FoNVP highlighted the importance of the floodplain for Aboriginal cultural heritage and submitted that the Project could alter the floodplain and have a "*potentially devastating impact*". FoNVP submitted that the project lacks community support including among Traditional Owners, some of whom have expressed deep concern about the Project. It submitted that while CHMPs are being prepared, there is a significant lack of knowledge about Aboriginal cultural heritage in the area with the likelihood of significant sites being unreported.

These views were discussed and expanded upon in the Roundtable by FoNVP.

In their Part C submission (D89) the Proponent noted the unique and valuable opportunity to hear from Traditional Owners and interested parties in the Roundtable. It submitted that:

- areas to be inundated have historically been inundated
- Project controls will include consultation with Aboriginal people and integration of their knowledge
- the CHMP process is ongoing alongside the Roundtable process which will separately identify and assess Aboriginal cultural heritage.

(iv) Discussion

The Committee considers the ER, and particularly the Specialist Assessment, appropriately assesses the presence and potential for Aboriginal cultural heritage in the Nyah and Vinifera areas. The Committee notes that while some Traditional Owners have chosen not to be involved in the assessment, as described in the previous section the Committee is satisfied that there has been considerable and significant Traditional Owner involvement, as well as from the heritage experts who have undertaken the Specialist Assessment.

It is important to note that at the time of writing, the CHMP process is ongoing, and this will be the primary mechanism for ensuring the protection of Aboriginal cultural heritage. The Committee is satisfied that CHMPs and the EMF (containing the EDS) for the Project together should ensure that Aboriginal cultural heritage is protected or appropriately managed.

(v) Findings

The Committee finds:

• The ER assessment of Aboriginal cultural heritage effects is appropriate and effects can be satisfactorily managed through the EMF and CHMPs.

9 Other issues

9.1 Historic heritage

(i) Introduction

Historic heritage is discussed in:

- ER Sections 11 (Vinifera) and 15 (Nyah)
- Specialist Assessment G Historic Heritage.

The exhibited EMF includes the following EDS:

- HH1 Management of Historical Heritage during construction
- HH2 Management of Historical Heritage during operation.

Monitoring requirements are also set out in the EMF.

In Vinifera, there is one Heritage Overlay (**HO**) site in the Swan Hill Planning Scheme being HO186 the Takasuka Levee Bank (**the Levee Bank**) as shown in Figure 23. The Levee Bank is also registered with the National Trust. The Bank is associated with the first commercial rice growing in Australia by Jo (Isaburo) Takasuka in the early 20th century.

The ER notes that the Levee Bank runs for approximately 2 kilometres north south on the eastern edge of the Vinifera area but that only a few hundred metres is within the HO, and the HO is apparently offset in some of this area. The ER reported there is no apparent difference to the intactness of the Levee Bank within the HO or outside it.

Project construction will affect the Levee Bank in some areas including physical impact from construction in some areas as summarised below from the ER:

- Southern section a 230 metre section runs underneath and alongside Forest Road. Proximate to works and possible unplanned impacts but replacement of existing regulator and track upgrades should have minimal additional impact
- HO listing boundary section a 300 metre section runs immediately to the west of the construction footprint and there may be potential unplanned due to proximity
- Northern section a 15 metre section (near the HO listing) and 370 metre section (near Murray River) would be subject to the construction of containment banks, spillways and track upgrade. The remaining 1,050 metres of Levee Bank is outside the construction footprint and should not be affected.

The ER notes that some sections of the Levee Bank will be altered or removed, affecting its overall intactness and legibility. The ER concludes that there will be substantial sections in good condition which will still demonstrate the historical significance of the Levee Bank.

Some of the Levee Bank will be inundated through operation and the ER concludes that as flooding and inundation would have been part of its history there is unlikely to be a significant adverse effect.

The ER concludes that the residual effects on the Levee Bank will be low for construction and operation after the application of mitigation measures.

Other irrigation channels and pipes identified in the historic heritage field survey were determined not to be of heritage significance.

Figure 23 HO186 and Takasuka Levee Bank



Source: Figure 5.46, Specialist Assessment G

A set of timber stockyards was identified on the western edge of the Vinifera project east of River Road approximately 25 metres outside the MIA. An assessment of the stockyards concluded they are not of heritage significance.

In Nyah, a number of HO sites were identified as being just outside the Project area in the Wood Wood area but should not be affected by the Project.

The ER concluded that the Project has the potential to encounter unrecorded historic heritage and both HH1 and HH2 are proposed to include 'unexpected finds' protocols.

(ii) The issue

The issue is whether historic heritage effects have been appropriately assessed and are acceptable.

(iii) Submissions

Historic heritage was not raised in any of the submissions to the Nyah and Vinifera Projects during the exhibition period.

There was some discussion in the Roundtable around the importance and heritage protection of the Takasuka Levee Bank. The location of the Swan Hill Planning Scheme HO relative to the Levee Bank was discussed at length, as was the significance of the history of the Levee Bank itself.

(iv) Discussion

The Committee considers the assessment of historical heritage in the ER is appropriate. The most significant effects on historical heritage relate to the potential impact on some areas of the Takasuka Levee Bank. On balance the Committee considers that these impacts are relatively limited, noting some areas of the historical bank are impacted already by infrastructure and tracks. Even after the Project is implemented, there will be significant areas of the Levee Bank remaining to enable interpretation and recognition in the landscape of this important part of Australia's agricultural history.

The Committee is satisfied that HH1 and HH2 can satisfactorily manage residual impacts.

In the Incorporated Document (D85, 4.7.2), the Committee notes there is the requirement to document, via photographic survey, demolition, alteration or removal of a building in the HO. It is not clear whether the Levee Bank would qualify as a 'building' and thus Committee considers this should be expanded to include structures so that any original areas of the Takasuka Levee Bank that are impacted by works are recorded appropriately.

(v) Findings

The Committee finds:

- The assessment of historical heritage in the ER and proposed EDS are appropriate.
- The Incorporated Document wording should be modified to include the photographic recording of any structures to be modified or removed, to ensure any original areas of the Takasuka Levee Bank disturbed are recorded.

(vi) Recommendation

The Committee recommends:

Revise the Incorporated Document to include the photographic recording of any heritage *structures* as well as buildings.

The change is shown in Appendix E.

9.2 Social and business

(i) Introduction

Social and business is discussed in:

- ER Section 3 (Project benefits)
- Specialist Assessment L

The exhibited EMF includes the following EDS:

- SB1 Community and Stakeholder Engagement Management Plan
- SB2 Minimise social and business impacts Construction
- SB3 Communication and stakeholder engagement activities Operation.

Other EDS are relevant in terms of minimising amenity impacts from traffic and visual impacts and construction and operation management plans.

There are no social and business impacts on private land for the Nyah and Vinifera projects.

Impacts during construction for both projects were said to include:

- Social and recreational
 - temporary reduction in amenity for visitors including from noise, dust, and lighting
 - temporary impacts including impeded access on nature based recreational activities including bushwalking, birdwatching, fishing, camping, 4wd driving and trail bike riding and in water activities (Vinifera only).
- Business
 - temporary impact on business licence holders such as apiarists.

Impacts during operation were said to include:

- Social and recreational
 - diminishment of the nature based experience for recreational users from the presence of infrastructure in the forest
 - reduced access fir recreational use due to increased inundation events.
- Business
 - periodic disruptions to business licence holders due to inundation events
 - perceived impacts on businesses due to impacts related to increased inundation events (reduced accessibility and potential related reduced visitation to region).

A range of construction and operational benefits were identified including direct and indirect employment on the Project itself and the need to source supplies and equipment from the region.

During operation the improved natural values and amenity from the more frequent inundation were identified in the ER as being:

- improved recreational opportunities (eg improvement in fish stocks, vegetation and habitat condition improvement for wildlife spotting)
- improved accessibility from upgraded tracks
- enhanced tourism opportunities
- improved environment for apiarists
- downstream improvements in indirect employment and demand for tourism servicing.

The Project (both Nyah and Vinifera) assessed the residual impacts on social and business of construction and operation to be low.

(ii) The issue

The issue is whether social and business effects have been appropriately assessed and are acceptable.

(iii) Submissions

The social and business values of the Project were not explicitly addressed in many submissions but broader issues around cultural values are discussed elsewhere in this report.

In the Roundtable there was considerable discussion around the state of the floodplains and the opportunities for increased social and business use of the floodplains if they were restored and more actively managed, with little disagreement that the environment of the floodplain is currently in a poor state.

There was general support for improving social and business values through the natural inundation of the floodplain in the Project areas and beyond, rather than through the inundation proposed through the Project.

Future management, an area outside the TOR for the Committee, was also discussed including the need for greater resources and more effective management and co-management with Traditional Owners.

(iv) Discussion

The Nyah and Vinifera Parks presently have limited business activity although have significant social values related to nature based recreation. There are limited facilities for visitors in the parks which possibly prevents them from being more heavily used, but also means they are less disturbed.

The long period that has been experienced without inundation has clearly impacted on the environmental values of the parks and if the more frequent inundation of the floodplains produces significant environmental improvements, then the Committee considers the values that attract visitors will also be improved.

The construction period will clearly have short-term negative impacts on visitors but the Committee is satisfied that this can be managed acceptably through the EMF. In terms of operation, the changed nature of some of the park through infrastructure (particularly permanent infrastructure such as regulators) may have adverse effects on some people, particularly those who like the parks as they are. However on balance the Committee considers the opportunities for environmental improvement, if realised, will produce an overall benefit.

The Committee accepts that there will be increased economic activity in the area from the construction and operation of the Project, and it will be important to ensure that as much as possible of this economic activity is captured in the region.

(v) Finding

The Committee finds:

• The assessment of social and business in the ER and proposed EDS are appropriate.

PART C: APPROVALS AND IMPLEMENTATION

10 Implementation

10.1 Draft Swan Hill Planning Scheme Amendment C78

(i) Introduction

Draft Planning Scheme Amendment (**PSA**) C78 to the Swan Hill Planning Scheme was included at Attachment IV to the ER. The PSA, as exhibited, in summary:

- applies the Specific Controls Overlay (SCO3) to the Nyah, Vinifera and Burra Creek Floodplain Restoration Project areas²⁵
- amends the schedule to Clause 45.12 to include the new specific control
- makes the Minister the responsible authority within the SCO3
- inserts SCO maps into the planning scheme
- includes a new Incorporated Document 'Victorian Murray Floodplain Restoration Project: Vinifera Floodplain Restoration Project, Nyah Floodplain Restoration Project & Burra Creek Floodplain Restoration Project (October 2022)'.

The PSA has been exhibited as a draft. Because it has been exhibited as part of the ER, it is likely that if the Project is to be approved the Minister would approve the PSA using the provisions of section 20(4) of the PE Act to exempt further notice.

The purpose of the SCO is:

To apply specific controls designed to achieve a particular land use and development outcome in extraordinary circumstances.

The SCO at Clause 45.12-1 overrides other controls in the Swan Hill Planning Scheme for use and development:

Land affected by this overlay may be used or developed in accordance with a specific control contained in the incorporated document corresponding to the notation on the planning scheme map (as specified in the schedule to this overlay). The specific control may:

- Allow the land to be used or developed in a manner that would otherwise be prohibited or restricted.
- Prohibit or restrict the use or development of the land beyond the controls that may otherwise apply.
- Exclude any other control in this scheme.

The Incorporated Document provides the detail for how a Project must be undertaken under the planning approval.

The Committee's TOR contain a number of areas relating to the draft PSA. Clause 5 specifies the Committee must consider the following:

5f. consider the merits of the draft planning scheme amendments (PSAs) exhibited with the EES or environment report (as applicable), which have been prepared to apply a Specific Controls Overlay, incorporated document and establish planning approval for the projects;

²⁵ Noting the Burra Creek project will be assessed at a later time. The decision will need to be made as to whether Burra Creek, if it proceeds, is included in Amendment C78 or a future amendment. The Committee considers this a technical process decision and does not need to form a view on it; comments on the merits of the Project in this section relate only to Nyah and Vinifera.

- 5g. undertake a strategic assessment of draft PSAs, exhibited with the EES or environment report (as applicable) against the strategic considerations identified in Planning Practice Note 46 Strategic Assessment Guidelines and other relevant considerations;
- 5h. consider any relevant issues raised in submissions about the draft PSAs;
- 5i. review the contents of the draft PSAs including the incorporated documents; and
- 5j. recommend any changes to the draft PSAs that it considers necessary.

Clause 39 of the TOR requires the Committee to consider the following in its review of the draft PSA:

- 39a. consider the P&E Act, ministerial directions, Victoria Planning Provisions and the Loddon Mallee North Regional Growth Plan.
- 39b. consider the relevant planning schemes, including state, regional and local planning policies, and any adopted plans, strategies and PSAs. In particular, attention should be given to the consistency of the projects/draft PSAs with state policy on native vegetation, biodiversity and bushfire planning.
- 39c. review all relevant material submitted on behalf of VMFRP or otherwise provided to the SIAC.
- 39d. review all relevant submissions and evidence received.

Clause 47 of the TOR requires the Committee's report to contain:

47h. advice on whether the consultation on the draft PSAs and proposed planning approval process is considered adequate or whether additional consultation should occur.

(ii) Consultation

The draft PSA was exhibited with the ER in early 2023.

The EPA (S7) advised of its engagement in the development of the PSA. It recommended modification to the Explanatory Report to better reflect steps to be taken if contaminated land, particularly ASS, is encountered by the Project in areas of sensitive use.

There were no other submissions on the PSA itself, but there was considerable discussion around the Incorporated Document and its contents.

(iii) Strategic assessment of the Draft PSA

A Strategic Assessment Report was included with the draft PSA in Attachment 4 of the ER. The Report noted that the approach being taken for the ER Central Projects is consistent with that for the other VMFRP projects. The Report noted:

- the draft PSA makes proper use of the Victoria Planning Provision by using the SCO and an Incorporated Document
- the SCO and Incorporated Document are the most appropriate tools to achieve the proposed use and development outcomes by streamlining approvals and a consistent approach across the VMFRP
- because of the geographic extent of the Project, it triggers a significant number of different permit requirements across zones and overlays and the SCO and Incorporated Document are appropriate to address this issue
- a fragmented permit application process would cause difficulties in consistency, notice, timing and possible planning reviews and would be a significant administrative burden on the responsible authority
- a permit application approach would likely delay the delivery of project objectives and environmental watering.

(iv) The Incorporated Document

The Incorporated Document, when approved, becomes part of the Swan Hill Planning Scheme. It will allow for use and development associated with the Project subject to:

- a requirement to prepare development plans
- the preparation of the EMF (which includes EDS and Monitoring Requirements)
- the preparation of other plans including the CEMP and OEMP
- a final assessment of native vegetation removal
- requirements for monitoring
- other matters including heritage and bushfire.

A Final Day version (D85) of the Incorporated Document was tabled by the Proponent, which included the exhibited version plus elements adopted through the EES Central process. Based on the findings and recommendations of this Committee, further changes to the Incorporated Document have been made which are included in Appendix E and discussed in detail in the relevant chapters through this report.

In particular offset arrangements are discussed in detail in Chapter 7.

(v) Environmental Management Framework

The Incorporated Document requires, among other plans, the preparation and approval of the EMF. The EMF must contain:

- a description of Project elements and construction and operational activities
- EDS for design, construction process and operation
- process and timing requirements for plans and procedures
- summary of consultation in informing the EMF and ongoing engagement
- performance monitoring and reporting processes, including audit.

The Committee has recommended numerous changes to the EMF, particularly related to the EDS and Monitoring Requirements, as discussed in Part B of this report.

For EES Central the approval of the EMF (in the Incorporated Document) was to be by the Minister for Planning. For ER Central the approver is to be the Secretary of DEECA. This appears to have come from the ER Scope.

The Committee does not consider this difference is appropriate. The risks and uncertainties inherent in this Project are similar to those in EES Central. The Committee considers that the EMF, as arguably the most critical element of Project delivery, should be signed off at the highest level.

(vi) Discussion

In relation to consultation, the Committee is satisfied that the draft PSA has been subject to appropriate opportunities for consultation both through Project development and formal exhibition of the ER; no further consultation on the draft PSA is required.

The Committee has reviewed the Strategic Assessment Report and is satisfied that the draft PSA is strategically justified. It adopts the conclusions of the EES Central Committee for those Projects which are equally applicable here:

- the draft PSA will facilitate the VMFRP's implementation
- the use of the SCO and incorporated document is an appropriate use of the Victoria Planning Provisions

- the draft PSA appropriately responds to the objectives of planning, as well as relevant State, regional and local policies, strategies and plans, including the Loddon Mallee North Regional Growth Plan referred to in TOR 39(a)
- the draft PSA appropriately responds to the relevant Ministerial Directions, Planning Practice Notes, bushfire risk and the *Transport Integration Act 2010* referred to in TOR 39(b)
- the preparation of the draft PSA included appropriate consultation with relevant agencies and stakeholders
- the administrative costs associated with implementing the incorporated document will potentially be significant, but are balanced by the broader Project benefits.

The Committee generally accepts that the Incorporated Document included within the draft PSA provides an acceptable approach to Project delivery and will provide appropriate controls for Project implementation, subject to the changes recommended in this report.

As noted earlier in this chapter, the Committee considers the EMF is acceptable subject to the Committee's recommended changes to the EDS and Monitoring Requirements, and subject to making its approval by the Minister rather than the Secretary of DEECA.

The Committee notes the EPA's submission relating to references to contaminated land in the Explanatory Report. The Committee considers these are matters that can be 'tidied up' through the amendment approval and has not made a specific recommendation about them, but considers they should be discussed between EPA and the Proponent to seek agreement on suitable wording.

(vii) Findings

The Committee finds:

- the consultation on the draft PSA was appropriate and no further consultation is required
- the draft PSA, subject to changes recommended in this report, should ensure an acceptable planning outcome can be achieved in Project delivery and should be approved
- the Final Day versions of the Project documents are appropriate, subject to the Committee's recommended changes as shown in Appendices E and F.

(viii) Recommendation

The Committee recommends:

Approve draft Planning Scheme Amendment C78 to the Swan Hill Planning Scheme subject to the Committee's recommendations in this report, including:

- a) Revisions to the Incorporated Document as shown in Appendix E
- b) Revision to the Environment Delivery Standards and Monitoring Requirements in the Environmental Management Framework as shown in Appendix F.

10.2 Matters of National Environmental Significance

(i) Context

Clause 5c of the TOR requires the Committee to:

... consider and report on potential environmental effects for each project on relevant matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) for that project;

Clause 47k requires SIAC reports to include:

... specific findings and recommendations about the predicted impacts on matters of national environmental significance and their acceptability, including appropriate controls and environmental management.

In June 2020, the Vinifera and Nyah projects were determined to be 'controlled actions' under the EPBC Act by the Commonwealth Minister for the Environment's delegate, as they are likely to have a significant impact on MNES protected under Part 3 of the EPBC Act. The relevant controlling provision for MNES for both projects is listed threatened species and communities (sections 18 and 18A).

In July 2020 the Minister's delegate determined under section 87(4) of the EPBC Act that the projects would be assessed by the State using the accredited environmental report process under the EE Act, as set out in Schedule 1, item 2.1(c) of the Bilateral (Assessment) Agreement) between the Commonwealth and the State of Victoria. This process requires:

- the Proponent to prepare an environmental report that addresses relevant matters
- the report to be released for public comment
- the Proponent to provide 'final assessment documentation' that includes an assessment of relevant impacts and summarises issues raised in public responses
- the Victorian Minister for Planning to provide an Assessment Report.

The Commonwealth will rely upon the outputs of the accredited process to inform its decisionmaking.

The *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance*, issued by the Commonwealth Department of the Environment, provide guidance for determining whether an action is likely to have a significant impact on a MNES.

(ii) What did the ER say?

The ER provided detailed assessments of the likelihood of species and communities listed under the EPBC Act occurring in the project areas as well as of the potential for significant impacts, in accordance with the *Significant Impact Guidelines*.

As outlined in Chapters 5 and 6, the ER documented that:

- no threatened flora species or ecological community listed under the EPBC Act has been recorded in either the Vinifera or Nyah AOI or MIA. Winged Peppercress was assessed as possibly occurring within the AOI and MIA for both the Vinifera and Nyah projects, though it was not recorded in surveys
- five terrestrial fauna species listed as threatened under the EPBC Act were assessed to possibly occur within the Vinifera AOI and MIA:
 - South-eastern Long-eared Bat
 - Painted Honeyeater
 - Regent Parrot
 - Growling Grass Frog
 - White-throated Needletail.
- the same terrestrial fauna species were assessed to possibly occur within the Nyah AOI and MIA, though with the exception of White-throated Needletail and the addition of Australian Painted Snipe

- in addition to the terrestrial species mentioned above, Murray Cod and Silver Perch were assessed to be present within the adjoining section of the Murray River but are not currently present within the creeks of the Vinifera and Nyah floodplain areas
- Several listed migratory bird species may visit the Vinifera and Nyah floodplain areas.

In terms of construction impacts, the ER identified that some species (South-eastern Long-eared Bat, Painted Honeyeater, Regent Parrot) could be subject to losses of potential foraging and breeding habitat, but any adverse impacts would not be significant with respect to the *Significant Impact Guidelines*. Either no or only minor impacts are expected for the other species, because:

- they are unlikely to be present (Growing Grass Frog, Winged Peppercress)
- they are aerial feeders (White-throated Needletail)
- construction works would pose a low or insignificant risk (Murray Cod, Silver Perch), having regard to proposed EDS mitigation measures.

Any impacts are unlikely to be significant for these species. This is also the case for the migratory species that may occur.

Finally, construction activities were considered to have no significant impact on Ramsar wetlands, the nearest of which is Hattah-Kulkyne Lakes 50-100 km downstream of Vinifera.

In terms of adverse impacts of project operations on MNES, the ER identified only a minor potential for temporary loss of foraging resources from managed inundation. Adverse impacts were expected to be unlikely or insignificant. It was further assessed that all listed species identified as possibly occurring within the MIAs could benefit from managed inundation events. The listed threatened and migratory birds that are wetland-dependent as well as the Growling Grass Frog are expected to benefit from an increase in floodplain inundation, which would improve the availability and condition of their required foraging and breeding habitats. Murray Cod and Silver Perch could benefit from temporary access to the MIAs for foraging.

Table 12 summarises both the likelihood of significant adverse impacts from project construction and the potential for benefits from managed inundation for listed threatened species. No significant impacts are expected from either the construction or operation of the Project. The ER considers the potential for cumulative impacts on MNES from the combined VMFRP projects and concludes that no significant impacts would result, including with respect to Regent Parrot, Murray Cod, Silver Perch and Ramsar wetlands.

Species	Construction	Operations
Vinifera Project		
Winged peppercress	No impacts expected	Could benefit (if present)
South-eastern long-eared bat	Unlikely to be significant	Could benefit
Painted honeyeater	Unlikely to be significant	Could benefit
Regent parrot	Unlikely to be significant	Could benefit
White-throated Needletail	No impacts expected	Could benefit
Growling grass frog	No impacts expected	Could benefit (if present)
Murray cod	No impacts expected	Could benefit

Table 12 Likelihood of significant adverse impacts and potential benefits for threatened species under EPBC Act

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Species	Construction	Operations
Silver perch	No impacts expected	Could benefit
Nyah Project		
Winged peppercress	No impacts expected	Could benefit (if present)
South-eastern long-eared bat	Unlikely to be significant	Could benefit
Australian painted snipe	No impacts expected	Could benefit
Painted honeyeater	Unlikely to be significant	Could benefit
Regent parrot	Unlikely to be significant	Could benefit
Growling grass frog	No impacts expected	Could benefit (if present)
Murray cod	No impacts expected	Could benefit
Silver perch	No impacts expected	Could benefit

Source: Compiled from information in Specialist Assessment B (including Tables 7.8, 7.14, 10.8, 10.14) and Specialist Assessment A.

(iii) Evidence and submissions

Submissions and evidence relevant to MNES were considered in Chapters 5 and 6 of this Report and are not repeated here.

(iv) Discussion

Detailed discussion on matters related to threatened species and communities listed under the EPBC Act is set out in Chapters 3, 5 and 6 of this Report and is not repeated here. The Committee notes that it has recommended the refinement and strengthening of several relevant mitigation measures, including EDS E3 and SW2, to address key threats including pest plants and animals, and carp and fish stranding that will assist in further reducing potential impacts to MNES.

(v) Findings

The Committee concludes:

- MNES impacts can be acceptably managed through recommended mitigation measures.
- The Project will not have significant residual impacts on any MNES.

10.3 Other approvals

(i) Introduction

The Project will require consideration and approval under State and Commonwealth legislation that is outlined in Attachment 3 (Legislation and Policy) to the ER. The legislation listed (Victorian legislation unless otherwise noted) includes:

- Environment Protection and Biodiversity Conservation Act 1999 (Cth)
- Native Title Act 1993 (Cth)
- Water Act 2007 (Cth)
- Environment Effects Act 1978
- Aboriginal Heritage Act 2006
- Fisheries Act 1995

- Flora and Fauna Guarantee Act 1988
- Heritage Act 2017
- Mineral Resources (Sustainable Development) Act 1990
- National Parks Act 1975
- Planning and Environment Act 1987
- Traditional Owner Settlement Act 2010
- Road Management Act 2004
- Local Government Act 2020
- Water Act 1989
- Wildlife Act 1975.

The ER describes the approvals that will be required under the following New South Wales legislation, which are not within the Committee's scope:

- Environmental Planning and Assessment Act 1979 (NSW)
- Fisheries Management Act 1994 (NSW).

The TOR require the Committee to consider recommendations for other approvals:

47i. recommendations for any appropriate conditions that may be lawfully imposed on any approval for the projects, or changes that should be made to the draft PSA (for each assessment package) in order to ensure that the environmental effects of the projects are acceptable having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development;

(ii) Discussion and conclusion

As discussed elsewhere in this report the Committee has recommended extensive changes to the PSA (Incorporated Document and EMF, particularly the EDS and Monitoring Requirements).

The planning approvals do not remove the need for other statutory approvals, and these will need to be considered by the relevant statutory decision maker in due course.

The Committee has recommended in accordance with Clause 47i of the TOR that conditions be considered for inclusion under the following legislation:

- Water Act 1989, Recommendation 0
- National Parks Act 1975, Recommendation 0.

The recommendations and their justification are included in the relevant chapters.

10.4 Overall assessment

The Committee considers the various elements of the Projects' assessment through this report, and notably in Chapters 3-7. At a high level the Committee notes and generally accepts the premises of the Project assessment undertaken in the EES Central report at Chapter 21; the Projects are an acceptable response within the bounds of legislation and policy within what is a variously complex environment at the local, regional and basin level.

Many of the impacts of the Projects are common construction impacts which can be managed with standard construction environmental management techniques. There are significant construction impacts, particularly in native vegetation and habitat loss and there will be impacts on other values of the floodplains, including changing the nature of them in some areas through introducing infrastructure where it does not currently exist. The biggest risk and potential reward is in operation, and the benefits to the floodplain and its habitats of more frequent flooding. The Committee considers there are significant risk inherent in achieving the Projects' desired ecological outcomes, but that these risks can be mitigated through careful Project implementation. We have made significant recommended changes to the Project framework which we consider are necessary to ensure that the benefits can be delivered and risks more actively identified and managed.

10.5 Response to Terms of Reference

(i) Clause 47

Clause 47 lists the matters the Committee's report must contain. Table 13 identifies where the matters are addressed.

Terms of Reference Clause 47	Committee's response	Relevant report reference
47(a) analysis and conclusions with respect to the predicted environmental effects and benefits of each project in the package and their respective significance and acceptability	The Committee is generally satisfied with the ER analysis and assessment of predicted environmental effects. The Committee has recommended further work in some areas to reduce risk and uncertainty in Project implementation, particularly related to floodplain hydraulics and implications for floodplain ecology and erosion risk.	The analysis and conclusions are provided in Part B of this report.
47(b) in the context of predicted effects, advice on whether each project is expected to result in overall improvement to the biodiversity values of relevant floodplain ecosystems, including for each relevant matter of national environmental significance	 The Committee considers the Project is likely to result in an overall improvement to the biodiversity values of the floodplains. In relation to MNES, the Committee finds: MNES impacts can be acceptably managed through recommended mitigation measures the Project will not have significant residual impacts on any MNES. 	The analysis and conclusions are provided in Part B. MNES impacts are discussed in Part B and Chapter 10.2.
47(c) recommendations on whether the proposed alternative arrangement to compensate for the removal, destruction or lopping of native vegetation and associated impact on biodiversity is considered acceptable, and if not, whether any biodiversity offsets are necessary	The Committee considers it likely that the Project benefits will ensure that no biodiversity offsets to compensate for vegetation loss will be required. The Committee has recommended an offset regime that requires the final assessment of offset determination to be deferred until there is clear evidence the benefits have been delivered.	Native vegetation offsets are discussed in Chapter 7.

Table 13 Committee's responses to Terms of Reference Clause 47

4(d) recommendations for any feasible modifications to the projects	The Committee has not recommended any design modifications to the Project, but has recommended various changes to the Incorporated Document and EMF (including the EDS), including further analysis of various matters. This includes consideration of whether there could be Project modification in areas close to the Murray River.	Recommended changes to the Incorporated Document and EMF are discussed in Part B and Chapter 10.
47(e) findings on whether acceptable environmental outcomes can be achieved	The Committee is satisfied the Project is likely to achieve acceptable environmental outcomes, subject to the adoption of its recommendations.	Environmental outcomes are discussed in Part B.
47(f) recommendations on specific measures appropriate to prevent or mitigate adverse environmental effects to achieve acceptable environmental outcomes	The Committee has recommended various refinements to the Incorporated Document and EMF to better prevent or mitigate adverse impacts. It has also recommended further analysis and monitoring of various matters.	The recommendations are discussed in Part B and consolidated in the Executive Summary.
47(g) a short summary and assessment of the issues raised in submissions about the draft PSAs	No issues were raised in submissions about the SCOs and associated planning scheme provisions. Various issues were raised in evidence and submissions about the Incorporated Document and EMF. The EPA raised minor issues relating to the draft Explanatory Report.	The consolidated discussion on the PSA is included in Chapter 10.1.
47(h) advice on whether the consultation on the draft PSAs and proposed planning approval process is considered adequate or whether additional consultation should occur	The Committee is satisfied the consultation was adequate and that no additional consultation need occur.	PSA consultation is discussed in section 10.1.
47(i) recommendations for conditions on any approval for the projects, or changes that should be made to the draft PSA	The Committee recommends various changes to the PSA (Incorporated Document and the EMF) to better address the environmental effects of the Project. The Committee recommends specific conditions on the <i>Water Act 1989</i> and <i>National Parks Act 1975</i> approvals.	Recommended changes to the PSA and the other approvals are in Part B. A revised Incorporated Document and Environmental Management Framework are included in Appendices E and F respectively.
47(j) recommendations about the structure and content of the draft management plans provided with the EES	The Incorporated Document and EMF require the preparation of various management plans that were not exhibited as part of the ER. The	A revised Incorporated Document and Environmental Management

47(k) specific findings and T		
recommendations about the predicted impacts on MNES	he Committee is satisfied: MNES impacts can be acceptably managed through the Committee's recommended EDS the Project will not have significant	MNES impacts are discussed in Chapter 10.2.

(ii) Clause 48

Clause 48 lists additional matters the Committee's report must contain. Table 14 identifies where the matters are included.

	Table 14	Committee's responses to	Terms of Refe	rence Clause 48
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Terms of Reference Clause 48	Relevant report reference
48(a) information and analysis in support of the SIAC's findings and recommendations	Parts B and C
48(b) a list of all recommendations, including cross-references to relevant discussions in the report	Table 15
48(c) a description of the public hearing/roundtable conducted by the SIAC, and a list of those persons consulted with or heard	Chapter 1 and Appendix C
48(d) a list of all submitters in response to the exhibited EES/Environment Report and the draft PSA	Appendix B
48(e) a list of the documents tabled during the proceedings	Appendix D

Table 15 Recommendations and cross references

Recommendation	Relevant report reference
EDS SW2, SB3 – surface water - timing and management of inundation, communication	3.4
EDS GW2, Monitoring Requirements M GW1, M GW2 – groundwater monitoring	3.5
EDS GS1, EDS GS3 and Monitoring Requirements M GSC1 – hydraulic assessment and monitoring	4.2
Water Act 1989 approval	4.2
EDS CM1c, CM2, GS1 – soil characterisation	4.3
EDS E1 – alternatives near river bank	5.2
EDS E2e – hollow replacement	5.2
Incorporated Document – assessment of works and vegetation near river bank	5.2
EDS E2e and Monitoring Requirement M TE2 – vegetation monitoring	5.3

National Parks Act 1975 approval	5.4
EDS SW4 – further hydraulic assessment	6.2
Incorporated Document – requirements in Operational Management Plan	6.2
Monitoring Requirement M TAE2 – transect surveys	6.3
EDS SW2 – timing to prevent carp breeding	6.6
Monitoring Requirement M AE3 – monitoring for native fish and carp	6.6
EDS SW5 – regulator design for fish and containment bank design for turtles	6.6
EDS E3 – monitoring for terrestrial and aquatic pests	6.6
Monitoring Requirement M AE7 – fish strandings	6.6
Amendment Operating Plan within EMF	6.6
Incorporated Document – arrangements for deferred consideration of offsets	7.3
Incorporated Document – change to heritage for structures as well as buildings	9.1
Adopt Amendment C78 to the Swan Hill Planning Scheme	10.1

PART D: APPENDICES

Appendix A Terms of Reference

Terms of Reference

Victorian Murray Floodplain Restoration Project Standing Inquiry and Advisory Committee

Version: August 2022

Standing Inquiry and Advisory Committee appointed to inquire into, and report on, the proposed nine Victorian Murray Floodplain Restoration Projects (VMFRP) and their potential environmental effects in accordance with this terms of reference.

VMFRP consists of nine discrete projects that are being assessed under the *Environment Effects Act* 1978 (EE Act) via four 'assessment packages', as set out below:

- a. a single environment effects statement covering both Hattah Lakes North Floodplain Restoration Project and Belsar-Yungera Floodplain Restoration Project;
- a single environment effects statement covering both Lindsay Island Floodplain Restoration Project and Wallpolla Island Floodplain Restoration Project;
- c. a single environment report covering Nyah, Vinifera and Burra Creek Floodplain Restoration Projects; and
- d. a single environment report covering Gunbower National Park and Guttrum-Benwell Forests Floodplain Restoration Projects.

The Standing Inquiry and Advisory Committee is appointed pursuant to:

- section 9(1) of the EE Act as an inquiry; and
- part 7, section 151(1) of the *Planning and Environment Act* 1987 (P&E Act) as an advisory committee.

Name

1. The Standing Inquiry and Advisory Committee is to be known as the 'Victorian Murray Floodplain Restoration Project Standing Inquiry and Advisory Committee' (SIAC).

Skills

- The SIAC needs to have members that cover the following areas of knowledge and expertise:
 - a. floodplain ecology (terrestrial and aquatic);
 - b. environmental hydrology;
 - c. Aboriginal cultural heritage; and
 - d. land use and planning.
- 3. The SIAC may seek additional specialist expert advice to assist it in undertaking its role.
- 4. The SIAC will comprise of an appointed Lead Chair (SIAC Chair), co-Chairs and other appropriately qualified members.

Purpose

5. The SIAC is appointed by the Minister for Planning under section 9(1) of the EE Act and section 151(1) of the P&E Act to inquire into and provide an integrated assessment of the environmental effects of each of the projects within the VMFRP. For each of the assessment packages the SIAC is to:



Environment, Land, Water and Planning

VMFRP Standing Inquiry and Advisory Committee: Terms of Reference

- a. review and consider the relevant environment effects statement (EES) or environment report together with the associated technical appendices, other exhibited documents and submissions received in relation to the projects covered by the relevant EES or environment report package;
- consider and report on potential environmental effects and benefits of each project presented in the relevant EES or environment report, their significance and acceptability, having regard to the evaluation objectives in scoping requirements and relevant policy and legislation;
- c. consider and report on potential environmental effects for each project on relevant matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) for that project;
- d. identify any measures, including any necessary project modifications, it considers necessary and effective to sufficiently avoid, mitigate or manage the environmental effects, within acceptable limits, for the projects that are the subject of the relevant EES or environment report;
- e. advise on how any identified measures relate to relevant conditions, controls and requirements that could form part of the necessary approvals and consents for the projects being assessed;
- f. consider the merits of the draft planning scheme amendments (PSAs) exhibited with the EES or environment report (as applicable), which have been prepared to apply a Specific Controls Overlay, incorporated document and establish planning approval for the projects;
- g. undertake a strategic assessment of draft PSAs, exhibited with the EES or environment report (as applicable) against the strategic considerations identified in the Planning Practice Note 46 Strategic Assessment Guidelines and other relevant considerations;
- h. consider any relevant issues raised in submissions about the draft PSAs;
- i. review the content of the draft PSAs including the incorporated documents; and
- j. recommend any changes to the draft PSAs that it considers necessary.
- 6. For each of the four assessment packages, the SIAC is to produce a report of its findings and recommendations to the Minister for Planning to inform the assessment under the EE Act and, in turn to assist the Minister to make a decision about the PSAs for the projects relevant to the assessment package. One report shall be prepared for each assessment package however findings and recommendations need to be clearly identified for each individual project.

Background

Project outline

- 7. VMFRP is being implemented as part of Victoria's obligations under the Murray-Darling Basin Plan. The Basin Plan sets out Sustainable Diversion Limits, which are the amount of water that can be taken from the Murray-Darling Basin each year, and the projects form part of the greater Sustainable Diversion Limit Adjustment Mechanism (SDLAM) under the Murray Darling Basin Plan.
- 8. The structure and implementation of the Murray Darling Basin Plan, SDLAM and the Victorian Environmental Water Framework are outside the scope of matters to be examined by the SIAC. They are only context for these projects.
- The projects aim to restore a more natural flooding regime to approximately 14,000 hectares of high ecological value floodplains along the Murray River through modification of existing and construction of new infrastructure.
- 10. The buildings and works proposed for these projects will include construction of infrastructure such as channels, regulators, containment banks, drop structures, spillways, temporary or permanent pumping stations, laydown areas, site compounds and workforce facilities. Construction and upgrade of access roads will be required, as well as the removal of native vegetation in construction areas. Sites will also need to be established to supply fill material to support construction.

VMFRP Standing Inquiry and Advisory Committee: Terms of Reference

- 11. The proponent for all nine projects is Lower Murray Urban and Rural Water Corporation (LMW).
- 12. LMW, as the proponent, is responsible for preparing technical studies, consulting with the public and stakeholders and preparing the EESs and environment reports.

Assessment processes

- 13. The proponent provided a referral for each of the nine VMFRP projects to the Minister for Planning under the EE Act.
- 14. In response to the referrals made under the EE Act from the proponent, the former Minister for Planning determined that assessment under the EE Act was required for all 9 projects, either through the preparation of an EES or environment report (as specified in the Introduction). The projects have the potential for significant effects, in particular on floodplain ecosystems, native vegetation, threatened species and ecological communities, as well as Aboriginal cultural heritage values.
- 15. The EESs are being prepared by the proponent in response to the Minister for Planning's respective EES decisions, procedures and requirements, as well as the scoping requirements issued by the Minister for Planning for each EES.
- 16. The environment reports (ER) are being prepared by the proponent in response to the Minister for Planning's decisions, specified conditions and scopes issued by the Department of Environment, Land, Water and Planning (DELWP) for each ER.

Commonwealth assessment process

- 17. Due to the potential significant impacts on matters of national environmental significance, each of the nine VMFRP projects were determined to be a controlled action for the purposes of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), thus requiring approval under the EPBC Act.
- 18. The Victorian assessment processes (either via an EES or environment report) are serving as the accredited assessment processes under the EPBC Act.
- 19. At the conclusion of each accredited process, the Victorian Minister for Planning will provide an assessment of environmental effects to the Commonwealth Minister for the Environment, to inform the approvals decision on each of the nine projects under the EPBC Act.

Planning approval process

20. The SIAC is to consider and provide advice on the draft PSAs that propose planning controls and provisions for the nine projects. The PSAs, in conjunction with other required approvals, will regulate the use and development of land for the projects in accordance with incorporated documents that are proposed to be included in the relevant Council's Planning Schemes.

Other approvals

- 21. The VMFRP projects may require several other statutory approvals and/or consents including:
 - a. an approved Cultural Heritage Management Plan under the Aboriginal Heritage Act 2006;
 - b. a permit to remove listed flora under the Flora and Fauna Guarantee Act 1988;
 - c. permits for works potentially affecting historic heritage sites under the Heritage Act 2017;
 - d. approval to undertake works in a national park under the National Parks Act 1975;
 - e. consent for the use or development of land within a declared road under the Road Management Act 2004;
 - f. authorisation to create obstructions to fish passage and/or a permit to take fish under the *Fisheries Act 1995*; and
 - g. a licence to take and use water and a licence for works on a waterway under the Water Act 1989.
Method

Submissions

- 22. Each of the EESs and environment reports (together with corresponding draft PSAs) will be placed on public exhibition, each for at least thirty (30) business days.
- 23. Submissions on each of the EESs, environment reports and corresponding draft PSAs are to be provided in writing on or before the close of exhibition for each assessment package. Submissions will be collected by the office of Planning Panels Victoria (PPV) on behalf of the Minister for Planning through the Engage Victoria platform. All submissions must state the name and address of the person making the submission. Submissions will be collected and managed in accordance with the 'Guide to Privacy at PPV'.
- 24. Petition responses will be treated as a single submission and only the first name from a petition submission will be registered and contacted.
- 25. Pro-forma submitters will be registered and contacted individually if they provide their contact details. However, pro-forma submitters who want to be heard at the public hearing or roundtable forum may be encouraged to present as a group, given their submissions raise the same issues.
- 26. All written submissions and other supporting documentation or evidence received through the course of the SIAC process may be published online, unless the SIAC specifically directs that the submission or other material, or part of it, is to remain confidential.
- 27. Electronic copies of each submission on the EESs, environment reports and draft PSAs are to be provided to the proponent, DELWP Impact Assessment Unit, DELWP Regional Planning Services (Loddon Mallee), First Peoples State Relations, relevant Registered Aboriginal Party (RAP), relevant Council and Parks Victoria.
- 28. PPV will retain any written submissions and other documentation provided to the SIAC for a period of five years after the time of its appointment.

Referrals to the SIAC

- 29. The DELWP Impact Assessment Unit will refer projects by letter to the SIAC, for advice on relevant aspects listed in clauses 5 and 6.
- 30. The referral letter will specify:
 - a. the locality/relevant municipality for each project being referred;
 - any specific matters, not already explicitly addressed in these terms of reference, the Minister for Planning seeks advice about;
- 31. The letter of referral will be a public document.

Public hearings for EES packages (including draft PSAs)

- 32. The SIAC must hold a public hearing for each of the two EES assessment packages and may make other such enquiries as are relevant to undertaking its role.
- 33. Prior to commencement of the public hearing for each EES, the SIAC must hold a directions hearing to make directions it considers necessary or appropriate as to the conduct, scope or scheduling of the public hearing.
- 34. When it conducts the public hearing, the SIAC has all the powers of an advisory committee that are specified in section 152(2) of the P&E Act.

Roundtable for environment report packages (including draft PSAs)

- 35. The SIAC must hold a roundtable forum for each of the two environment report assessment packages, unless given alternative direction in the referral letter, and may make other such enquiries as are relevant to undertaking its role.
- 36. Prior to commencement of the roundtable forum for each environment report, the SIAC may hold a directions hearing and make any directions it considers necessary or appropriate as to the conduct, scope or scheduling of the roundtable forum.
- 37. The SIAC may determine the scope of specific evidence and submissions to be presented by parties at the roundtable (such as by theme), based on key issues identified by the SIAC through its review of the exhibited environment report, draft PSA and submissions received on the exhibited documents. All relevant experts and parties with an interest in a particular issue or theme need to attend the roundtable for that theme, but not other sessions unless identified by the SIAC.

SIAC consultation processes

- 38. The SIAC may inform itself in any way it sees fit, but must review and consider for each assessment package:
 - a. the referral letter from the DELWP Impact Assessment Unit.
 - b. the exhibited EES or environment report (as applicable to the assessment package) and corresponding draft PSA;
 - c. all submissions and evidence provided to the SIAC by the proponent, state agencies, local councils and submitters;
 - any known views of the Registered Aboriginal Parties (RAPs) / Traditional Owner groups or seek the views of the RAPs / Traditional Owner groups if they are not already known;
 - e. any information provided by the proponent and parties that responds to submissions or directions of the SIAC; and
 - f. any other relevant information that is provided to, or obtained by, the SIAC.
- 39. In their review of the draft PSAs, the SIAC is to:
 - a. consider the P&E Act, ministerial directions, Victoria Planning Provisions and the Loddon Mallee North Regional Growth Plan.
 - b. consider the relevant planning schemes, including state, regional and local planning policies, and any adopted plans, strategies and PSAs. In particular, attention should be given to the consistency of the projects/draft PSAs with state policy on native vegetation, biodiversity and bushfire planning.
 - c. review all relevant material submitted on behalf of VMFRP or otherwise provided to the SIAC.
 - d. review all relevant submissions and evidence received.
- 40. The SIAC must conduct its processes in accordance with the following principles:
 - a. the public hearing/roundtable forum will be conducted in an open, orderly and equitable manner, in accordance with the principles of natural justice;
 - b. the public hearing/roundtable forum will be conducted with a minimum of formality and without legal representation being necessary for parties to be effective participants; and
 - c. the SIAC process is to be exploratory and constructive, with adversarial behaviour discouraged and with cross-examination/questioning regulated by the SIAC.
- 41. The SIAC may limit the time of parties appearing before it.

- 42. The SIAC may direct that a submission or evidence is confidential in nature and the hearing/roundtable forum be closed to the public for the purposes of receiving that submission or evidence.
- 43. The SIAC may conduct its processes when there is a quorum of at least two of its members present or participating through electronic means, one of whom must be the SIAC Chair or a co-Chair.
- 44. The SIAC should, as appropriate, use relevant understandings gained from SIAC's other public hearings or roundtable forums, including to assist with common matters and consistency.
- 45. Recording of the proceedings must be undertaken by the proponent, if directed by the SIAC. If recorded, the audio recording will be provided to PPV as a weblink and would be made publicly available on the project website as soon as practicable after the conclusion of each day of the proceedings, or otherwise as directed by the SIAC.
- 46. Any other audio or video recording of the conference by any other person or organisation may only occur with the prior consent of, and in accordance with, the directions of the SIAC.

Report

- 47. For each of the four assessment packages, the SIAC must produce a written report for the Minister for Planning containing its:
 - a. analysis and conclusions with respect to the predicted environmental effects and benefits of each project in the package and their respective significance and acceptability, based on the EES or environment report documents (as applicable) and public submissions, as well as documentation and evidence presented to the SIAC, and having regard to referral letter given to the SIAC under paragraph 28;
 - b. in the context of predicted effects, advise on whether each project within the EES or environment report (as applicable) is expected to result in overall improvement to the biodiversity values of relevant floodplain ecosystems (including listed threatened species and communities), including for each relevant matter of national environmental significance;
 - recommendations on whether the proposed alternative arrangement to compensate for the removal, destruction or lopping of native vegetation and associated impact on biodiversity is considered acceptable, and if not, whether any biodiversity offsets are necessary;
 - recommendations for any feasible modifications to the projects, necessary to achieve appropriate environmental outcomes, including in relation to variations to the proposed design and/or environmental monitoring and management measures;
 - e. findings on whether acceptable environmental outcomes can be achieved, having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development;
 - f. recommendations on specific measures appropriate to prevent or mitigate adverse environmental effects to achieve acceptable environmental outcomes, having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development;
 - g. a short summary and assessment of the issues raised in submissions about the draft PSAs;
 - h. advice on whether the consultation on the draft PSAs and proposed planning approval process is considered adequate or whether additional consultation should occur;
 - recommendations for any appropriate conditions that may be lawfully imposed on any approval for the projects, or changes that should be made to the draft PSA (for each assessment package) in order to ensure that the environmental effects of the projects are acceptable having regard to legislation, policy, best practice, and the principles and objectives of ecologically sustainable development;

- j. recommendations about the structure and content of the draft management plans provided with the EES, including with respect to mitigation and monitoring of environmental effects, as well as contingency measures; and
- k. specific findings and recommendations about the predicted impacts on matters of national environmental significance and their acceptability, including appropriate controls and environmental management.
- 48. Each report should include:
 - a. information and analysis in support of the SIAC's findings and recommendations;
 - b. a list of all recommendations, including cross-references to relevant discussions in the report;
 - c. a description of the public hearing/roundtable conducted by the SIAC, and a list of those persons consulted with or heard;
 - d. a list of all submitters in response to the exhibited EES/environment report and the draft PSA; and
 - e. a list of the documents tabled during the proceedings.
- 49. In preparing reports for each package, the SIAC should provide advice and recommendations cognisant of other packages as appropriate, including to address consistency across all VMFRP projects where appropriate.

Timing

- 50. For public hearings, the SIAC should commence proceedings no later than 30 business days from the final date of the exhibition period.
- 51. For roundtable forums, the SIAC should commence proceedings no later than 20 business days from the final date of the exhibition period, cognisant of timing and sequencing of public hearings/roundtable forums for other assessment packages.
- 52. The SIAC must submit its report in writing to the Minister for Planning within 40 business days from the last day of its proceedings for a public hearing and 30 business days from the last day of its proceedings for a roundtable forum.
- 53. The DELWP Impact Assessment Unit must liaise with the office of PPV and the proponent to agree on the proposed dates to be included on all public notices for the exhibition of the EESs and environment reports (including draft PSAs) for the directions hearing, hearing and/or roundtable forum.

Minister's assessment

- 54. The Minister for Planning will issue a Minister's assessment of the environmental effects of each of the projects that are the subject of an assessment package after considering the corresponding SIAC's report, as well as the EES or environment report (as applicable), submissions and any other relevant matters (as applicable).
- 55. PPV will notify all submitters for each assessment package of the release of the Minister for Planning's assessment and SIAC report.

Fee

- 56. The fees for the members of the SIAC will be set at the current rate for a panel appointed under part 8 of the P&E Act.
- 57. All costs of the SIAC, including the costs of obtaining any expert advice, technical administration and legal support, venue hire, accommodation, recording proceedings and other costs must be met by the proponent.

Miscellaneous

- 58. The SIAC may apply to the Minister for Planning to vary these terms of reference in writing, at any time prior to submission of its final report.
- 59. The SIAC may retain specialist expert advice and legal counsel to assist if necessary.
- 60. PPV is to provide any necessary administrative support to the SIAC. In addition, the proponent is to provide any necessary administrative or technical support to the SIAC in relation to the conduct of hearings and roundtables.

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Hon Lizzie Blandthorn MP Minister for Planning

Date: 16/8/22

The following information does not form part the terms of reference.

Project Management

- 1. For matters regarding the inquiry and advisory committee process, please contact Amy Selvaraj, Senior Project Officer, of Planning Panels Victoria, by phone (03) 8624 5714 or email <u>Planning.Panels@delwp.vic.gov.au</u>.
- 2. For matters regarding the EES and environment report processes please contact the Impact Assessment Unit in DELWP by email <u>environment.assessment@delwp.vic.gov.au</u>.

Appendix B List of submitters

No	Submitter
1	Ross Macfarlane
2	Malcolm Thompson
3	Dylyn Dejong
4	Christiane Jaeger
5	Fenner School of Environment and Society, Australian National University
6	Peta Thornton
7	Environment Protection Authority Victoria (EPA)
8	Rodney Duffy
9	Nicole McKay
10	Jacquie Kelly
11	Environment Victoria
12	Department of Energy, Environment and Climate Action (DEECA)
13	Friends of Nyah Vinifera Park Inc
14	Mid- Murray Field Naturalists Inc

Appendix C List of parties

Submitter	Represented by
Lower Murray Urban and Rural Water Corporation (Proponent)	Rupert Watters and Robert Forrester of Counsel, instructed by Sallyanne Everett and William Bartley of Clayton Utz, who called expert evidence on:
	- groundwater from Greg Hoxley of Jacobs
	- surface water from Dr Simon Treadwell of Jacobs
	- aquatic ecology from Jean-Michel Benier of Jacobs
	- terrestrial ecology (flora) from Dr Drew King of Jacobs
	 terrestrial ecology (fauna) from Christopher Watson of Jacobs
	Proponent also provided descriptive and explanatory presentations on:
	 overview of the Project, existing conditions, physical context and description of proposed infrastructure and works from Josh White of Lower Murray Water
	 Project benefits (Overall Improvement for Biodiversity) from Hilary Chapman
	 Traditional Owner engagement update from James Kellerman of Mallee Catchment Management Authority and Craig Watson (former Mallee Catchment Management Authority employee)
Department of Energy, Environment and Climate Action	Stewart Dekker
Cain Chaplin	
Environment Victoria	Tyler Rotche and Natalie Hogan of Environmental Justice Australia
ANU Fenner School of Environment and Society	Dr Matthew Colloff and Prof Jamie Pittock
Friends of Nyah Vinifera Park Inc (FoNVP)	Dr Jacquie Kelly and Marilyne Nicholls
Marilyne Nicholls	
Nicole McKay	
Peta Thornton	
Raymond Kennedy	
Vincent Kirby	

Appendix D Document list

ER Central package – Vinifera and Nyah Floodplain Restoration Projects

Note: The Burra Creek Project has its own separate document list.

No.	Date	Description	Presented by
1	25 Jan 23	Letter of Referral from DTP to SIAC - ER Central package	Department of Transport and Planning (DTP)
2	7 Mar 23	Letter from Proponent to SIAC - Relevant information, presentations, evidence, site visit and Roundtable format	Clayton Utz for the Proponent
3	u	ER Central - Draft itinerary for unaccompanied site inspection and files in Keyhole Markup Language (KML) format	u
4	14 Mar 23	Directions Hearing Notification and draft directions	Committee
5	17 Mar 23	Letter from Proponent to SIAC – Confirmation of expert witnesses and comments on draft timetable	Clayton Utz for the Proponent
6	24 Mar 23	VMFRP SIAC ER Central - Directions, Timetable and Distribution List (version 1)	Committee
7	28 Mar 23	Instructions for using document sharing platform (Direction 5)	Clayton Utz for the Proponent
8	29 Mar 23	VMFRP SIAC ER Central - Timetable (version 2)	Committee
9	u	VMFRP SIAC ER Central – Letter to Proponent regarding contact with Traditional Owners (Direction 10)	Committee
10	30 Mar 23	Submission on relevant key matters in contention in EES Central (Direction 1)	Clayton Utz for the Proponent
11	3 Apr 23	Letter from Proponent to SIAC - Expert evidence (Direction 19) and update on Burra Creek Project	Clayton Utz for the Proponent
12	u	Proponent - Expert witness statement of Greg Hoxley - groundwater	"
13	<i>u</i>	Proponent - Expert witness statement of Dr Simon Treadwell - surface water a. Annexure D (Nyah) b. Annexure D (Vinifera) (statement also includes information that addresses Direction 15)	u
14	"	Proponent - Expert witness statement of Jean-Michel Benier - aquatic ecology	<i>u</i>
15	u	Proponent - Expert witness statement of Dr Drew King - terrestrial ecology (flora)	u
16	"	Proponent - Expert witness statement of Christopher Watson - terrestrial ecology (fauna)	"

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No.	Date	Description	Presented by
17	5 Apr 23	Proponent - Part A Submission (Direction 17)	Clayton Utz for the Proponent
18	u	Proponent - Response to submissions (Direction 17b)	u
19	u	Proponent - Day 1 - Incorporated Document (Direction 20a)	u
20	"	Proponent - Day 1 - Environmental Management Framework (EMF) (Direction 20b)	"
21	u	Proponent - Day 1 – Environmental Delivery Standards (EDS) and Monitoring Requirements (Direction 20b)	u
22	u	Technical Note 1 (TN01) - Ecological Associates Reports	"
23	u	Ecological Associates Report - Nyah	"
24	u	Ecological Associates Report - Vinifera	u
25	u	Technical Note 2 (TN02) - Conceptual models and approach to adaptive management (Direction 16)	u
26	u	Operational Maps - Nyah (Direction 14 a-e)	u
27	u	Operational Maps - Vinifera (Direction 14 a-e)	u
28	u	Aerial Maps – Nyah (Direction 14 f)	"
29	u	Aerial Maps - Vinifera (Direction 14 f)	"
30	u	Freehold land parcels map - Nyah	u
31	"	Road classification maps - Nyah and Vinifera	"
32	u	Traditional Owner consultation update	u
33	u	Cultural Heritage Management Plan (CHMP) update memorandum - Nyah	u
34	u	CHMP update memorandum - Vinifera - 5 Apr 23	u
35	6 Apr 23	VMFRP SIAC ER Central - Letter to Parties in regard to Burra Creek Project	Committee
36	11 Apr 23	DTP Impact Assessment Unit (IAU) – Submission - Overview of ER process ER Central	DTP
37	u	Email from Proponent to SIAC – Providing Josh White presentation and interactive Storey Maps (ArcGIS) links on Project Context and Project Descriptions	Clayton Utz for the Proponent
38	"	Proponent - presentation of Josh White (LMW) - Project context	"
39	"	Email from Proponent to SIAC – Link to Ecology Mapping System [CONFIDENTIAL FOR USE OF COMMITTEE ONLY]	"
40	12 Apr 23	Proponent - Part B Submission (Direction 33)	Clayton Utz for the Proponent

No.	Date	Description	Presented by
41	"	Roundtable Submission (Direction 33)	Environmental Justice Australia (EJA) for Environment Victoria
42	"	Roundtable Submission (Direction 33)	Prof Pittock for ANU Fenner School of Environment & Society
43	u	Roundtable Presentation	u
44	u	Roundtable Presentation	Friends of Nyah Vinifera Park Inc
45	13 Apr 23	Roundtable Photos	Мѕ МсКау
46	u	Fish trap locations River Road	Friends of Nyah Vinifera Park Inc
47	14 Apr 23	Roundtable presentation - Greg Hoxley - Groundwater	Clayton Utz for the Proponent
48	u	Roundtable presentation – Dr Simon Treadwell - Surface water	u
49	17 Apr 23	Going against the flow (Age Article 1 April 2023)	Friends of Nyah Vinifera Park Inc
50	"	Proponent - Technical Note 3 (TN03) - Contour maps	Clayton Utz for the Proponent
51	"	Nyah - Contours Overview Map (TN03)	u
52	"	Vinifera - Contours Overview Map (TN03)	u
53	"	Nyah - Water Movement, Operating Elevation, Contours Map (TN03)	u
54	"	Vinifera - Water Movement, Operating Elevation, Contours Map (Part 1) (TN03)	u
55	"	Vinifera - Water Movement, Operating Elevation, Contours Map (Part 2) (TN03)	u
56	u	Roundtable Presentation - Jean-Michel Benier - Aquatic ecology	u
57	u	VMFRP SIAC ER Central - Timetable (version 3)	Committee
58	"	Proponent - Technical Note 4 (TN04) - Floodplain Extent	Clayton Utz for the Proponent
59	"	Friends of Nyah Vinifera Park Inc - Supporting Roundtable photos	Friends of Nyah Vinifera Park Inc
60	18 Apr 23	VMFRP SIAC ER Central - Timetable (version 4)	Committee

No.	Date	Description	Presented by
61	"	Proponent - Technical Note 5 (TN05) - Drop structures	Clayton Utz for the Proponent
62	"	Roundtable Presentation - Dr Drew King - Terrestrial ecology (flora)	"
63	u	Roundtable Presentation - Christopher Watson - Terrestrial ecology (fauna)	u
64	u	Requests for information and questions on notice (surface water) - 18 Apr 23	"
64A	20 Apr 23	Committee Edits on D64 - Requests for information and questions on notice (surface water)	Committee
65	19 Apr 23	Response to questions taken on notice	Department of Energy, Environment and Climate Action (DEECA)
66	u	Preliminary investigation of floodplain vegetation web	Friends of Nyah Vinifera Park Inc
67	20 Apr 23	Nyah and Vinifera project benefits presentation (corrected and updated)	Clayton Utz for the Proponent
68	19 Apr 23	Environment Victoria - Shing halts floodplain works - Fears federal funding will be cut	Environment Victoria
69	u	Proponent - SDL Fish Management Plan - Nyah - 19 Apr 23	Proponent
70	u	Proponent - SDL Fish Management Plan - Vinifera - 19 Apr 23	u
71	20 Apr 23	Index for supporting Roundtable photos (D59)	Friends of Nyah Vinifera Park Inc
/2		 Providing various correspondence (18 Apr 23): a. Swan Hill Rural City Council Meeting - Agenda - 17 August 2021 - Notice of motion -D.21.10 b. Swan Hill Rural City Council Meeting - Minutes 17 Aug 	Мѕ МсКау
		 21 - Notice of motion - D.21.10 c. Swan Hill Rural City Council Meeting - Minutes - 14 	
		June 2022 - Notice of motion - D.22.3 d. Murray-Darling Basin Authority - Constraints	
		e. Murray-Darling Basin Authority - Icon site condition - The Living Murray - May 2018	
		 Research Gate - Supplementary material - Restoring dissolved organic carbon subsidies from floodplains to lowland river food webs - a role for environmental flows 	

No.	Date	Description	Presented by
		 g. Murray-Darling Basin Authority and CSIRO - Assessment and mitigation options of blackwater risk in the River Murray system b. DCCEEW, Latest water use, mid Musray 	
		n. DCCEEW - Latest water use, mid-Murray	
73	"	Golden perch - why the Darling River is so important for the Basins fish communities	"
74	u	Ecological management and Restoration Volume 12 No 2 - A new approach to determining environmental flow requirements: Sustaining the natural values of floodplains of the southern Murray-Darling Basin (Peake, Fitzsimons, Frood, Mitchell, Withers, White and Webster) August 2011	u
75	u	Example image of regulator referred to by Vincent Kirby	u
76	u	Email from Proponent to SIAC – videos referred to by Raymond Kennedy and Mallee CMA	Clayton Utz for the Proponent
77	u	Roundtable Photo (tree)	Ms McKay
78	21 Apr 23	Visit The Murray - Nyah Vinifera Park (tourism and recreation) (corrected)	Friends of Nyah Vinifera Park Inc
79	u	Roundtable submission dated 13 March 2023	Ms Nicholls
80	u	Comments on Day 1 EDS and Monitoring Requirements (D21)	EPA
81	24 Apr 23	Nyah-South Australian Border Salinity Management Plan Environmental Report, April 1992	Friends of Nyah Vinifera Park Inc
82	"	Email regarding indigenous cultural heritage	u
83	u	Letter to Julia Cusack and excerpt from Nyah State Forest Heritage Assessment of Proposed Forestry Coupes report	"
84	u	Final day version EDS and Monitoring Requirements	Clayton Utz for the Proponent
85	u	Final day version incorporated document	u
86	u	Map of conservation areas, image from Australian Geographic article, and article on Ian Abdulla	Friends of Nyah Vinifera Park Inc
87	u	Community response to management of the Nyah-Vinifera Regional Park	u
88	"	Nyah State Forest & Vinifera River Reserve tourism guides	u
89	u	Part C Submission	Clayton Utz for the Proponent
90	"	Technical Note 6 (TN06) - Burra Creek Project	"
91	23 Apr 23	Graph from Supplementary material - Restoring dissolved organic carbon subsidies from floodplains to lowland river food webs	Nicole McKay
92	25 Apr 23	Presentation slideshow	"

No.	Date	Description	Presented by
93	26 Apr 23	Letter from Dr Beth Gott regarding conservation management plan for Nyah Wetland Forest	Friends of Nyah Vinifera Park Inc
94	27 Apr 23	Email from Proponent to SIAC - TN 7, 8 and 9 and Conservation Works Exemption guidance documents	Clayton Utz for the Proponent
95	u	Technical Note 7 (TN07) - response to questions taken on notice (groundwater)	u
96	u	Technical Note 8 (TN08) - response to questions taken on notice (aquatic ecology)	u
97	u	Technical Note 9 (TN09) - response to questions taken on notice (project benefits)	u
98	28 Apr 23	Technical Note 10 (TN10) - response to questions taken on notice (surface water)	"
99	"	Modelling Report (Nyah) (Response to Question 8 of Tabled Document 64A)	u
100	u	Modelling Report (Vinifera) (Response to Question 8 of D64A)	u
101	1 May 23	VMFRP SIAC ER Central - End of Roundtable Directions	Committee
102	3 May 23	Final day verbal closing submission	Environment Victoria
103	u	Final day verbal closing submission	Friends of Nyah Vinifera Park Inc
104	u	Extracts from River Red Gum Forests Investigation, July 2007	"
105	5 May 23	Letter from DEECA to SIAC - Response to ER Central questions taken on notice	DEECA
106	9 May 23	Email from Proponent to SIAC - response to end of roundtable Directions 2 (Submission 6A) and 6 (DEECA)	Clayton Utz for the Proponent
107	11 May 23	Without prejudice comments on Project Documentation drafting	Friends of Nyah Vinifera Park Inc
108	12 May 23	Email from Proponent to SIAC – Response to material received on Direction 7 (Direction 9)	Clayton Utz for the Proponent

Documents from EES Central identified by the Proponent as likely to be of relevance in ER Central (Attachment A to Document 2 above)

No.	Date	Description	Presented by		
Backgi	Background and policy Documents				
29	13 Dec 22	Frood and Papas (2016) A Guide to water regime, salinity ranges and bioregional conservation status of Victorian wetland Ecological Vegetation Classes (Direction 16 1A)	Clayton Utz for the Proponent		
30	u	DELWP (2014) The Victorian wetland classification framework (Direction 16 1A)	"		
33	"	Duncan et al (2018b) Mulcra Island Offsets 5 Year assessment (Direction 16 1B)	"		
34	u	Cunningham et al. (2013) Mapping the Condition of River Red Gum (<i>Eucalyptus camaldulensis Dehnh</i>) and Black Box (<i>Eucalyptus largiflorens F.Muell</i>) Stands in The Living Murray Icon Sites (Direction 16 1B)	u		
35	u	Bennetts (2014) Gunbower Forest Sentinel Wetland and Understorey Survey (Direction 16 1B)	u		
36	"	Parks Victoria (2019) Conservation Action Plan for River Red Gum parks and reserves managed by Parks Victoria (Direction 16 1B)	"		
37	u	Horner et al. (2015) Recruitment of a keystone tree species must concurrently manage flooding and browsing (Direction 16 1B)	u		
38	u	Lunt et al. (2012) Effects of flood timing and livestock grazing on exotic annual plants in riverine floodplains(Direction 16 1B)	"		
39	u	Horner etal.(2012) Forest structure, flooding and grazing predict understorey composition floodplain forests in south eastern Australia (Direction 16 1B)	"		
40	u	Moxham et al. (2017) Tree health and regeneration response of Black Box (<i>Eucalyptus largiflorens</i>) to recent flooding (Direction 16 1B)	"		
41	u	DELWP (2017a) Native vegetation gain scoring manual Version 2 (Direction 16 1B)	u		
42	u	DELWP (2021d) Victorian Murray Long-term Watering Plan Minor Update (Direction 16 1B)	u		
44	"	Ecological Monitoring, Evaluation and Reporting Plan (Direction 16 1D)	"		
45	"	Socio-economic Monitoring, Evaluation and Reporting Plan (Direction 16 1D)	"		
46	u	The 2020 Basin Plan Evaluation – Vulnerabilities to climate change in the Murray-Darling Basin (Direction 16 1E)	u		

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No.	Date	Description	Presented by
47	u	The 2020 Basin Plan Evaluation (Direction 16 1E)	u
48	u	Guide to the proposed Basin Plan (Volume 1) (2010) (Direction 16 1E)	"
49	u	Guide to the proposed Basin Plan (Volume 2) (2010) (Direction 16 1E)	u
50	"	Guide to the Environmental Watering Plan (July 2022) (Direction 16 1E)	u
51	"	Basin-wide environmental watering strategy (November 2019) (Direction 16 1E)	u
52	u	Basin-wide environmental watering strategy (November 2014) (Direction 16 1E)	u
53	u	Constraints under a future climate (October 2022) (Direction 16 1E)	u
54	u	Basin plan annual report 2020-21 (Direction 16 1E)	"
55	u	Sustainable diversion limit adjustment mechanism 2022 Assurance report (November 2022) (Direction 16 1E)	u
56	"	VMFRP Climate Change Stress Test (October 2022) (Direction 16 1E)	u
57	"	Review of the Environmental Watering Plan (March 2021) (Direction 16 1E)	u
58	u	July 2022 Report Card (Direction 16 1E)	"
60	u	Constraints Management Strategy 2013 to 2024 (2012) (Direction 16 1E)	u
61	"	Basin annual environmental watering priorities 2022-2023 (Direction 16 1E)	u
62	u	Basin Salinity Management Strategy 2030 (Direction 16 1E)	"
121	17 Jan 23	Cost of further water purchases irrigation industry impacts (RMCG 2021)	<i>u</i>
176	7 Feb 23	Proponent - Cosier et al, Assessment of river flows in the Murray-Darling Basin (2019)	u
VMFR	P program-wi	de documents	
112	16 Jan 23	Proponent - Technical Note 5 (TN05) - Private landowner agreements	u
113	"	Proponent - Technical Note 6 (TN06) - Cumulative assessment for Matters of National Environmental Significance (MNES)	"
139	30 Jan 23	Proponent - Technical Note 9 (TN09) - Dispersive and reactive soils	u

No.	Date	Description	Presented by
181	7 Feb 23	Proponent - VMFRP Independent Expert Review Panel Terms of Reference of Biodiversity Expert Review Group (TOR BERG)	Clayton Utz for the Proponent
184	8 Feb 23	Proponent - Technical Note 15 (TN15) - Previous environmental watering projects	"
VMFR	P program-wi	de presentations	
114	16 Jan 23	Proponent - presentation of Nicholas Sheahan – Murray- Darling Basin Authority (MDBA) - Hattah Lakes North and Belsar Island VMFRP projects in the context of the Basin Plan	Clayton Utz for the Proponent
115	17 Jan 23	Proponent - presentation of Beth Ashworth - Victorian Environmental Water Holder (VEWH) - Victoria's Environmental Watering Program (updated)	u
116	16 Jan 23	Proponent - presentation of James Kellerman - Mallee CMA - Waterway management an adaptive management approach	u
Expert	elicitation re	port	
73	13 Dec 22	Expert elicitation of tolerable and optimal watering regimes for Murray River floodplain vegetation (Direction 17a) (Expert Elicitation Report; Dec 22)	Clayton Utz for the Proponent
74	u	Proponent - Technical Note 1 (TN01) – Expert Elicitation Report (Direction 17a)	"
108	10 Jan 23	Proponent - Technical Note 3 (TN03) - Implications of the Expert Elicitation Report on the EES Central package (Direction 17)	u
Native	vegetation		
138	30 Jan 23	Proponent - Technical Note 8 (TN08) - Terrestrialisation	Clayton Utz for the Proponent
172	6 Feb 23	Proponent - Attachment to Part C Submission – Native Vegetation Policy	u
172a	7 Feb 23	Proponent - draft Conservation Work Exemption (CWE) further guidance	u
Traditi	ional Owner e	ngagement	
2	4 Nov 22	VMFRP SIAC EES Central - Letter to Victorian Aboriginal Heritage Council (VAHC) - Assistance on relevant Traditional Owner groups	SIAC
3	"	VMFRP SIAC EES Central - Letter to First Peoples - State Relations - Assistance on relevant Traditional Owner groups	"
4	u	VMFRP SIAC EES Central - Letter to Department of Environment, Land, Water and Planning (DELWP) - Assistance on relevant Traditional Owner groups	"

No.	Date	Description	Presented by
5	u	VMFRP SIAC EES Central - Letter to Lower Murray Water (LMW; Proponent) - Assistance on relevant Traditional Owner groups	u
6	10 Nov 22	Letter from VAHC to SIAC - Response on Traditional Owner groups	VAHC
7	11 Nov 22	Letter from Proponent to SIAC - Response on Traditional Owner groups	Clayton Utz for the Proponent
8	14 Nov 22	Email from DELWP to SIAC - Response on Traditional Owner groups	DELWP - Land Services and First Peoples' Group
9	"	Letter from First Peoples - State Relations to SAIC - Response on Traditional Owner groups	First Peoples - State Relations
11	18 Nov 22	VMFRP SIAC EES Central - Letter to Mallee Catchment Management Authority (CMA) - Invitation to participate and Traditional Owner engagement	SIAC
12	24 Nov 22	Letter from Mallee CMA to SIAC - Response to invitation and Traditional Owner engagement (dated 25 November 22)	Mallee CMA
90	19 Dec 22	VMFRP SIAC Letter to First Peoples - State Relations - Further assistance Traditional Owner Group engagement	SIAC
96	21 Dec 22	Email from First Peoples - State Relations to SIAC – Response to further assistance on engagement	First Peoples - State Relations
168	3 Feb 23	VMFRP SIAC EES Central - Letter from SIAC to Proponent regarding closed session	SIAC
169	6 Feb 23	Letter from Proponent to SIAC - Response regarding closed session	Clayton Utz for the Proponent
170	"	VMFRP SIAC EES Central - Letter to Proponent - Response to proposal to hold closed session	SIAC
174	7 Feb 23	Proponent - Part C Submission (Direction 41)	Clayton Utz for the Proponent
175	"	Proponent - Attachment to Part C Submission, Traditional Owner Consultation Update	"
Expert	evidence		
77	15 Dec 22	Expert witness statement of Alex Holmes - terrestrial ecology (fauna)	Clayton Utz for the Proponent
78	u	Expert witness statement of Greg Hoxley - groundwater	u
79	"	Expert witness statement of Mick George - bushfire	<i>u</i>
80	u	Expert witness statement of Dr Simon Treadwell - surface water	"
81	u	Expert witness statement of Tim Marsden - aquatic ecology	"

No.	Date	Description	Presented by	
82	"	Expert witness statement of Zoe Jellie - terrestrial ecology (flora)	<i>u</i>	
122	17 Jan 23	Expert Witness presentation of Greg Hoxley - groundwater	"	
124	"	Expert Witness presentation of Dr Simon Treadwell - surface water	<i>u</i>	
127	20 Jan 23	Expert Witness presentation of Tim Marsden - aquatic ecology	"	
130	23 Jan 23	Expert Witness presentation of Zoe Jellie - terrestrial ecology (flora)	"	
131	"	Expert Witness presentation of Alex Holmes - terrestrial ecology (fauna): a. Part 1 b. Part 2 c. Part 3	"	
132	24 Jan 23	Expert Witness presentation of Mick George bushfire	"	
Propo	nent's respon	se to the EES Central Committee's RFIs		
99	23 Dec 22	Proponent - Response to the Committee Request for Information (RFI)	Clayton Utz for the Proponent	
126	20 Jan 23	Response to the Committee Request for Information (RFI) Part II	u	
Propo	nent's submis	sions		
92	21 Dec 22	Proponent - Part A Submission (Direction 18)	Clayton Utz for the Proponent	
93	"	Proponent - Response to the public submissions (Direction 18c)	"	
110	16 Jan 23	Proponent - Part B Submission (Direction 30)	"	
174	7 Feb 23	Proponent - Part C Submission (Direction 41)	"	
Final day documents				
177	7 Feb 23	Proponent - Final Day - Environmental Delivery Standards (EDS) and Monitoring Requirements (Direction 42)	Clayton Utz for the Proponent	
178	u	Proponent - Final Day - Incorporated Document (Direction 42)	u	

Appendix E Recommended Incorporated Document

The attached Incorporated Document is based on the Final Day document (D85) and including recommendations from EES Central with further modifications by this (ER Central) Committee. Where changes suggested in D85 are accepted by the Committee they are not tracked.

Given that Burra Creek is undergoing further assessment, references to that Project have been removed at this time.

Committee Added

Committee Deleted

Other minor grammatical changes and corrections have not been tracked.

Victorian Murray Floodplain Restoration Project

Vinifera Floodplain Restoration Project & Nyah Floodplain Restoration Project

Incorporated Document, June 2023

Based on the Final Day document (D85) and including recommendations from EES Central with further modifications by this (ER Central) Committee. Where changes suggested in D85 are accepted by the Committee they are not tracked.

Given that Burra Creek is undergoing further assessment, references to that Project have been removed at this time.

Committee additions

Committee deletions

A number of minor changes (eg numbering, changing DELWP to DEECA) have not been tracked.

Clau	se
1.0	INTRODUCTION
1.1	This document is an incorporated document in the Schedule to Clause 45.12 (Specific Controls Overlay) and Clause 72.04 (Documents incorporated in this Planning Scheme) of the Swan Hill Planning Scheme (planning scheme) under Section 6(2)(j) of the <i>Planning and Environment Act 1987</i> .
1.2	This incorporated document facilitates the delivery of:
	The Vinifera Floodplain Restoration Project (Vinifera Project); and
	The Nyah Floodplain Restoration Project (Nyah Project).
	(together, the Projects).
1.3	The control in Clause 4.0 prevails over any contrary or inconsistent provision in the planning scheme.
1.4	References to the 'Secretary' are to the Secretary as constituted under Part 2 of the Conservation, Forests and Land Act 1987.
2.0	PURPOSE
2.1	The purpose of this incorporated document is to permit and facilitate the use and development of land described in Clause 3.0 for the Projects.
3.0	LAND
3.1	The control in Clause 4.0 applies to the land shown as SCO3 on the planning scheme maps forming part of the planning scheme.
	(Project Land).
	[Committee note: SCO number to be confirmed on amendment finalisation]

4.0 CONTROL

EXEMPTION FROM PLANNING SCHEME REQUIREMENTS

- 4.1 Despite any provision to the contrary, or any inconsistent provision in the planning scheme, no planning permit is required for, and no provision in the planning scheme operates to prohibit, restrict or regulate the use or development of the Project Land for the purposes of, or related to, constructing, maintaining or operating the Projects.
- 4.2 The use and development of the Project Land for the purposes of, or related to, constructing, maintaining or operating the Projects includes:
 - a) Environmental watering including retarding, discharging, storing, releasing and the escape, percolation, seepage and passage of water, and includes both surface and underground flow and inundation of land, and the commissioning of infrastructure and mitigation measures and works;
 - b) Permanent and temporary infrastructure, utility installations and relocation of utility installations to collect, transmit, store or distribute water including pumps, regulators, culverts, pipelines, water quality facilities, flow devices and associated structures and services;
 - c) Construction, alteration and maintenance of waterways, earthworks, channels, water and soil transfer and treatment facilities, embankments, containment banks, barriers, cuttings, batters, fill and associated works;
 - d) Quarrying, excavation, extraction, treatment and removal of stone, clay, sand, earth or soil (or other similar materials) for building, construction and roadworks and site rehabilitation;
 - e) Roadworks and construction, alteration, maintenance and use of roads, access ways, temporary access roads, diversion roads, vehicle parking areas, tracks and creating or altering access to roads; and
 - f) Any buildings or works or associated infrastructure or activities for the Projects including:

i.Developing and using laydown areas for construction purposes.

- ii. Constructing and using temporary site workshops and storage, administration and amenities buildings.
- iii. Stockpiling spoil and excavated material.
- iv. Storing and assembling of materials and equipment.
- v. Restoring and reinstating works.
- vi. Removing, destroying and lopping vegetation, including native vegetation and dead native vegetation.
- vii. Relocating, modifying and upgrading services and utilities.
- viii. Demolishing, removing and relocating buildings, fixtures, structures and infrastructure.
- <u>ix.</u> Constructing fences, temporary site barriers and site security.

Claus				
	<u>x.</u> Erecting and displaying signage for construction, directional and identification purposes.			
4.3	ONDITIONS			
4.3.1	3.1 The use and development allowed by this incorporated document is subject to the following conditions and is to be implemented in accordance with the plans and documents approved pursuant to this Incorporated Document.			
4.4	evelopment Plans			
4.4.1	Prior to the commencement of development (excluding preparatory buildings and works), development plans must be-submitted to and approved by the Minister for Planning. The development plans must include:			
	a) Details of buildings and works, the location and extent of the construction footprint, including any construction compound, extractive industry site and access tracks;			
	b) Details of any staging of the development; and			
	c) Be fully dimensioned and drawn to scale.			
4.4.2	Submitted development plans are to be supported by an assessment to the Minister for Planning's satisfaction of:			
	a) The need for siting of any works within 30 metres of the banks of the Murray River having regard to the considerations identified in <u>CI 12-03-1S and CI 14.02-1S of the Swan Hill Planning Scheme and relevant alternatives; and</u>			
	b) Proposed measures to avoid and minimise impacts on native vegetation, large trees and habitats of threatened flora and fauna, as well as on cultural heritage and waterway values, within 30 metres of the banks of the Murray River.			
4.4.3	The development plans may be amended from time to time, with the approval of the Minister for Planning.			
4.4.4	ny request to amend the development plans must be accompanied by:			
	a) Amended plans and a schedule explaining the proposed amendment/s;			
	b) Details of any proposed infrastructure and associated construction footprints; and			
	c) A written statement explaining and supporting the proposed amendment, including:			

Clause	9			
		i.	A description of the form and extent of any consultation undertaken with relevant councils, government agencies and other stakeholders concerning the proposed amendment;	
		ii.	Any written comments from relevant councils, government agencies and other stakeholders; and	
		iii.	A written response to comments from relevant councils, government agencies and other stakeholders.	
<u>4.4.5</u>	_For th works	e avoid under o	ance of doubt, the development plans do not need to show areas of environmental watering or any mitigation measures or clause 4.2(a).	
4.5	Enviror	nmenta	Management	
Enviro	nmenta	l Manag	iement Framework	
4.5.1	Prior be pre <u>Clima</u> Act 1	Prior to the commencement of development (excluding preparatory buildings and works), an Environmental Management Framework must be prepared, and then submitted to and approved by the <u>Minister for Planning</u> . Secretary to the <u>Department of Energy, Environment and</u> <u>Climate Action</u> Department of Environment, Land, Water and Planning (as constituted under Part 2 of the Conservation, Forests and Land <u>Act 1987).</u>		
4.5.2	1.5.2 The Environmental Management Framework must:			
	a)	Be info <i>1978</i> ; <u>a</u>	rmed by the findings and conclusions of the environment report prepared for the Projects under the Environment Effects Act and by the Assessment provided by the Minister responsible for the Environment Effects Act 1978;	
	b)	Be pre	pared in consultation with the Department of Energy, Environment and Climate Action;	
	c)	Include for add	a statement of all environmental commitments for the Projects, including details of the required content and review process itional management and monitoring plans to be developed; and	
	<u>d)</u>	Contain the follo	n the Environmental Delivery Standards that are applicable to the design, construction and operation of the Projects and address owing areas and any other relevant matters:	
		<u>i. /</u>	Aboriginal cultural heritage	
		<u>ii. /</u>	Air quality	

Clause	
	<u>iii. Bushfire</u>
	iv. Contamination
	v. Environmental Management
	vi. Geology and soils
	vii. Groundwater
	viii. Historical heritage
	ix. Landscape and visual
	x. Native vegetation
	xi. Noise and vibration
	xii. Overall biodiversity improvement
	xiii. Social and business
	xiv. Surface water
	xv. Threatened species and communities and their habitat
	xvi. Traffic and transport
4.5.3	The use and development of the Projects must be carried out in accordance with the approved Environmental Management Framework.
4.5.4	The Environmental Management Framework may be amended from time to time, with the approval of the Minister for Planning Secretary.
4.5.5 A	Any request to amend the Environmental Management Framework must be accompanied by:
	a) A description of the form and extent of any consultation undertaken with relevant stakeholders concerning the proposed

Clause		
	b)	Any written comments received from relevant stakeholders; and
	c)	A written response to comments made by relevant stakeholders.
4.5.6	The owners	current version of the Environmental Management Framework must be available on a clearly identifiable Project or other relevant ite from the date of approval and must remain available on such website for at least 10 years after completion of construction.
Constru	uction	Environmental Management Plan
4.5.7	Prior must const	to the commencement of development (excluding preparatory buildings and works), a Construction Environmental Management Plan be prepared, and then submitted to and approved by the Secretary to the Department of Energy, Environment and Climate Action (as tituted under Part 2 of the Conservation, Forests and Land Act 1987). The Construction Environmental Management Plan must:
	a)	Be informed by the findings and conclusions of the environment report prepared for the Projects under the Environment Effects Act 1978;
	b)	Be prepared in consultation with the Department of Energy, Environment and Climate Action and other relevant agencies including Parks Victoria, Heritage Victoria, First Peoples State Relations, Environment Protection Authority Victoria and the Mallee Catchment Management Authority;
	c)	Document all avoidance and mitigation measures to be implemented for the Projects during construction, and responsibilities for implementation.
<u>Operat</u>	ional E	nvironmental Management Plan Operating Plan
4.5.8	Prior subm the C	to the commencement of works, an <u>Operational Environmental Management Plan</u> Operating Plan must be prepared, and then nitted to and approved by the Secretary to the Department of Energy, Environment and Climate Action (as constituted under Part 2 of conservation, Forests and Land Act 1987). The <u>Operational Environmental Management Plan</u> Operating Plan must:
	a)	Be informed by the findings and conclusions of the environment report prepared for the Projects under the Environment Effects Act 1978 and by the Assessment provided by the Minister responsible for the Environment Effects Act 1978;
	b)	Be prepared and implemented in consultation with Department of Energy, Environment and Climate Action and other relevant agencies including Parks Victoria, Heritage Victoria, First Peoples State Relations, Environment Protection Authority Victoria, the Mallee Catchment Management Authority, and Swan Hill Rural City Council;

Claus	e		
	c)	Docum of inun	ent all avoidance and mitigation measures to be implemented for the Projects during operations (including the planned timing dation events), as well as responsibilities for implementation.
	<u>d)</u>	Include	<u>.</u>
		i.	The objectives, targets and indicators to be used for the monitoring and evaluation of biodiversity responses, including for areas of different ecological vegetation communities, in accordance with Clause 4.6;
		ii.	The conceptual frameworks of environmental system interactions that will guide adaptive management of managed inundations and associated land management actions; and
		iii.	The process for preparation, approval and implementation of a Monitoring, Evaluation and Reporting Plan.
	e)	Include authorit	guidelines for any appropriate notification of inundation events to the public and relevant agencies, including the relevant fire ies.
<u>4.6</u>	Nat	ive vege	tation
4.6.1	Prix the infc 10 Env mu <u>ma</u> attr unc	or to the f native ve ormation and 11 o vironmen vironmen st include <u>y be subr</u> ibutable der Claus	removal, destruction or lopping of any native vegetation, information about that native vegetation (including description of egetation to be removed, <u>destroyed or lopped</u> , location map, relevant offset requirements, site assessment report and about impacts on rare or threatened species habitat) in accordance with Application Requirements 1, 5 and 9 of Table 4 and f Table 5 (as applicable) of the <i>Guidelines for removal, destruction or lopping of native vegetation</i> (Department of t, Land, Water and Planning, 2017) must be submitted to and approved by the Secretary to the Department of Energy, t and Climate Action (as constituted under Part 2 of the Conservation, Forests and Land Act 1987). Information submitted a details regarding the timing of the removal, <u>destruction or lopping</u> of native vegetation for construction works. Information mitted separately or subsequently, as directed, in relation to any likely or observed destruction of native vegetation that is to managed inundation enabled by each Project. (NOTE – offset requirements are not applicable if offsets are not required to 4.5.2)
4.6.2	Prior to the removal, destruction or lopping of any native vegetation (except for preparatory buildings and works in accordance with Clause 4.12), native vegetation offsets must be provided in respect of the native vegetation to be removed, <u>destroyed or lopped</u> in accordance with the requirements of the <i>Guidelines for removal, destruction or lopping of native vegetation</i> (Department of Environment, Land, Water and Planning, 2017) unless written agreement is obtained from the Secretary to the Department of Environment and Climate Action (as constituted under Part 2 of the Conservation, Forests and Land Act 1987) that:		
	a)	lt has b develop	een demonstrated that the removal, <u>destruction or lopping</u> of native vegetation necessary to enable the use and oment of the Projects provides for <u>and is reasonably likely to achieve</u> an overall improvement for biodiversity; <u>and</u>

Clause		
	b) Monitoring and evaluation of biodive	rsity responses is to be implemented by or on behalf of the operator of the Project in
	accordance with clause 4.5.8d and t	o the satisfaction of the Secretary; and
	c) An evaluation of the overall biodiver	sity changes attributable to the construction and operation of each Project is to be provided by
	the operator of the Project to the sat	isfaction of the Secretary within five years of the completion of Project construction or such
	other timeframe that the Secretary r	nav approve: and
	d) The party responsible for the constr	uction and operation of the Project has agreed to provide such native vegetation offsets that the
	Secretary may require after conside	ring the evaluation of overall biodiversity changes.
	The agreement must address and be cor Minister responsible for the Environment	sistent with all relevant matters set out in the Minister's Assessment under provided by the Effects Act 1978 dated [insert date].
	[Committee note: date to be inserted]	
4.6.3	Any secured offsets for the Projects mus	t be reconciled within six months of the completion of construction, or such other timeframe that
	the Secretary may decide, in accordance	with the Assessor's handbook – Applications to remove, destroy or lop native vegetation
	(Department of Environment, Land, Wate	r and Planning, 2018) or its successors. (NOTE – not applicable if offsets are not required as
	per clause 4.6.2)	
4.6.4	Evidence that any required offsets have	been secured for the projects must be provided in a report to the Secretary to the Department
	of Energy, Environment and Climate Act	on (as constituted under Part 2 of the Conservation, Forests and Land Act 1987) within six
	Months of the last vegetation removal of	required as new elevies 4.6.2).
	(NOTE – not applicable il offsets are not	required as per clause 4.6.2)
405	The Convetory to the Department of Ener	ing Environment and Climete Action (on constituted under Dart 2 of the Concernation Ecrete
4.0.5	and Lond Act 1007) may yory the timing	gy, Environment and Climate Action (as constituted under Part 2 of the Conservation, Porests
	and Land Act 1987) may vary the timing	or the requirement for implementing onsets and may consider onset requirements for
	construction works and in relation to loss	es autoutable to managed inundation separately. (NOTE – not applicable if onsets are not
	required as per clause 4.6.2)	
4.6	Monitoring and evaluation of biodivers	sitv improvement
4.6.1	Monitoring activities to evaluate the exte	at to which an overall improvement for biodiversity has been achieved must be carried out
	during operation of the Projects, and a re	port of monitoring results must be submitted to the Secretary to the Department of
	Environment, Land, Water and Planning	(as constituted under Part 2 of the Conservation, Forests and Land Act 1987) 5 years after the
	first environmental watering and thereaft	er every 10 years, unless otherwise agreed by the Secretary to the Department of
	Environment, Land, Water and Planning	(as constituted under Part 2 of the Conservation, Forests and Land Act 1987). The report must
	be prepared and submitted to the satisfa	ction of the Secretary to the Department of Environment, Land, Water and Planning (as

Clause			
	values, and any adaptive management proposed to be undertaken to provide for an increase in overall biodiversity improvements.		
4.7	Heritage management		
4.7.1	Where, but for this incorporated document, a planning permit would be required to demolish or remove a building or construct a building or carry out works on land subject to a Heritage Overlay, site and elevation plans showing the extent of buildings and works must be prepared, submitted to and approved by the Minister for Planning.		
4.7.2	Prior to the commencement of any work to demolish, alter or remove a building <u>or structure (including levee banks)</u> on land subject to a Heritage Overlay for which a planning permit would be required but for this incorporated document, a full archival photographic survey of the heritage place must be prepared, submitted to and approved by the Minister for Planning. The survey must show:		
	a) Photographs of both the exterior and interiors of the listed heritage place.		
	b) Contextual images of the environs and setting of the heritage place.		
	Once approved by the Minister for Planning, a copy of the full archival photographic survey must be provided to the relevant Council.		
4.8	Road access		
4.8.1	Before the commencement of works to create, alter or modify an intersection to a Transport Zone Category 2, a plan showing the works and materials is to be submitted to and approved by the Head, Transport for Victoria.		
4.9	Floodplain management		
4.9.1	Development on land subject to the Land Subject to Inundation Overlay must be undertaken to the satisfaction of, and in accordance with, plans submitted to and approved by the relevant floodplain management authority.		
4.10	Bushfire protection measures		
Bushfire	Bushfire risk management during construction		
4.10.1	Prior to the commencement of development (except for preparatory buildings and works), a Bushfire Emergency Response Plan must be prepared and submitted to the satisfaction of the relevant fire authority.* The Plan must be prepared in consultation with the relevant land manager, emergency management and fire authorities (including Department of Energy, Environment and Climate Action - Forest Fire Management Victoria), and show:		

Clause			
	a)	Procedures for the location of site offices and combustible liquids (associated with the construction of the Projects) in areas clear of vegetation and with a minimum ten (10) metre buffer from all retained vegetation. The buffer must be:	
		i. Either mineral earth or non-combustible mulch such as crushed rock.	
		ii. Kept free of vegetation and fine fuels at all times.	
	b)	Training and equipment requirements for on-ground personnel.	
	c)	Site access/equipment restrictions and permits that apply according to the fire danger rating.	
	d)	Pre work assessment to incorporate fire ignition risk assessment and controls (e.g. restrictions on use of machinery which must be adhered to during the fire danger period).	
	e)	A description of how bushfire danger (i.e. fire danger ratings and bushfire incidents) will be monitored.	
	f)	Emergency response actions (including evacuation routes or shelter in place locations) if bushfire is detected on or off site.	
	g)	Procedures for managing flammable material to prevent ignition, explosion or spread of fire from fuels or other hazardous materials.	
	h)	The locations of fire suppression equipment.	
	i)	Guidelines for Total Fire Ban days including prohibition of works for any specified day or time period except with written consent of the relevant fire authority.	
Fire Acc	cess	Road Plan	
4.10.2	Be the	efore the commencement of works on roads,* a Fire Access Road Plan must be prepared showing the following to the satisfaction of ne relevant fire authority*:	
	a)	Identification of the operational fire access roads;	
	b)	Identification of the strategic fire access road network;	
	c)	Identification of other roads that are not part of the strategic fire access road network and not operational fire access roads;	

Clause			
	d)	Exc	cept with approval of the Secretary, how operational fire access roads that are part of the land used for the Projects:
		i)	are designed to a standard to accommodate a vehicle configuration which is 4.5 metres high, 3.0 metres wide, and 19.0 metres in length with a 78.5 tonnes gross mass.
		ii)	have crossings designed to the SM1600 traffic loading model in the Australian Standard AS 5100.1:2017 Bridge design, Part 1: Scope and general principles (Standards Australia, 2017).
		iii)	can be maintained to road class 5D or higher, as outlined in the <i>Department of Environment Land Water and Planning - Parks</i> Victoria Road Management Plan October (Department of Environment, Land, Water and Planning, 2019) and must meet the Guide to Road Design (Austroads, 2021).
	e)	Exc lan	cept with approval of the Secretary, how roads that form part of the strategic fire access road network and which are part of the d used for the Projects:
		i)	are designed to a standard to accommodate a vehicle configuration of 5.0 metres high, 4.0 metres wide, and 26 metres in length.
		ii)	can be maintained to road class 5C or above as outlined in the <i>Department of Environment Land Water and Planning - Parks</i> Victoria Road Management Plan October (Department of Environment, Land, Water and Planning, 2019).
	f)	Info	ormation addressing:
		i)	how the proposed roads meet the objectives and standards contained in the Guide to Road Design (Austroads, 2021).
		ii)	how designs accommodate the operation of oversize over mass vehicles which are up to 78.5 tonnes gross mass, 5.0 metres high, 4.0 metres wide, and 26 metres in length.
		iii)	how crossing designs respond to the SM1600 traffic loading model in the Australian Standard AS 5100.1:2017 Bridge design, Part 1: Scope and general principles (Standards Australia, 2017).
	<u>The</u> any	e Fire / road	Access Road Plan does not apply to the following works which may carried out within the existing horizontal or vertical footprint of d or access track on land used for the Projects:
	<u>a)</u>	R	epairing potholes and ruts;
	b)	S	houlder grading for improved drainage;

Clause			
	c) Cleaning the surface drainage system (table drains and culverts);		
	d) Light grading (including gravel and patch and patrol repairs), medium and heavy blading (with and without compaction and watering) to reduce corrugations, ravelling and reinstate the desired pavement crossfall; and		
	e) Re-sheeting and re-gravelling, of the wearing surface of formed and gravel roads.		
Managin	g changes to bushfire risk arising from environmental watering operations		
4.10.3	Increased bushfire risk to life and property resulting from the operation of the Projects must be mitigated in accordance with Code of Practice for Fire Management on Public Land (Department of Environment, Land, Water and Planning, amended 2022) or subsequent plans approved by the Minister of Environment and Climate Action (as the Minister administering Conservation, Forests and Lands Act 1987).		
4.10.4	The plans and other documents listed in Clause 4.10.1 and Clause 4.10.2 may be amended from time to time to the satisfaction of the relevant fire authority.*		
4.11	Other conditions		
4.11.1	Unless otherwise stated, the plans and other documents listed in Clause 4.3 to Clause 4.10.2 must be approved before the start of the relevant component of development or operation. Plans and other documents may be prepared and approved separately for the Vinifera Project, Nyah Project and Burra Creek Project.		
4.11.2	The plans and other documents listed in Clause 4.3 to Clause 4.10.2 may be amended from time to time to the satisfaction of the relevant authority specified in Clause 4.3 to Clause 4.10.2. In deciding whether a plan or other document is satisfactory or whether to approve an amendment to a plan or other document, the relevant authority may seek the views of any relevant council or other authority.		
4.12	Preparatory and other works		
4.12.1	Preparatory buildings and works may commence before the conditions and requirements set out in Clauses 4.0 to 4.10 are satisfied.		
4.12.2	Preparatory buildings and works for the Projects includes:		
	a) Buildings and works and vegetation removal where a planning permit would not be required under the provisions of the planning scheme.		

Clause	lause					
	b) Investigation, testing and preparatory works to determine the suitability of land, and property condition surveys.					
	c)	Salvage and relocation of Aboriginal cultural heritage and other management actions required to be undertaken in compliance with the relevant cultural heritage management plan approved under the <i>Aboriginal Heritage Act 2006</i> or other compliance with that Act.				
5.0	EXPIRY					
5.1	5.1 The control in Clause 4.0 of this incorporated document expires in respect to land identified in Clause 3.0 of this document following circumstances apply:					
	a)	The use and development of the land allowed by the control is not started by 31 December 2024.				
	b)	The development of the land allowed by the control is not completed by 31 December 2028.				
	c)	The use allowed by the control is not started by 31 December 2033.				
5.2	The Minister for Planning may extend these periods if a request is made in writing before the expiry date or within six months afterwards.					

Appendix F Recommended EDS and Monitoring Requirements

The following table is based on the Final Fay document (D84) and including recommendations from EES Central with further modifications by this (ER Central) Committee. Where changes suggested in D84 are accepted by the Committee they are not tracked.

Given that Burra Creek is undergoing further assessment, references to that Project have been removed at this time.

Committee Added

Committee Deleted

Other minor grammatical changes and corrections have not been tracked.

VMFRP ER Central Committee recommended version of Environmental Delivery Standards and Monitoring Requirements

Environmental Delivery Standard			Responsibility
EMF1	Environmental Management System Develop, prepare and implement an Environmental Management System that is consistent with AS/NZS ISO 14001:2015 Environmental management systems – Requirements with guidance for use through the design and construction of the Projects.	Design, Construction	Contractor
EMF2	Construction Environmental Management Plan Prepare and implement a project specific Construction Environmental Management Plan and other relevant sub-plans as required by the Environmental Delivery Standards and in accordance with the Environmental Management Framework. The development of the Construction Environmental Management Plan and sub-plans must include consultation with relevant stakeholders as listed in the Environmental Management Framework and as required under any statutory approvals. Allowance of sufficient review time in agreement with the relevant stakeholders is to be included in the development process timeline. The Construction Environmental Management Plan and all sub-plans shall be prepared or approved by Lower Murray Water before construction commences. The Plan and all sub-plans will be audited for compliance by the Independent Environmental Auditor.	Construction	Contractor
EMF3	Operational management Operate the Projects in accordance with the following documents (or equivalent) within the environmental watering framework in accordance with the Environmental Management Framework and as applicable to the relevant project: Operation Environmental Management Plan Environmental Water Management Plan Seasonal Watering Plan Operating Plan Operations and Maintenance Plan. The development of the Operational management plans must include consultation with relevant stakeholders as listed in the Environmental Management Framework and as required under any statutory approvals. Allowance of sufficient review time in agreement with the relevant stakeholders is to be included in the development process timeline.	Operation	Mallee CMA LMW
EMF4	Operation performance management Operation of the projects will be monitored, evaluated and reported on in accordance with: • Operation Environmental Management Plan • Ecological Monitoring, Evaluation and Reporting Plan • Socio-economic Monitoring, Evaluation and Reporting Plan • Environmental Watering Management Plans Annual Operational Environmental Performance Reports will be prepared to report on performance against the EDSs and other operational obligations. As part of this process the Plans will address the management of, and access to, baseline and monitoring data. Implement a process to ensure that the outcomes of the monitoring, evaluation and reporting inform adaptive management of environmental watering events as per the Environmental Watering Management Plans.	Operation	Mallee CMA
ACH1	Cultural Heritage Management Plan Comply with the Cultural Heritage Management Plans, No. 16900 (Nyah) and No.16901 (Vinifera)) approved by First Peoples – State Relations under the Aboriginal Heritage Act 2006.	Design, and construction <u>and</u> operation	LMW Contractor
ACH2	Connection to Country Integrate Aboriginal knowledge, values, and aspirations into the planning, delivery and evaluation of the Burra Creek, Nyah and Vinifera projects. Create opportunities for enhancing and sharing cultural connection to Country.	Design, <u>construction and</u> operation and construction	Mallee CMA Parks Victoria

Environmental Delivery Standard						
	Cultural Heritage Management – Operation					
ACH3	Operate the projects in accordance with the existing Victorian environmental watering management framework, including via Environmental Watering Management Plans, Seasonal Watering Proposals and/or D Plans (or equivalent), to:					
	 Undertake a risk-based approach to identify, avoid and minimise risks (where practicable) to cultural heritage in (and immediately adjacent to) the Maximum Inundation Area in consultation with Registered A Parties/Traditional Owners and interested parties (as applicable), and In accordance with that framework, before watering develop measures to avoid, mitigate, minimise or manage risks (e.g. protection measures). All measures are to be commensurate with the level of risk and 					
	developed in consultation with Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable).					
	If culturally sensitive locations are observed or reported to be at risk from pest or overabundant native species or human activity (i.e. visitation), conduct monitoring at these locations to determine the potential impact, and as a first priority, implement protective measures, and secondary to this, implement remedial measures, where necessary. These actions are to be commensurate with the level of risk and determine agreed between the land manager and Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable).					
	Construction air quality management: dust					
AQ1	The Construction Environmental Management Plan must include an Environmental Emission Management Sub-plan with processes and measures to avoid and, where avoidance is not practicable, minimise emis air in accordance with the requirements of the Environment Protection Act 2017, subordinate legislation and other relevant statutory requirements and guidelines. Measures to include:					
	 A process for confirming all sensitive receptors within 350 metres of active construction sites Apply dust suppression on unsealed roads/tracks and areas to the extent practicable for reducing impacts within 350m of stationary human sensitive receptors Vehicle loads on public roads to be covered when carrying dust (or litter) generating material 					
	 Setting speed limits for construction vehicles (in accordance with the Traffic Management Plan required by EDS TT2) to reduce dust as far as practicable Dust suppression activities must consider weather patterns, ground cover, ground conditions e.g. type and moisture content of soil present, and type of activities being conducted as well as proximity to sensitive recentor locations 					
	 Manage stockpile areas to minimise dust (e.g, through compaction, lining, covering, wetting or use of a binding agent) Environment inspections as detailed in the Construction Environmental Management Plan to include dust observations and recording of inspection results Contractors will be required to refer to and utilise the following three documents and implement measures where appropriate during the construction phase of the project with reference to, and in accordance of the project with reference to accordance of the project with reference t					
	the following publications:					
	- Managing stockpiles (EPA Publication 1895)					
	- Managing soil disturbance (EPA Publication 1894)					
	- Managing truck and other vehicle movement (EPA Publication 1897)					
	 Ondertake visual observations of nuisance dust and reactive continuous/reactive continuous/re					
	Reactive dust monitoring is required at these locations only while construction and/or haulage is being undertaken (i.e., not required outside of working hours). If fine dust particles are measured to exceed PM ₁₀ ug/m3 for a 15 minute average and/or the trigger level identified in Guideline for assessing and minimising air pollution in Victoria (EPA Publication 1961) and following an investigation which determines that the attributed to the project construction, then the contractor must temporarily modify or suspend dust generating activities until controls are put in place to avoid and reduce dust.					
	Dust nuisance and complaints					
AQ2	The Community and Stakeholder Engagement Management Plan required by EDS SB1 must detail a process to receive and respond to queries or complaints relating to dust. This must include a project specific hore receive queries or complaints and a process for investigating and responding as required. Measures to address the complaint must be implemented as soon as practicable.					
	Pumping equipment					
AQ3	All pumping infrastructure involving diesel plant to be serviced within appropriate servicing frequencies and maintained to manufacturer specifications (where available).					
	Bushfire management during construction					
BF1	Prepare and implement a Bushfire Emergency Response Plan for the construction of the projects in consultation with the relevant land manager, emergency management and fire authorities (including DEECA - R Management Victoria). The Bushfire Emergency Response Plan must include:					
	 Training and equipment requirements for on-ground personnel Site access/equipment restrictions and permits that apply according to the Fire Danger Rating Pre work assessment (for example a Job Safety Analysis) to incorporate fire ignition risk assessment and controls 					

	Project phase	Responsibility
or Delivery ed Aboriginal and must be tial for nined and	Operation	Mallee CMA
missions to ensitive lance with,	Construction	Contractor
re M ₁₀ of 100 t the dust is		
c hotline to	Construction	Contractor
	Operation	LMW Mallee CMA
A - Forest Fire	Construction	Contractor
Enviro	nmental Delivery Standard	
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	 Monitoring of bushfire danger by using the Bureau of Meteorology and Victorian and NSW government recommended emergency information sources (e.g. VicEmergency app) Emergency response actions (including evacuation routes or shelter in place locations) in the event that bushfire is detected on or off site. Procedures for managing flammable material to prevent ignition, explosion or spread of fire from fuels such as: Minimisation of storage quantities and use of mobile refuelling where feasible 	
	- Storage methods and locations for flammable materials such as fuels, with low radiant heat exposure	
	Setbacks and vegetation management procedures to provide suitable separation between fuels and combustible materials.	
	Bushfire management during operation	
	Activities associated with the operation and maintenance of project infrastructure with relevance to bushfire ignition, preparedness and management must be undertaken in accordance with existing relevant (such as the Joint Fuel Management Program including cultural burning), procedures and requirements of the relevant land manager and relevant emergency management authorities. Prior to the commencent operation:	
BF2	 Prepare a pre work assessment (for example a Job Safety Analysis) to incorporate fire ignition risk assessment and controls for any operation and maintenance activities. Prepare Emergency Response Plans (or equivalent) in consultation and agreement with the relevant land manager and relevant emergency management authorities. The Emergency Response Plans must ind with key access/egress roads, alternative routes and key visitation sites for each proposed watering scenario. Prepare guidelines for operational or maintenance activities on Total Fire Ban days and during the Fire Danger Period, including requirements to adhere to any relevant restrictions as applicable. 	
	Before a watering event notify landowners and managers, emergency management agencies and DEECA Forest Fire Management Victoria of the timing and type of event (confirm the watering scenario) regard changes to access/egress.	
	Contaminated land duties	
	The Construction Environmental Management Plan must include processes and procedures to manage contaminated land, spoil and waste in accordance with land manager processes, procedures and requirer the requirements of the Environment Protection Act 2017, the Environment Protection Regulations 2021, and the following publications as appropriate and as amended or replaced from time to time:	
	 EPA Victoria, 2022, Publication 2008 Notifiable contamination guideline – Duty to notify contaminated land EPA Victoria, 2021, Publication 1827.2 Waste classification assessment protocol 	
	EPA Victoria, 2021, Publication 1828.2 Waste disposal categories – characteristics and thresholds EPA Victoria, 2021, Publication 1700, 2 Permissions eshame policy.	
	 EPA Victoria, 2021, Publication 1799.2 Permissions scheme policy EPA Victoria, 2022, Publication 1977: Assessing and controlling contaminated land risks: A guide to meeting the duty to manage for those in management or control of land 	
	 WorkSafe Victoria, 2010, Asbestos Contaminated Soil Guidance Note 	
	Australian Standard AS1940 Storage Handling of Flammable and Combustible Liquids	
	EPA Victoria, 2020, Publication 1834 Civil construction, building and demolition guide	
	 EPA Victoria, 2018, Publication 1698: Liquid storage and handling guidelines 	
	EPA Victoria, 2021, Publication 1756.2, Summary of waste framework	
	 EPA Victoria, 2021, Publication 1915, Contaminated land policy EPA Victoria, 2021, Publication 1040, Contaminated land, understanding section 25 of the Environment Protection Act 2017. 	
CM1a	 EPA Victoria, 2021, Publication 1940, Contaminated land. understanding section 35 of the Environment Protection Act 2017 EPA Victoria, 2021, Publication 1820.1, Construction – Guide to preventing harm to people and the environment. 	
	Specifically, the Construction Environmental Management Plan must include:	
	 A framework for managing contamination risks to achieve compliance with the contaminated land duties, including the General Environmental Duty, duty to manage contaminated land and duty to notify th contamination. 	
	 A framework for monitoring baseline and post-construction conditions to measure compliance with the duties and assess whether contamination has occurred as a result of the project 	
	 A framework for managing waste to achieve compliance with the Duties and regulatory requirements including classification, transportation and disposal at a lawful place. This will include minimisation of w generation and implementation of the waste hierarchy 	
	• Management measures for storage, handling and transport of materials for the protection of human health and the environment, including controls for minimising dust generation, sediment and stormwate and seepage from stockpiled materials	
	 Management measures to minimise chemical and fuel storage (including hazardous materials and dangerous goods) onsite, and store in accordance with EPA and Safe Work Australia requirements in the leg and guidelines listed above. This must include: 	
	- Creating and maintaining a dangerous goods register	
	- Disposing of any hazardous materials, including asbestos, in accordance with the Environmental Protection Regulations 2021 and relevant guidelines	
	- Implementing requirements for the installation of bunds and precautions to reduce the risk of spills	
	- Contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits.	

	Project phase	Responsibility
t processes ement of nclude maps rding any	Operation	LMW Mallee CMA Parks Vic (as land manager)
ements and the EPA of waste ter run-off egislation	Construction	Contractor

Envir	onmental Delivery Standard
	 An unexpected finds protocol including procedures if building rubble/asbestos in fly-tipped waste, buried waste or previously unidentified contamination is encountered. This must include measures to ide asbestos and (if present) manage this soil in accordance with the Work Health and Safety (WHS) Act and Regulations and Safe Work Australia.
	Water, Soils and Waste Management Sub-plan
	A Water, Soils and Waste Management plan must be prepared as a sub-plan to the Construction Environmental Management Plan to:
CM1b	 Comply with the General Environmental Duty as per the Environment Protection Act 2017 Identify spoil management options and / or off-site disposal in accordance with regulatory requirements including details of reuse options for all categories of spoil expected to be generated through const Identify procedures and requirements for characterisation, management and reuse of soil to be imported and/or re-used in construction. Classification and relevant permits will be sought and obtained in a with the Environmental Protection Regulations 2021 and supporting EPA guidelines. Characterisation will also consider the National Environment Protection Measures (Assessment of Site Contamination) 2 confirm the material is suitable for the proposed end use (to be determined based on the identified re-use location). This will include:
	- Preparation of a sample analysis and quality plan and conceptual site models
	- Details of management measures to be implemented for sustainable handling and transport of spoil for the protection of human health and the environment
	- Details of design and specific environmental management plans for temporary stockpile areas and stockpile activities including but not limited to containment of stockpiled materials to prevent any impact to human he environment (if required)
	- Classify material for disposal and identification of a suitable receiving facility (dependant on the classification) in accordance with EPA Victoria requirements to classify spoil for disposal or re-use as required
	- Provide a framework for material and waste tracking
	- Apply the waste hierarchy, including avoidance as far as reasonably practicable, prioritise beneficial re-use of material as part of the project and avoid on-site disposal to landing as reasonably practicable.
	 Prior to construction activities commencing at a discrete location, the contractor must characterise the condition of the land by applying a risk based approach to understand the nature and extent of any pote (existing) contamination or hazardous conditions or soil sensitivity or degradation at the following locations: Lay down areas and compounds Other areas where soil or materials will be handled, or chemicals will be stored/used Proposed construction sites where acid sulfate soils may exist Proposed construction sites with soils prone to erosion or other instability (including dispersive, saline, reactive and/or soft soils)
CIVIIC	This characterisation will include:
	 Review of desktop information (including the ER Central Geology, Soils and Contamination Specialist Assessment and any further information provided from land managers, through the design process and information that may have changed, for example, publicly available information such as from EPA Victoria) Site walkover across the locations identified above, with a particular focus on visual or olfactory signs of contamination such as staining, spills, dumped waste or stockpiles of soil Depending on the outcomes of the tasks above, targeted soil sampling at locations identified as having potential to contain contaminated material. The outcomes of this characterisation will inform construction control measures, inform the re-use of soil, and/or to classify material in accordance with EPA waste guidelines.
	Soli will be managed in accordance with the water, solis and waste Management Sub-plan as per EDS CM1D.
	Acid sulfate soils
CM2	 The Construction Environmental Management Plan must include an Acid sulfate soil management plan (ASMP). The ASMP must be prepared in accordance with the following where relevant: National Guidance for the Management of Acid Sulfate Soils in Inland Aquatic Ecosystems Guidance for the dewatering of acid sulfate soils in shallow groundwater environments Environment Protection Act 2017 General environmental duty Environment Protection Regulations 2021 National Acid Sulfate Soils Guidance – A synthesis National acid sulfate soils sampling and identification methods manual Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management
	Land manager policies and requirements.
	The ASMP must include measures to:
	 Identify areas of acid sulfate soils and notential acid sulfate soils within the proposed construction footprint.

	Project phase	Responsibility
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Envir	onmental Delivery Standard
	Characterise and manage acid sulfate soils in accordance with:
	- EPA Victoria, 2009, Publication 655.1 Acid Sulfate Soil and Rock Murray Darling Pacin Authority, 2010, Detailed Assessment of Acid Sulfate Soils in the Murray Darling Pacin
	Manage stocknile areas to prevent release of acid to the environment
	 Identify suitable sites for management, re-use or disposal of acid sulfate soil and rock in accordance with EPA Victoria requirements.
	• As far as reasonably practicable, prevent oxidation that could lead to acid formation through cover and/or scheduling practices or addition of neutralising compounds to avoid acid formation.
	Contaminated land duties
	The Operation Environmental Management Plan must include processes and procedures to manage contaminated land, spoil and waste in accordance with land manager processes, procedures and requirements of the legislation and other relevant statutory regulations and guidelines as detailed in EDS CM1a. Specifically, the Operation Environmental Management Plan must include:
	• Reference to a framework(s) for managing contamination risks to achieve compliance with the contaminated land duties, including the General Environmental Duty, duty to manage contamination and dut the EPA of contamination
CM3	• Management measures for storage, handling and transport of soil, water and/or waste materials for the protection of human health and the environment, including measures for minimising dust generation and stormwater run-off. Soil and/or water monitoring and reporting would be undertaken to ensure effective implementation of the management measures and ongoing environmental compliance of the infrastructure/operational activities. Controls must include:
	- Measures to minimise chemical and fuel storage on site and store hazardous materials and dangerous goods in accordance with EPA and Safe Work Australia requirements in the legislation and guidelines listed in EDS must include:
	Creating and maintaining a dangerous goods register
	Disposing of any hazardous materials, including asbestos, in accordance with the Environmental Protection Regulations 2021 and relevant guidelines
	 Contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits.
	Native vegetation and habitat design minimisation
	Avoid and, where avoidance is not practicable, minimise native vegetation removal and ensure that the removal of native vegetation will not exceed 12.844 ha for the Vinifera project, 14.118 ha for the Nyah 21.599 ha for the Burra Creek project.
	The following measures to avoid and minimise impacts to native vegetation (including habitat fragmentation) are to be implemented as part of detailed design and construction planning phases including:
	• Further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large tree
E1	habitats of threatened species, including within 30 metres of the top of the Murray River Bank. Minimice featuring and surface disturbance of temporary and permanent works within the Construction Featuring as far as reasonably practicable, particularly pear waterways, wetlands, endangered EVCs
	habitats (eg native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials.
	• Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the de
	when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and mi impacts to threatened species and Large or Very Large Trees). Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environment Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act listed the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.)
	The implementation of these measures is to be consistent with any relevant requirements in the Incorporated Document for the Projects under the Swan Hill Planning Scheme.
	Construction biodiversity administrative processes
	Develop and implement a Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2). The Native Flora and Fauna Management Sub-Plan m auditable specific commitments, and identify requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, in
	• The matters required by EDS E2b, E2c, E2d, E2e and E2f
E2a	Contractor inductions to be undertaken so that all staff onsite are aware of the ecological values (and other values) to be protected during construction
	• Monitoring and auditing requirements for implementation by the environmental supervisor to confirm works are proceeding in accordance with the Native Flora and Fauna Management Sub-plan (e.g. che
	 If EPBC Act or FFG Act listed threatened species (individuals or population) are encountered which were not assessed within the Environment Report assessment:
	 Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DEECA as relevant Notify a suitably qualified ecologist to determine the significance of any potential impacts

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Envir	onmental Delivery Standard			
	- Seek any relevant approvals from the relevant authority if removal/impacts cannot be avoided.			
	• Should works be required outside the approved Construction Footprint, follow the change process as detailed in the Construction Environmental Management Plan which includes consideration of biodiversion native vegetation, threatened species) implications, including approval requirements, re-quantification of impacts.			
	Construction vegetation management			
	The Native Flora and Fauna Management Sub-Plan must include the following requirements for vegetation removal activities:			
	 Clearly identify the trees to be removed. Trees that may be or are to be retained, must not be marked in any way Delineate no-go zones incorporating Tree Protection Zones of Large Trees and threatened flora species populations to be retained to prevent access during construction 			
	 Tree protection measures to be implemented to respond to arborist recommendations (e.g. tree protection zone fencing, mats) where appropriate Minimise removal of vegetation approved for removal/impacts (e.g. Reducing the number of trees felled) 			
E2b	 Once the construction footprint and construction methods are finalised in areas not previously assessed by an arborist during the design phase, undertake a detailed arborist assessment for Large Trees that impacted by more than 10% of their Tree Protection Zone (TPZ) to document the tree condition and significance, tree protection zone, structural root zone, tree protection fencing or ground protection system used, and determine if the tree can be retained. The arborist is required to have a minimum qualification of Diploma in Arboriculture (AQF level 5 or equivalent) and tree impacts are to be assessed in accord the Australian Standard 4970 - 2009 Protection of Trees on Development Sites. For trees to be retained implement tree and vegetation protection measures outlined in this EDS. 			
	 Pruning of trees to be retained will be undertaken to the minimum extent necessary and must not exceed one third of total canopy area. Pruning to be undertaken in accordance with AS4373 Pruning of Ame Vegetation clearing, pruning and excavation controls and protection measures, including the following protocols: 			
	- pre-clearing surveys by an authorised and experienced wildlife handler of all accessible fauna habitat up to 5 days prior to clearing, as well as identified obscured fauna habitat (e.g. hollows, nests, logs, inaccessible habitat hours prior to clearing. These can be conducted together as one pre-clearing survey provided it occurs no more than 24 hours prior to clearing			
	- fauna salvage by an authorised and experienced wildlife handler that is to be onsite during all vegetation removal/felling/lopping activities.			
	- two-stage clearing and phased/staged removal to retain trees for as long as possible wherever practicable			
	- minimised clearing during spring where practicable.			
	Construction fauna management			
	The Native Flora and Fauna Management Sub-Plan must include the following requirements for terrestrial and aquatic fauna management during construction:			
	• Development and implementation of handling and salvage protocols for terrestrial and aquatic fauna during construction, including legislative permit and authorisation requirements of wildlife handlers (e.g. Management Authorisation under the Wildlife Act 1975). This will include guidance for appropriate methods to encourage wildlife to leave vegetation and the construction areas, and other procedures show (including juveniles or eggs) be found within hollows or nests during the pre-clearance surveys. The protocols will include details of requirements, including wildlife handler/ecologist/Victorian Fisheries Auth permit and authorisation requirements and EPBC Act post-referral approvals processes			
	All fencing must be fauna friendly to minimise risk of wildlife injury from collision and include provision of egress points, for example:			
	- Temporary to exclude construction: High visibility string of bunting or plastic mesh (not transparent) attached to star pickets with plastic caps (or weighted posts that avoid ground penetration in culturally sensitive areas)			
E2c	- Temporary to exclude wildlife (e.g. from open trenches): Chain wire fencing >1.8m high with a top rail or tension wire. Fencing stays located inside the exclusion area, or with high visibility mesh to guide wildlife away from obstructions. Shade cloth or other suitable deterrent attached to the lower 50 cm of the outside of the exclusion zone and weighted to the ground to exclude smaller animals			
	- No barbed or razor wire will be used			
	• Trench management, including avoiding open trenches overnight where practicable. Where trenches cannot be closed, check trenches at the start and end of each day (i.e. dawn/dusk), and consider feasibility measures (e.g. ramps) to aid animal escape			
	 Implement measures to minimise noise, vibration and lighting impacts on known threatened fauna species and habitat, including: 			
	- Avoid unnecessary light spill across a broader area than required to avoid attracting insects and subsequently their predators (bats and birds)). EDS LV3 provides additional requirements in relation to lighting during const			
	- Avoiding night works during periods of high insect/bird/bat activity (October to March) as far as reasonably practical, so as to minimise disturbance to fauna communication, foraging and other behaviours that depend or darkness			
	- Avoiding pile driving in waterways at night as far as reasonably practical. If pile driving in waterways must occur over multiple nights, consecutive days are to be separated with a night of no works in between to minimise chronic disturbance to wildlife.			
	Construction weed and pest management			
E2d	 The Native Flora and Fauna Management Sub-Plan must include the following requirements and measures to mitigate weed (terrestrial and aquatic) and pathogen introduction and spread: Vehicle, personnel, material and equipment hygiene protocols (including measures required to prevent the spread or transmission of Chytrid Fungus as per Hygiene protocols for the control of diseases in Au frogs (Murray et al. (2011)) 			
	 Weed, pest animal and pathogen management and monitoring and reporting requirements. 			

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Enviro	onmental Delivery Standard			
	• Biosecurity check/inspections of all vehicles entering the Construction Footprint for plant material, seeds and soils containing organic matter. Following this initial check upon entry, biosecurity checks are not each time the vehicle comes into the Construction Footprint if the vehicle has only travelled on bitumen or well-established gravel or dirt roads (i.e. no vegetation growing within roads) outside the Construction Footprint.			
	These measures must be auditable and linked to management outcomes such as:			
	 Identify CaLP Act listed weeds in the construction area and assess the risk of additional spread prior to relocating topsoil. Implement measures to manage this risk during clear and grade, and reinstatement To a reasonable extent practicable during the clear and grade phase, ensure that vehicles and plant are free of soil (dust/clods) and vegetation prior to entry and exit from the construction area Evaluate disturbed areas post-construction and implement rehabilitation in accordance with EDS E2e. To avoid and prevent spread of pathogens, all vehicles and plant undertaking construction works directly in the watercourse must be cleaned and free of soil prior to entrance of each waterway and on exit if between multiple waterways (excluding vehicles and plant using the constructed access route). 			
	Construction rehabilitation management			
	The Native Flora and Fauna Management Plan must include the following requirements for rehabilitation following construction:			
	Development and implementation of a hollow replacement plan that is:			
	- to provide for nominated priority fauna species on the basis of suitable evidence of their habitat requirements			
	- to be implemented progressively over a ten-year period with appropriate monitoring to ensure its cost-effectiveness			
52.	- to the satisfaction of the Secretary of DEECA			
EZe	 Replace large woody debris (existing logs and snags) removed during construction from waterbodies or the floodplain as close as practicable to where it was initially located, in consultation with land manager. The projects must include rehabilitation of all affected areas following construction within the timeframe specified by the land manager. Rehabilitation for all areas except Borrow sites must be detailed in the CEMP and must be developed in consultation with the relevant land manager. Rehabilitation should include as appropriate topsoil, leaf litter, log reinstatement and targeted revegetation (using locally appropriate indigenous species in areas of native vegetation pre-construction or soil s non-invasive species in other areas), as agreed with the land manager Borrow sites rehabilitation should include as appropriate topsoil, leaf litter, log reinstatement, weed monitoring and management and targeted revegetation, with appropriate monitoring of rehabilitation outcomes including vegetation cover, as agreed with the land manager. 			
	Aquatic fauna management			
	In addition to the handling and salvage protocols for aquatic fauna as detailed in EDS E2c implement the following:			
	Where works in waterbodies require coffer-damming that completely blocks the waterway:			
F2f	- Where practical, undertake works under no-flow conditions or outside the periods of time when fish migration occurs			
	- Clearance of coffer dams during the de-watering process and following flood events which over-top the coffer dam			
	- If clearance is not possible (e.g. for safety reasons), screens/filters to be placed on temporary pumps to be used to dewater coffer dam to avoid entrainment			
	- Implement flow-through via pumping from upstream to downstream to maintain water quality and levels on both sides of the conter dam			
	 Minimise the duration of fish passage restrictions during works undertaken in or within the vicinity of any waterbodies to reduce impacts on aquatic fauna movements and water quality. 			
	Pest Plant and Animal Monitoring and Management Plan			
	Prepare (prior to the commencement of operation) and implement a Pest Plant and Animal Monitoring and Management Plan to detect and manage terrestrial and aquatic pest presence and activity due to man environmental watering events, including carp. The Plan may be prepared for multiple VMFRP projects, and will include:			
E3	 A monitoring program to indicate pest presence and activity, which will inform adaptive management and treatment measures Thresholds for implementation of contingency management measures Contingency measures, which may refer to existing policies, practices and procedures. 			
	The monitoring program must include monitoring objectives, indicators and requirements (e.g. parameters, locations, frequency) appropriate to identify the exceedance of thresholds for pest presence and active Locations must include culturally sensitive locations relevant to EDS ACH3.			

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Enviro	nmental Delivery Standard			
E4a	Overall biodiversity improvement – Vinifera			
	Operate the Vinifera project to better align the frequency, duration and timing of managed inundation events with the ecological needs of the floodplain, including to improve ecosystem function, threatened habitat and native vegetation.			
	Operation of the projects, including the monitoring and reporting of outcomes, is to be undertaken in accordance with the principles of adaptive management through the following documents (or successors, applicable):			
	 Operation Environmental Management Plan Environmental Water Management Plan Seasonal Watering Proposal Operating Plan Operations and Maintenance Plan Monitoring, Evaluation and Reporting Plan 			
	Overall biodiversity improvement – Nyah			
	Operate the Nyah project to better align the frequency, duration and timing of managed inundation events with the ecological needs of the floodplain, including to improve ecosystem function, threatened specified and native vegetation.			
E4b	Operation of the projects, including the monitoring and reporting of outcomes, is to be undertaken in accordance with the principles of adaptive management through the following documents (or successors, applicable):			
	Operation Environmental Management Plan			
	Environmental Water Management Plan Seasonal Watering Proposal			
	Operating Plan			
	 Operations and Maintenance Plan Monitoring, Evaluation and Reporting Plan 			
	Overall biodiversity improvement – Burra Creek			
	Operate the Burra Creek project to better align the frequency, duration and timing of managed inundation events with the ecological needs of the floodplain, including to improve ecosystem function, threater habitat and native vegetation.			
E4c	Operation of the projects, including the monitoring and reporting of outcomes, is to be undertaken in accordance with the principles of adaptive management through the following documents (or successors, applicable):			
	Operation Environmental Management Plan			
	Environmental Water Management Plan			
	Seasonal Watering Proposal Operating Plan			
	Operations and Maintenance Plan			
	Monitoring, Evaluation and Reporting Plan			
	Minimising erosion and sedimentation through design			
	Design the projects having regard to:			
GS1	 soil characterisation, for example dispersive, saline, reactive and/or soft soils, with the objective of dispersing water flows and minimising water velocities to minimise the potential for erosion and sediment the extent practicable 			
	• the hydraulic effects of the Projects on erosion, sedimentation and related risks, to minimise such risks including in the vicinity of structures, in watercourses between the maximum inundation areas and the Diverse and at the homework site.			
	 risks to the stability of the Murray River banks resulting from seepage of water ponded by the Project 			
	In addition to the assessment in SW4, undertake a hydraulic assessment of floodplain erosion risks to inform the project design and implementation:			
	By using a hydraulic model that has been calibrated to reflect local conditions and that is suitably scaled to inform the detailed project design			

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	 To identify flow depths, velocities and bed shear stresses that could affect the proposed infrastructure and its intended functioning under relevant, realistic inundation scenarios, including for filling and dresses, and with regard to the possible effects of the various operational objectives in EDS SW2 on water releases. To assess the risks that are associated with the hydraulic performance of the project construction and operation and provide for their mitigation.
	Erosion and Sediment Control Plan
	The Construction Environmental Management Plan must include an Erosion and Sediment Control Plan which details measures to:
GS2	 Minimise clearance of vegetation and retain existing vegetation wherever possible, particularly along drainage lines and waterways, steep slopes and areas with unstable soils Stabilise exposed soil where applicable with the appropriate structural materials and media for the construction activities (e.g. stabilisation matting, rock armour or vegetation) Manage vehicle movement to designated roads and access areas as detailed in the Traffic Management Plan (EDS TT2) Erosion and sediment control measures to be maintained as appropriate following construction until the site is stabilised or vegetation is established, or as otherwise agreed with the land manager Install sediment controls around stockpiles to contain coarse soil and sediment, as applicable to prevent sedimentation of watercourses If required, treat dispersive or reactive soils prior to importation and use in construction.
	Soils and landform stability
	The Operation and Maintenance Plan must identify infrastructure locations (including but not limited to, regulators and containment banks) to be monitored for erosion risk. This monitoring is to inform adapt management and/or any measures to ensure structural integrity of infrastructure.
GS3	Monitoring of bank and bed erosion and bed aggradation should be undertaken in watercourses within the Projects' areas and draining to the Murray River, to inform adaptive management and any structure to address accelerated erosion, if required.
	Monitoring of the stability of the Murray River bank:
	 in all areas where seepage erosion risks have been identified through investigations for EDS GS1 in all areas where riparian vegetation removal or other works are undertaken adjacent to the riverbank
	Construction groundwater management
	The Construction Environmental Management Plan must include measures to manage groundwater impacts in accordance with the requirements under the Environment Protection Act 2017, subordinate leg other relevant statutory requirements and guidelines.
C)4/1	Measures must include:
GW1	 Avoid extracting contaminated groundwater wherever possible Seeking advice from a suitably qualified person on the most suitable way to manage contaminated groundwater Disposal of groundwater from dewatering must minimise impacts to land and/or waterways. Disposal option(s) selected for each dewatering activity must consider the volume and or quality of the groundwater disposed (i.e. salinity) and be undertaken to avoid and minimise effects on groundwater values Dewatering must be restricted to the minimum volume required Spills of contaminants must be avoided and managed in accordance with EDS CM1.
	Operational groundwater management
GW2	The Operation Environmental Management Plan must provide for the monitoring of groundwater and surface water levels, surface water flow and salinity, and an appropriate framework for action, to minim salinity to local floodplain values and in accordance with the relevant Catchment Management Authority's salinity management program that complies with <i>Basin Salinity Management 2030</i> or its successor.
0112	The groundwater monitoring should include wells or bores within the Projects' areas, including parts of each Project's area that are expected to be the most sensitive to groundwater rise or salinity increase, sufficient number of monitoring wells or bores within each Water Management Area to adequately detect and interpret any changes in water levels and salinity.
	The operation of the Projects should be reviewed and, if necessary, modified through adaptive management, if a significant trend of increasing salinity or related effects is identified at any of the monitoring
	Management of Historical Heritage during construction
HH1	The Construction Environmental Management Plan must include:
	 An unexpected finds protocol that specifies measures to avoid and minimise impacts on any previously unidentified historical archaeological sites and values discovered during construction. The managem must be consistent with the requirements of the Heritage Act 2017 and include procedures for ceasing work if human remains or archaeological sites, values or objects are discovered, notifying Heritage V find, obtaining consent to deal with the find, and dealing with the find in accordance with the consent

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	 Measures to manage historical heritage impacts including physical barrier protection and/or exclusion zones to manage unplanned effects Details around training and awareness in relation to historic heritage places and obligations (e.g. Project induction toolbox talks and staff inductions) Requirement to obtain any necessary consent under the Heritage Act 2017 prior to the disturbance of a known archaeological site.
	Management of Historical Heritage during operation
	In accordance with the Heritage Act 2017, manage historical heritage impacts including:
HH2	 Details around training and awareness in relation to historic heritage places and obligations (eg. Project induction toolbox talks and staff inductions) An unexpected find protocol that specifies measures to avoid and minimise impacts on any previously unidentified historical archaeological sites and values discovered during operation. The management must be consistent with the requirements of the Heritage Act 2017 and include procedures for ceasing work if human remains or archaeological sites, values or objects are discovered, notifying Heritage V find, obtaining consent to deal with the find, and dealing with the find in accordance with the consent Apply for and obtain any necessary consent under the Heritage Act 2017 where an archaeological site is to be disturbed, and comply with the conditions of that consent.
	Avoid and minimise visual impacts through design
LV1	Design permanent and temporary works in consultation and agreement with relevant stakeholders (e.g. land and asset managers) to minimise any adverse landscape and visual impacts as far as reasonably p
	Avoid and minimise visual impacts during construction
LV2	As far as reasonably practicable, locate construction equipment, stockpiles, and other visible elements away from key sensitive receptor views (as identified in the Construction Environmental Management P otherwise incorporate screening measures such as hoarding where necessary. Remove construction equipment and temporary construction infrastructure when no longer required.
	Minimise construction and operation lighting impacts
LV3	Temporary and permanent lighting used during construction and operation must avoid and minimise light spillage where safe to do so (considering AS/NZS 4282:2019 Control of the Obtrusive Effects of Outd to protect the amenity of adjacent sensitive receptors (as identified in the Operations Environment Management Plan).
	Develop and implement measures to avoid and minimise lighting impacts to terrestrial and aquatic fauna species including considering the siting of temporary pumps and associated equipment to avoid impa downward angles or directional lights to avoid unnecessary light spill across a broader area than required, yellow/orange LED light wavelengths to avoid attracting insects and subsequently their predators (b birds)).
	Construction noise and vibration management
	The Construction Environmental Management Plan must include process and measures to ensure the risk of harm from construction noise and vibration is minimised so far as reasonably practicable at all tim accordance with the obligations under the <i>Environment Protection Act 2017</i> , subordinate legislation and the provisions of other relevant Victorian statutory requirements and guidelines, including the Civil Co Building and Demolition guide (CCBD guide), EPA Publication 1834. The Construction Environmental Management Plan must include (but not be limited to) measures, such as:
	Review activities to be conducted and the equipment to be used
	• Investigate, and adopt wherever reasonably practicable, opportunities to reduce noise emissions at source, and eliminate or otherwise reduce features that increase the impacts of noise, such as tonality, impulsiveness, intermittency and high energy in the low frequency range
	Fit and maintain appropriate mufflers on vehicles
	 Maximise shielding taking topography, existing structures and equipment location into consideration
NV1	 Implement contingency measures wherever there is risk of harm associated with the residual holse and vibration (for example respite periods or alternative accommodation) Restrict noisy activities to the normal working hours of the CCBD guide (between 7 am and 6 pm weekdays and 7 am to 1 pm Saturday) except where the activity is justified and approved to be:
	- unavoidable works as defined in the CCBD guide, or
	- Managed impact works as defined in the CCBD guide.
	• A process must be established, in consultation with relevant stakeholders, for the Independent Environmental Auditor (IEA) to approve out-of-hours works, prior to the works being conducted, following a the IEA that
	- the justification for proposed out of-hours unavoidable works is consistent with the definition of unavoidable works in the CCBD guide
	- the justification for proposed out of-hours managed impact works is consistent with the definition of managed impact works in the CCBD guide
	- all reasonably practicable measures will be implemented to mitigate noise and vibration and their impacts, including contingency measures wherever relevant.
	 Inform the community on work scheduling and working hours in accordance with EDS SB1 and advise local residents when unavoidable out-of-hours work would occur Provide the opportunity for the community to raise issues / concerns and respond to these in accordance with EDS SB1 Setting speed limits for construction vehicles (in accordance with EDS TT2) to minimise vibration and noise effects

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Enviro	onmental Delivery Standard	Project phase	Responsibility
	• Prior to the commencement of vibration intensive works (such as compaction, sheet piling, rock breaking), prepare a risk assessment to inform the need to undertake dilapidation survey(s).		
NV2	Operational noise management Noise and vibration from operation and commissioning (e.g. pumps) must be minimised as far as reasonably practicable and be within established limits as set by the Noise Limit and Assessment Protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA Publication 1826).	Operation	Mallee CMA
RU1	Waste management Develop and implement management measures for resource use and waste (excluding soils) minimisation during construction and operation in accordance with the EPA waste management hierarchy and management options, to address: • Litter management • Construction and demolition wastes • Organic wastes.	Operation and construction	LMW Mallee CMA
SB1	Community and Stakeholder Engagement Management Plan Prior to construction (other than preparatory buildings and works), develop and implement a Community and Stakeholder Engagement Management Plan to engage and consult the community and affected stakeholders and discuss progress and timing of construction activities. The Community and Stakeholder Engagement Management Plan must include measures to: Provide advanced notification to relevant Councils and land managers to allow communication of upcoming construction activities, their timing and duration to direct visitors away from the construction footprint where appropriate. Provide advanced notification to potentially affected stakeholders (i.e. private landowners and leaseholders) of the extent and timing of access disruptions associated with construction and commissioning activities. Establish communication protocols to provide adequate notification to the local community, stakeholders, businesses, registered recreational users of the park/forest and emergency response organisations prior to access disruptions and community complaints or enquiries, as soon as practicable. Prepare incident notification to potentially affected stakeholders will be determined in consultation with the relevant stakeholder prior to the community of not preparatory buildings and and managers Timing and type of notification to potentially affected stakeholders will be determined in consultation with the relevant stakeholder prior to the community of construction (other than preparatory buildings and works), and may be amended from time to time, subject to agreement.	Construction	Contractor
SB2	Minimise social and business impacts – Construction Where recreation facilities are displaced or potentially affected by access restrictions or amenity impacts, work in collaboration with land managers, relevant Councils and other relevant authorities to identify relocation opportunities with the objective to maintain the continuity of affected facilities and activities, as far as reasonably practicable.	Construction	Contractor
SB3	 Communication and Stakeholder Engagement activities – Operation Catchment Management Authorities to continue to deliver communication and stakeholder engagement activities in accordance with Victoria's Catchment Management Authorities Community Engagement and Partnership Framework and Toolkit. Communication and engagement during the operation of the project must include: Advanced notification to relevant Councils and land managers to allow communication of upcoming operational activities, their timing and duration to direct visitors away from inundation areas where appropriate. Advanced notification to potentially affected private landowners and leaseholders of the extent and timing of access disruptions associated with commissioning and operational activities. Advanced notification to the local community, stakeholders, businesses and registered recreational users of the park/forest and emergency response organisations prior to access disruptions and communicate alternate access arrangements. Advanced notification to relevant agencies (e.g. DEECA) so that they can engage with license holders (i.e. apiary and other) to provide information on the timing of watering events. A process to receive queries or complaints and respond to these. A protocol for how community expectations regarding potential adverse effects, in particular adverse anoxic (blackwater) events, will be managed at identified stages of inundation events. Timing and type of notification to potentially affected stakeholders will be agreed prior to the commencement of operation, and may be amended from time to time, subject to agreement 	Operation	Mallee CMA

Enviro	onmental Delivery Standard
SW1	Surface water management – Construction
	The Construction Environmental Management Plan must include processes and measures to manage surface water in accordance with the relevant requirements of the <i>Environment Protection Act 2017</i> , subordin legislation and other relevant statutory requirements and guidelines. Mitigation and management measures will be informed by the EPA Publication 1834 and must include requirements to:
	 Manage sediment and erosion during construction in accordance with EDS GS2 Manage storage, handling and transport of materials in accordance with EDS CM1 for the protection of drains and waterways Establish water quality criteria through baseline monitoring (as specified in the CEMP) to inform site specific objectives for the treatment of water prior to discharge to receiving waterways Manage dewatering rates to prevent bank slumping Monitor surface water quality (in accordance with the requirements set out in the CEMP) upstream and downstream from where works occur within a designated waterway* to confirm effectiveness of establis controls and implement additional controls as required Include contingency plans should flooding occur during construction to avoid spills, erosion and discharge of poor quality water to waterways.
	* Designated waterways are named or unnamed, permanent or seasonal, and range in size from a river to a natural depression.
	Surface water management – Operation
	In accordance with the Water Act 1989, operate the project within the Victorian annual environmental water management cycle and, at the local level, be guided by site specific Operating Plans developed to out operational arrangements including identification of overarching operating risks and mitigation measures associated with the delivery of environmental water.
	The Catchment Management Authority is to develop the Operating Plan in consultation with relevant stakeholders prior to the first watering event.
	Operation of the project to consider and seek to avoid, minimise and manage where practicable <u>risks of producing adverse water quality</u> , or ecological or erosion outcomes from managed inundation events, and <u>particular</u> :
	 Protracted hypoxic or anoxic water quality conditions or excessive algal growth Constraining the breeding and movement of native fish, including stranding of native fish on the floodplain during drawdown events Stimulating the proliferation of introduced or pest plants or animals (including Carp) Excessive erosion during inundation filling and drawdown.
SW2	Relevant measures will include but not be limited to the following:
	 Factor seasonal implications in the timing of filling and drawdown for managed inundations, where practicable timing filling to occur in winter with drawdown prior to the onset of warmer conditions to reduce likelihood of creating suitable breeding conditions for Carp and to reduce the risk of hypoxic or anoxic blackwater events and algal blooms. Maintain throughflow during managed inundation if appropriate and possible to mitigate hypoxic/anoxic conditions
	 Assess accumulated organic material loads and adjust inundation timing, duration and extent to reduce the risk of a protracted hypoxic or anoxic blackwater event (if larger litter loads are present then consider inundation with throughflow or consider staged inundation)
	 Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow to reduce the impacts of low dissolved oxygen discharges from the Project areas of Murray River
	 Develop and evaluate a native fish exit strategy to allow native fish to migrate from the floodplain Monitor and evaluate native fish strandings associated with drawdown phase. Develop and implement mitigation measures to address strandings of native fish, which could include modifications to Project infrastructure, changes to operating arrangements, and/or capture and relocation of isolated large-bodied native fish
	 <u>Develop and evaluate a drawdown strategy to retain Carp on the floodplain</u> <u>Manage drawdown rates by slowly opening regulators to minimise erosion risks by minimising rapid increases in velocity and shear stress downstream of regulators.</u>
	Surface water – Monitoring
SW3	Monitor the volume, duration, frequency and surface water quality of managed environmental watering events in accordance with the Operation Environmental Management Plan to inform adaptive management through the Operating Arrangements for the Environmental Water Holdings of the Murray System and the Ecological Monitoring, Evaluation and Reporting Plans).
	Surface water – further hydraulic assessment of operational impacts on floodplain vegetation
S/V/4	In addition to the assessment in GS1, undertake hydraulic analysis and assessment of operational impacts on floodplain vegetation to:
SW4	 better understand the existing distribution of Ecological Vegetation Communities (EVCs) within the maximum inundation area identify optimal inundation regimes to achieve specific outcomes for EVCs assess potential losses of vegetation that could result from managed inundation regimes.

	Project phase	Responsibility	
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Enviro	onmental Delivery Standard
	This assessment is to include measures to:
	determine the frequency and duration of flood events that would inundate each EVC under relevant flow scenarios
	• analyse the location, maximum extent, durations and depths of inundation of different EVCs for representative flood events, using both mapped and tabular presentations as appropriate
	 assess the preferred frequencies, durations and depth ranges of inundation for each EVC based on the hydraulic analysis of existing patterns map the extent of appropriate watering in the preferred depth range, "over-" and "under-watering" of each EVC within the MIAs, relative to the preferred EVC inundation depths, for representative flood events and the second events of each EVC within the MIAs, relative to the preferred EVC inundation depths, for representative flood events and the second events of each EVC within the MIAs.
	The hydraulic applycis is to use a suitably refined and calibrated hydraulic model, and to apply scenarios for future flows reflecting the Basin Plan (with SDIAM projects) and reasonable climate change outcome
	The figuradic analysis is to use a suitably remined and calibrated involve, and to apply scenarios for future nows reflecting the basin rian (with 3DEAIN projects) and reasonable climate change outcome
	Ine outcomes of this hydraulic analysis and vegetation assessment are to be used to inform:
	<u>development and implementation of the OEMP, including any necessary operational changes</u> advector provident the language and any necessary operational changes
_	• relevant requirements under the incorporated Document for the projects under the Swan Hill Planning Scheme.
	Surface water design – regulators, containment banks and spillways
SW5	The design of the regulators should ensure that suitable flow velocities are provided to enable the passage of all target species of native fish to the extent reasonably practicable.
	The design of the containment banks and spillways should facilitate turtle passage.
	Safety in road design
TT1	Undertake independent road safety audits during project development to ensure all new and upgraded access tracks meet relevant land manager or road management authority requirements with respect to a network user safety. Implement relevant recommendations from the audit as appropriate.
	Traffic Management Plan
	Prepare and implement a Traffic Management Plan to minimise disruption during construction in consultation with relevant road management authorities and the land manager. The Traffic Management Plan clearly outline measures to:
	 Identify routes for construction haulage and construction vehicles travelling to and from the projects (including within the park(s) and outside) and identify any specific requirements for those routes Minimise road closures, access restrictions and disruption to all road users and active users
	 Provide for safe construction practices in accordance with road authority requirements Specify vehicle speed limits considering safety, poice, vibration and dust
TT2	 Specify venicle speed limits considering safety, holse, vibration and dust. Provide alternative routes for affected road users and active users where practicable
	 Maintain property accesses during construction where practicable or provide alternative access
	• Maintain emergency service access (as developed in consultation with emergency services) consistent with the Fire Access Road Plan required in the Incorporated Document
	 Notify affected residents and landholders of changes to traffic conditions and access to property for duration of the works Provide a clear delineation between read and areas dedicated for construction and reads and areas available for public use (e.g. through foncing, signage, etc).
	 Monitor weather conditions to reduce the risk of a heavy vehicle travelling into the area during poor weather conditions
	• Minimise the risk of vehicles getting bogged or stuck due to wet weather (including the requirement for recovery equipment to be on site)
	 Provide adequate access to heavy vehicles (including adequate vegetation clearance from vehicles) Determine whether any payement damage has occurred due to construction activity (including the requirement for pre and post construction road payement reports).
TT 2	Safety during operation – recovery equipment
113	The Operations and Maintenance Plan must detail the requirement for all maintenance vehicles associated with the operation of the projects to have recovery equipment on-board in order to recover any vehicles associated or stuck and blocking access.
	Safety during operation – signage
TT4	During operation, the land manager is to provide:
	 Advisory signage on closed or inaccessible tracks Public advice regarding changes in-park/forest conditions (eg. Via websites).

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Enviro	Project phase	Responsibility	
TT5	Track maintenance program Land managers to continue implementing a track maintenance program (according to regional priorities) to facilitate continued safe access for park users and emergency services, <u>consistent with the Fire Access Road Plan</u> required in the Incorporated Document.	Operation	Parks Victoria (as Land manager)

Key: M= Monitoring, AI = Auditing / Inspection, I = Investigation, C= Construction, O = Operation, WC = Wet Commissioning. ^ monitoring of operational impacts, risks and uncertainties, * monitoring of ecological benefits

ID & Discipline	Performance objective		Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
M AQ1 Air quality	Minimise dust within 20m of stationary human sensitive receptors	с	Dust plumes from construction activities at stationary human sensitive receptor(s) (i.e. occupied residences) located within 20m of the construction footprint.	As required by EDS AQ1, implement real- time monitoring where construction and/or haulage on unsealed roads occurs within 20m of occupied residences. If fine dust particles are measured to exceed PM10 of 100 ug/m3 for a 15 minute average and/or the trigger level identified in EPA Publication 1961 Guideline for assessing and minimising air pollution in Victoria and following an investigation which determines that the dust is attributed to the project construction, then the contractor must temporarily modify or suspend dust generating activities until controls are put in place to avoid and reduce dust.	Where construction and/or haulage on unsealed roads occurs within 20m of occupied residences	While construction and/or haulage is being undertaken at the specified locations (i.e. not required outside of working hours).	Construction contractor
M AE1 Aquatic ecology	To assess the development and maintenance of seasonal populations of small-bodied native fish.	0^	The average abundance of small fish during flood events at the wetlands of Vinifera, Parnee Malloo Creek and Burra Creek for years 6 to 10 of VMFRP operations is higher than the average for the Baseline Period	Boat/backpack electrofishing, fyke netting	Vinifera and Nyah wetlands - six sites as specified in MER program Burra Creek – four sites as specified in MER program	Measure at time and locations specified in the MER	Mallee CMA
<u>M AE3</u> <u>Aquatic</u> <u>ecology</u>	<u>To assess the benefits of floodplain</u> watering for small-bodied fish productivity. <u>To assess the effects of floodplain watering</u> and mitigation measures on carp populations	<u>0^</u>	Abundance of small-bodied native fish in wetlands and floodplain lakes increases due to environmental watering.Change in carp populations in relation to environmental watering and application of mitigation measures in EDS SW2.Relative numbers of Carp and small-bodied native fish stranded during drawdown phase of managed inundations.	Boat/backpack electrofishing, fyke netting	Wetlands and creeks within the inundation area. Effectiveness of watering to be determined through correlation with habitat quality and trends in fish abundance over time.	At least once during each inundation event. Trends evaluated after each watering event. Opportunity to reduce frequency and/or cease monitoring if a clear and reliable correlation with environmental watering is established	Mallee CMA
<u>M AE7</u> Aquatic ecology	Monitoring and reporting on native fish strandings resulting from managed inundation events, so that recurrent strandings can be identified and investigated to enable management measures to be undertaken to address the strandings as required	<u>0^</u>	Fish stranding events	Monitor and report on native fish strandings from managed inundation events	Areas inundated by managed inundation events	During drawdown of inundation events. Undertake a review of the monitoring after the first 5 inundation events to confirm and refine ongoing monitoring requirements (e.g. key risk factors and locations)	Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
M GSC1 Geology soils and contamination	Assess water containment and conveyance infrastructure locations with potential for erosion /or sedimentation to inform adaptive management and/or any measures to ensure structural integrity of infrastructure, as well as the condition of waterways within the Project areas and connecting the Project areas to the Murray River.	0^	Visual indicators (e.g., notching, bank slumping) of induced soil, water or wave erosion/sedimentation.	Visual inspections (including photo points) of constructed infrastructure <u>and</u> <u>waterways</u>	Infrastructure locations (including, but not limited to, regulators and containment banks) <u>and</u> <u>waterways connecting the Project</u> <u>areas to the Murray River.</u>	Before, during environmenta
M GW1 Groundwater	Identify changes to groundwater levels as a result of environmental watering	0^	Groundwater depth and groundwater elevation trends over time compared with the forecast changes	Groundwater depth below surface and groundwater reduced level. The frequency and location of monitoring may be adjusted through adaptive management.	Nyah: WRK119931 WRK119928 WRK119926 Vinifera: WRK119926 WRK119930 26271 26182 26155 26156 119389 119388 New groundwater monitoring sites: Establish new groundwater monitoring sites within the Maximum Inundation Areas of both Projects, including at the tree condition monitoring sites for M TE9 and in targeted areas that are predicted to be most sensitive to groundwater rise, particularly where there is high groundwater salinity.	Monthly Following the event, underta monitoring ou appropriate ac monitoring pro Following the inundation eve comprehensiv outcomes and adjustments to Including re-as against model expected effect
M GW2 Groundwater	Identify changes to groundwater quality as a result of environmental watering	0^	Groundwater salinity trends over time compared with the forecast	Groundwater salinity as measured by electrical conductivity or total dissolved solids	Nyah: WRK119931 WRK119928 WRK119926 Vinifera Forest: WRK119926 WRK119930 26271 26182 26155 26156 119389 119388	Annual Month Following the inundation ev interim review outcomes and adjustments t program. Following the inundation ev comprehensiv outcomes and adjustments t program.

	Responsibility
gand after an I watering event	Asset owner <u>(infrastructure)</u> and Mallee CMA (waterways)
first maximum inundation ake an interim review of itcomes and identify djustments to the ogram. second maximum ent, undertake a re review of monitoring l identify appropriate o the monitoring program. ssessment of performance ling results to confirm the cts.	Mallee CMA
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ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
					New groundwater monitoring sites: The new monitoring sites established to meet the requirements of M GW1	performance to confirm the
M GW3 Groundwater	Identify changes to surface water levels that influence groundwater Identify changes in surface water salinity, including the effect of groundwater discharge	0^	Water level, salinity and flow	Measure surface water levels, flow and salinity at specific locations.	Nyah: North Bank Regulator Vinifera: V1 Regulator	Daily. Following the f event, underta monitoring out appropriate ac monitoring pro Following the s inundation eve comprehensive outcomes and adjustments to Including re-as against modell expected effect
M SW1 Surface water	Assess the effect of the project's construction on surface water quality.	c	Routine field based monitoring:Electrical conductivity (salinity)TurbidityDissolved oxygenpHTemperatureVisual and olfactory inspection for oils andgreases, litter and algal growth. Ifhydrocarbons are suspected to be present, asample will be collected for laboratoryanalysis of oils and grease and totalpetroleum hydrocarbons.If algae are suspected to be present, a samplewill be collected for laboratory analysis ofnutrients (total nitrogen and totalphosphorus), chlorophyll and identification ofalgal species.Contingency monitoring:Indicators identified during contaminatedland assessment that could leach to surfacewaters due to construction activities at levelsabove objectives outlined in the NEPM 2013or Environment Reference Standard as aresult of the project (in accordance with EDSCM1). Contaminants accidentally spilled withpotential to pollute watercourses.	Specific monitoring programs for each construction location to be developed and documented in the CEMP prior to project commencement. This will include: Routine monitoring: Assess whether the project's construction is adversely effecting surface water quality and if relevant EDS are being implemented and effective. Thresholds for acceptable levels of change in indicators are provided in Table 16-4 of the ER Central Surface Water Assessment. If monitoring downstream of a construction site shows water quality exceeds values in Table 16-4 and the exceedance is due to construction activities (i.e. a comparison between water quality upstream and downstream of the construction shows compliance upstream but non-compliance downstream) implement contingency actions. Contingency monitoring: Assess whether the project's construction is adversely effecting surface water. The determination of effect should be based on water quality exceeding thresholds in Table 16-4 of the ER Central Surface Water Assessment that can be attributed to construction activities.	Specific monitoring programs for each construction location to be developed and documented in the CEMP prior to project commencement. This will include: Routine monitoring: For floodplain creeks and the Murray River – Where there is potential for runoff from the active construction sites to a watercourse, monitor upstream and downstream of the active area of construction in both immediate receiving waters (floodplain creeks) and the Murray River. Where construction blocks a waterway, monitor within the watercourse both upstream and downstream of that blockage. For wetlands – wetlands that receive surface water inflows from the active area of construction and a reference site (if relevant to individual construction locations). Contingency monitoring Upstream and downstream of affected areas, including multiple downstream sites to detect extent of potential impact.	Routine monit Weekly for one construction to water is presen At least weekly whenever wat frequently dur weather/ rainf If algae are sus sample will be analysis. <u>Contingency m</u> As required by being respond duration of po effectiveness of

	Responsibility
against modelling results e expected effects.	
first maximum inundation ake an interim review of itcomes and identify djustments to the ogram. second maximum ent, undertake a re review of monitoring l identify appropriate o the monitoring program. ssessment of performance ling results to confirm the cts.	Mallee CMA
toring: e month prior to o establish baseline (if nt) y during construction ter is present, or more ring and after: hot fall event. spected to be present, a collected for laboratory <u>monitoring</u> y the nature of the event led to (e.g. daily) to show otential impact and of rectification actions.	Construction contractor

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
M SW2 Surface water	Assess the effect of environmental watering on surface water quality on the floodplain and within the Murray River.	0^	Indicators are derived from the VMFRP Ecological MER plan (Sparrow et al. 2020) as covariates for enabling assessment of effects on floodplain biota such as fish during inundation events: Flow In-situ (field based) physico-chemical parameters Electrical conductivity (salinity) Turbidity Dissolved oxygen pH Temperature Visual observations for signs of severe blackwater or excessive algal growth. Parameters requiring laboratory analysis (as needs basis): • Total nitrogen • Total phosphorus • Organic carbon (dissolved and particulate) • Chlorophyll • Algal species identification and quantification (if an algal bloom occurs).	Specific monitoring programs for each project area and the process for evaluation and reporting against EDS to be developed and documented in the Operation Environmental Management Plan (EDS SW2, SW3) prior to project commencement. This will include: Monitor flow at outlet regulators Monitor changes in surface water quality across the floodplain during a managed inundation event to maximise beneficial effects and minimise adverse effects to environmental values supported by surface water in areas where sensitive environmental values exist (e.g. native fish and where throughflow to the Murray River occurs). Assess if relevant EDS are being implemented and are effective. Rates of through flow (discharge to the Murray River during the managed inundation event) should be adjusted based on the monitoring results to minimise effects of low dissolved oxygen on the Murray River. Results from managed inundation events should also be used to inform subsequent managed inundation events.	On the floodplain - site(s) to be identified at infrastructure locations and within the floodplain at locations that support sensitive receptors (for example, aquatic species or water users). Sites to be selected by CMA and may include sites already included in other monitoring programs. Within the Murray River - Upstream and downstream* of the floodplain return flow (and within the return flow prior to entering the Murray River). * immediately downstream of the floodplain return flow and further downstream if adverse effects are detected after floodplain outflows and the Murray River are mixed.	Baseline water quality will be established in the Murray River and across the floodplain (where possible i.e. for areas may be already wet) prior to the inundation event. For the Murray River, data from the MDBA RWQMP could be used. On the floodplain locations – minimum daily recording of out-flow weekly monitoring during a managed inundation event for in-situ parameters, spot monitoring for parameters requiring laboratory analysis if in-situ monitoring indicates degraded water quality that could affect sensitive values. The specific site locations will change as the event progresses and may depend on access limitations. Within the Murray River – immediately prior to drawdown from a managed inundation event then weekly during floodplain return flows for in-situ parameters in the Murray River. Spot monitoring for parameters requiring laboratory analysis if in-situ monitoring indicates degraded water quality that could affect sensitive values.	Mallee CMA
M TE2 Terrestrial ecology	To meet land manager and landowner post-construction requirements <u>for site</u> <u>condition and rehabilitation including</u> <u>vegetation cover.</u>	C & 0^	Area within Construction Footprint left as agreed with land manager and landowners.	Monitoring of topsoil redistribution, native and exotic vegetation cover, and organic litter and log cover within the Construction Footprint. <u>Monitoring of cover and diversity of native</u> <u>plant species in areas retained or</u> <u>rehabilitated with native vegetation.</u> Monitoring of weed cover following construction to identify if additional management is required to prevent an increase in Weeds of National Environmental Significance, weeds listed under the CaLP 1994 and those listed as FFG Act threatening processes.	Construction footprint with specific focus on waterways	First 12 months following construction unless specified otherwise in the Section 27 consent <u>the under National Parks Act</u> <u>1975</u> or agreed with the land manager. Subject to outcomes of monitoring, management and further monitoring may be required.	Land manager or as otherwise agreed with land manager (i.e through section 27 consent)
M TE3 Terrestrial ecology	To assess the change <u>in terrestrial and</u> <u>aquatic</u> weed occurrence and cover as a result of project environmental watering	0^	Occurrence or cover does not increase above threshold set in the Pest Plant and Animal Monitoring and Management Plan (PPAMP) for high threat weeds (i.e. Weeds of National	10x10 m vegetation quadrats to document species cover-abundance, including weeds. Monitor weeds within and adjoining the Maximum Inundation Area. This includes	Sufficient quadrats must be sampled to evaluate the statistical significance of watering effects. Quadrats should represent all	Annual for at least 15 years, with continued need to be reviewed thereafter every 3 years	Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
			Significance, designated high threat weeds, declared noxious weeds under the CaLP Act and/or weeds listed under DSE (2009) Advisory list of environmental weeds of aquatic habitats of Victoria) as a result of environmental watering.	 monitoring populations on ground and active management as required (e.g. infestations of high threat weeds using appropriate treatment techniques). This will include: Vegetation quadrat monitoring to identify species presence. 	major EVCs with sampling effort weighted according to EVC extent. The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP.	
		0^		Surveillance monitoring of weed infestation occurrence using a rapid search at specified search areas. Any other observed significant weed infestations should be added to the surveillance program search areas.	Rapid surveillance at high risk locations as specified in Pest Plant and Animal Management Plan. Report on effectiveness of pest plant control through surveillance program.	Annual for at lea continued need thereafter every
M TE4 Terrestrial ecology	To assess the change in damage to habitat from rabbits, goats, pigs and kangaroos as a result of project environmental watering	0^	Pest animal damage and/or abundance not to exceed thresholds identified in PPAMP for rabbits, goats, pigs and kangaroo within and adjacent to the Maximum Inundation Area as result of environmental watering.	Monitor old/new rabbit and pig damage and abundance of rabbit, goat and kangaroo populations. Methods to be detailed in the Pest Plants and Animals Monitoring and Management Plan (EDS E3).	Pest animal damage and/or abundance will be measured within and adjacent to the MIA. Sampling locations will be defined in the Pest Plants and Animals Monitoring and Management Plan (EDS E3). Sufficient sampling will be undertaken to detect the significance of watering effects. The significance of watering effects will be determined by comparison to control areas outside the MIA.	Frequency to be pest species in F years, with cont reviewed after e
M TE5 Terrestrial ecology	To assess the change in the abundance of cats and foxes as a result of project environmental watering	0^	Fox and cat abundance not to exceed thresholds identified in PPAMP within and adjacent to the maximum area of inundation as a result of environmental watering.	Monitor fox and cat populations. Methods to be detailed in the Pest Plants and Animals Monitoring and Management Plan (EDS E3).	Cat and fox abundance will be measured within and adjacent to the MIA. Sampling locations will be defined in the Pest Plants and Animals Monitoring and Management Plan (EDS E3). Sufficient sampling will be undertaken to detect the significance of watering effects. The significance of watering effects will be determined by comparison to control areas outside the MIA.	Frequency to be for at least 15 y need to be revie
M TAE1 Terrestrial and aquatic	To determine the level, duration and extent of the inundation during each event	O*	 Inundation of water management areas as described in the ER Chapter 6 Project description. This includes: Vinifera: Vinifera WMA – 335 ha. Nyah: Nyah WMA – 475 ha. Burra Creek: Burra North WMA - 331 ha, Burra South WMA – 74 ha. 	Monitor the: - level - duration; and - extent of managed environmental watering events.	Within Maximum Inundation Area	At an appropria event. CMA/PV to advi consistent with

	Responsibility
at least 15 years, with leed to be reviewed every 3 years	Parks Victoria
to be determined for each is in PPAMP, for at least 15 continued need to be ter every 3 years	Parks Victoria
to be determined in PPAMP, 15 years, with continued reviewed after every 3 years.	Parks Victoria
priate interval during the advise on frequency, vith current practices.	Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
M TAE2 Terrestrial and aquatic	To assess improvement in water- dependent vegetation in wetlands and floodplain lakes in response to environmental watering	0*	For wet wetlands: characteristic Plant Functional Groups (PFG) species richness meets target* characteristic PFG cover meets target * For dry wetlands, characteristic PFG species richness meets target* characteristic PFG cover meets target* *Targets to be defined in the Environmental Water Management Plan	10x10 m wetland vegetation quadrats to document species occurrence (including PFG) and cover-abundance. Saplings also counted. Number of individuals of each threatened flora also counted/estimated. <u>Transect surveys across margins of</u> <u>inundated areas to detect presence of any</u> <u>threatened flora species either within or</u> <u>adjoining the inundated area.</u>	Sufficient quadrats must be sampled to evaluate the significance of watering effects. The number of quadrats should be weighted according to the extent of EVCs. The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP sites. Quadrats should include areas of former treeless wetlands that have been recently colonised by River Red-gums. <u>Sufficient transects to sample</u> <u>habitats (within or adjoining the</u> <u>inundated area) within which have</u> <u>been assessed to be suitable for</u> <u>threatened species</u>	Annual <u>quadra</u> years, with con reviewed there <u>Transect sampleach inundatio</u> years.
M TE6 Terrestrial ecology	To assess improvement in the understorey of River Red-gum forest and woodland, Black Box woodland and Lignum shrubland in response to environmental watering	0*	For River Red Gum / Black Box / Lignum EWRC sites, characteristic PFG species richness meets target* For River Red Gum / Black Box / Lignum EWRC sites, characteristic PFG species cover meets target* *Targets to be defined in the Environmental Water Management Plan	10x10 m vegetation quadrats to document species occurrence (including PFGs) and cover- abundance. Saplings counted also.	Sufficient quadrats must be sampled to evaluate the significance of watering effects. The number of quadrats should be weighted according to the extent of EVCs. The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP sites. Quadrats should include areas where Black Box and/or Acacia stenophylla (Eumong) canopy have died.	Annual for at le continued need thereafter ever
		0*	For River Red Gum / Black Box / Lignum EWRC sites stand condition score meets target defined in the Environmental Water Management Plan	Stand condition monitored via remote sensing technique and model verified / calibrated by MER stand condition method.	Entire site.	Modelled stand reported every and 15. Ongoing field p to validate and
M TE7 Terrestrial ecology	To assess the response of native fauna species over time to environmental watering.	0*	Species richness, relative abundance, recruitment, presence of threatened/notable species is meets targets* for: Wetland birds Woodland birds Species richness, relative abundance, recruitment, extent of distribution, presence	Wetland birds – complete counts at wetlands, monitoring of breeding events (multiple counts required) Woodland birds – 20 min 2 ha counts (multiple counts required) Frogs – acoustic detectors with sufficient sampling to detect a significant effect of watering	Wetland birds, woodland birds and frogs at sites established through the MER within the MIA The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP sites.	Wetland birds - managed inunc trips). Woodland bird (spring, autum Frogs – acousti after each wate

	Responsibility
Irat sampling for at least 15 continued need to be ereafter every 3 years. npling within six months of tion event for at least 10	Mallee CMA
t least 15 years, with eed to be reviewed very 3 years	Mallee CMA
and condition to be ery five years at year 0, 5, 10 d plot data to be collected nd verify model as required.	Mallee CMA
ds – during and after every undation event (up to 6 irds – twice annually umn) istic detectors during and ratering event	Mallee CMA

ID &						
Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
			of threatened/notable species meets targets* for frogs * Targets to be defined in the Environmental Water Management Plan			Monitoring to years, with co reviewed the
M TE9 Terrestrial ecology	River Red-gum and Black Box condition does not deteriorate over time in areas susceptible to rising saline groundwater in response to environmental watering	0^	For River Red Gum trees, crown extent and/or stand condition score is the same or greater than baseline.* For Black Box trees, crown extent and/or stand condition score is the same or greater than baseline.* *Baseline quadrat data collected prior to commencement of environmental watering.	Tree condition assessment, including crown condition score either a) based on The Living Murray (TLM) method or b) crown condition index (Crome 2004). Note: location, frequency of sampling and specific parameters may be adjusted by the relevant water manager in response to adaptive management and existing programs.	 Margins of the Vinifera and Nyah Maximum Inundation Area dominated by EVC 295 Riverine Grassy Woodland and EVC 816 Sedgy Riverine Forest (as mapped in the ER Central Terrestrial Ecology Specialist Assessment) EVC 104 Lignum Swamp within the Burra Creek channel (as mapped in the ER Central Terrestrial Ecology Specialist Assessment) 	Every three ye with continue thereafter eve
M ACH1 Aboriginal Cultural Heritage	Identify potential for adverse effects to Ancestral Remains and earth mounds resulting from exceedance of population thresholds of pest and overabundant native species as a result of VMFRP environmental watering	0	N/A – determining baseline condition to inform contingency measures, if required.	Baseline assessment to be undertaken at Ancestral Remains and earth mound sites prior to environmental watering events.	The locations selected for baseline assessment will be determined in the Environmental Water Management Plan (EWMP) EWMP (or similar mechanism) process using a risk-based approach that considers locations of registered Ancestral Remains and earth mound sites and Ancestral Remains predictive mapping results overlaid with areas of proposed inundation. In addition to these sites control sites will be selected in comparable locations where environmental watering is not likely to have an effect. Exact locations to be identified by the Land Manager in consultation with the Traditional Owners and interested parties (as applicable).	Baseline asses environmenta applicable loca monitoring ev per risk-based ACH3.
M ACH2 Aboriginal Cultural Heritage	Identify potential adverse effects to specific Aboriginal cultural heritage values (Ancestral Remains) as a result of increased visitation as a result of VMFRP environmental watering	0	N/A – determining baseline condition to inform contingency measures, if required.	Baseline assessment to be undertaken at Ancestral Remains sites prior to environmental watering events.	The selection of locations for baseline assessment will be determined in the EWMP (or similar mechanism) process using a risk-based approach that considers locations of registered Ancestral Remains and predictive mapping results overlaid with areas of proposed inundation.	Baseline asses environmenta applicable loca monitoring ev per risk-based ACH3.

	Responsibility
occur for at least 15 ntinued need to be reafter every 3 years.	
ears for at least 15 years, d need to be reviewed ery 3 years.	Mallee CMA
sment prior to each l watering event at ations. Subsequent ents to be undertaken as approach outlined in EDS	Land manager Baseline assessment to be undertaken by a person appropriately qualified in archaeology or heritage management in collaboration with the Registered Aboriginal Parties/Traditional Owners and Interested Parties (as applicable).
sment prior to each I watering event at ations. Subsequent ents to be undertaken as approach outlined in EDS	Land manager The baseline assessment must be implemented by a person appropriately qualified in archaeology or heritage management in collaboration with the Registered Aboriginal Parties/Traditional Owners and

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
					In addition to these sites control sites will be selected in comparable locations where environmental watering is not likely to have an effect.	
					Exact locations to be identified by the Land Manager in consultation with the Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable).	
M ACH3 Aboriginal Cultural Heritage	Identify potential for adverse effects to Ancestral Remains and earth mounds as a result of exceedance of population thresholds of pest and overabundant native species as a result of VMFRP environmental watering	0	If monitoring (under EDS E3) identifies an exceedance of population thresholds for pest or overabundant native species, inspections of Ancestral Remains and earth mound sites to be undertaken.	This will include inspection of locations to identify effectiveness of implemented management measures (if applicable) and any change in site condition as a result of pest or overabundant native species activity in response to VMFRP environmental watering. Reporting will include a review of the causes of any change and provide recommendations for management if justified.	As necessary at sites assessed under the baseline monitoring –	Monitoring wo least one event monitoring eve Registered Abo Owners and int applicable) and (or similar mec
M ACH4 Aboriginal Cultural Heritage	Identify potential for adverse effects to specific Aboriginal cultural heritage values (Ancestral Remains) as a result of increased tourism as a result of environmental watering	0	If land managers identify locations that have been accessed and shouldn't have been (due to the restrictions), additional monitoring under this contingency measure will apply.	This monitoring will include inspection of areas potentially containing Ancestral Remains to determine if there has been unauthorised access to identify effectiveness of implemented management measures (if applicable) and report on changes in site condition directly related to the watering program. Reporting will include a review of the causes of any change and provide recommendations for management if justified.	Where necessary at sites assessed under the baseline monitoring,	Monitoring wo least one event monitoring eve Registered Abo Owners and int applicable) and (or similar mec
AI ACH1 Aboriginal Cultural Heritage	Verify compliance with the CHMP	с	Compliance check with EDS requirements	Monitoring and compliance in accordance with the CHMP No. 16902, 16900 and No. 16901 as approved under the Aboriginal Heritage Act 2006.	As required in accordance with CHMP No. CHMP No. 16902, 16900 and No. 16901.	As required in a No. 16898 and Compliance au per the program
AI ACH2 Aboriginal Cultural Heritage	Verify compliance with EDS GS2 and SW1	с	Compliance check with EDS requirements	Compliance with GS2 and SW1	Within the Construction Footprint	Compliance au per the program
AI ACH3	Verify compliance with EDS E3, GS3, SW2 and SW3	0	Compliance check with EDS requirements	Compliance with E3, GS3, SW2 and SW3	Within the Maximum Area of Inundation	Compliance au per the program

	Responsibility
	Interested Parties (as applicable).
would be required at for ent, with the number of events to be agreed with sboriginal Parties/Traditional interested parties (as and documented in EWMP nechanism).	Land manager The monitoring program must be implemented by a person appropriately qualified in archaeology or heritage management in collaboration with the Registered Aboriginal Parties/Traditional Owners and Interested Parties (as applicable).
would be required at for ent, with the number of events to be agreed with boriginal Parties/Traditional interested parties (as and documented in EWMP nechanism).	Land manager The monitoring program must be implemented by a person appropriately qualified in archaeology or heritage management in collaboration with the Registered Aboriginal Parties/Traditional Owners and Interested Parties (as applicable).
in accordance with CHMP nd No. 14330. audits to be undertaken as gram detailed in the EMF.	Construction contractor
audits to be undertaken as ram detailed in the EMF.	Construction contractor
audits to be undertaken as gram detailed in the EMF.	Mallee CMA during operation

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ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
Aboriginal Cultural Heritage						
AI AQ1 Air quality	Minimise dust during construction	с	Dust plumes from construction activities in proximity to human sensitive receptors	Environmental inspections as detailed in the CEMP which include dust observations.	At all active construction sites	Weekly during inspections
AI AQ2 Air quality	Minimise diesel emissions from pumping infrastructure	0	Pumping infrastructure involving diesel plant have not been serviced prior to installation and/or are not maintained to manufacturer specifications	Audit to check compliance with EDS AQ3 which requires all pumping infrastructure station(s) involving diesel plant to be serviced prior to installation and maintained to manufacturer specifications	Pumping infrastructure locations	Compliance a per the progra
AI AG1 Agriculture	Confirm implementation and effectiveness of measures implemented in EDS AG1 and assess the need for additional measures to minimise the impact of Biosecurity issues on agricultural land and farming operations during construction	с	Weed and pest control would be managed in accordance with the requirements of the CALP Act. It will be the responsibility of the construction contractor to manage waste (e.g. food scraps) and ensure the cleaning of vehicles and equipment.	Construction contractor: Weed and pest control mitigation and management strategies would be documented in the CEMP and implemented. This will include (but not limited to): maintenance of visitor registers, cleaning of plant and equipment prior to entering site, registers for import/export of material from site and site signage.	Construction footprint	Construction environmenta
AI GSC1 Geology soils and contamination	Confirm implementation and effectiveness of management of use of chemicals, fuels and materials during construction and assess need for additional measures	С	Visual indicators of spills or leaks Increase in concentrations of contaminants of concern between baseline and post- construction conditions. Contaminants of concern would be based on the materials used or stored in a specific location, to be determined in the CEMP.	During construction: Inspections of spill controls and bundings, plant and equipment	Lay down areas and compounds Other areas where soil or materials are handled, chemicals stored or used	Weekly inspe
AI GSC2 Geology soils and contamination	Confirm implementation and effectiveness of management of dispersive/sodic/unstable soils during construction as outlined in the CEMP and ESCP and assess the need for additional measures.	с	International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control 2008	Inspections of construction work areas for indications of erosion or sediment runoff and effective application of engineering controls	Areas of excavation and soil disturbance during construction as detailed in the Erosion and Sediment Control Plan.	Construction: event.
AI GSC3 Geology soils and contamination	Confirm implementation and effectiveness of management of soil related wastes during construction and assess need for additional measures	с	Compliance with the waste management hierarchy and the General Environmental Duties under the Environment Protection Act 2017 Compliance with EPA Publications 1827.2, 1828.2 and 1799.2 Classification of waste for off-site disposal or reuse against thresholds detailed in EPA Publication 1828.2	Construction: Check compliance with EDS CM1a. During construction, record and audit: i. type and volume of soil related wastes generated and compliance with waste management procedures and consider waste elimination/reduction and opportunities for the reuse and recycling of waste. ii. soil tracking system including trucking and destination tracking and sampling results.	All locations where waste generated (to be defined the CEMP)	Records kept Compliance a per the progra

,	Responsibility
ring environmental s	Construction contractor
e audits to be undertaken as ogram detailed in the EMF.	LMW
on contractor: weekly ental inspections.	Construction contractor
spections during construction	Construction contractor
on: weekly or after a rainfall	Construction contractor
ept during construction. e audits to be undertaken as ogram detailed in the EMF.	Construction contractor

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
AI GSC4 Geology soils and contamination	Confirm implementation and effectiveness of management of use of chemicals, fuels and materials during operation and assess need for additional measures	0	Visual indicators of spills or leaks	Inspections of spill controls and bundings, plant and equipment where used. If spills observed, undertake appropriate soil sampling as detailed/required in the OEMP.	Operation: regulators and pumps where fuel or hazardous materials are stored or used	Operation: weekly during pump operation. Soil sampling as required to address spills.	LMW/GW and Mallee CMA
AI GSC5 Geology soils and contamination	Confirm implementation and effectiveness of management of soil related wastes during operation and assess need for additional measures	0	Compliance with the waste management hierarchy and the General Environmental Duty under the Environment Protection Act 2017 Compliance with EPA Publications 1827.2, 1828.2 and 1799.2 Classification of waste of inorganics, anions, organics and pesticides against off-site disposal thresholds and other requirements detailed in EPA Publication 1828.2 Waste disposal categories – characteristics and thresholds (2021).	During operation, record and audit: i. type and volume of soil related wastes generated and compliance with waste management procedures and consider waste elimination/reduction and opportunities for the reuse and recycling of waste. ii. soil tracking system including trucking and destination tracking and sampling results.	All locations where waste generated (to be defined the Operational Environment Plan)	Records kept during construction and operation. Compliance audits to be undertaken as per the program detailed in the EMF.	LMW/GW and Mallee CMA
AI HH1 Historic heritage	Minimise risk of harm to historical heritage values at Takasuka Levee	с	Establishment of physical barrier protection and/or exclusion zones	Checks to confirm that appropriate barrier protection or exclusion zones (as detailed in the CEMP) have been established prior to construction commencing	Takasuka Levee Bank (HO186/NT B6238)	Prior to construction commencing and during weekly environmental inspections while work is being undertaken in proximity to these sites.	Construction contractor
AI HH2 Historic heritage	Verify compliance with EDS HH1.	с	Compliance with <i>Heritage Act 2017</i> for discovery of archaeological sites	Check compliance with EDS HH1 and specifically requirements for implementation of an unexpected archaeological finds protocol during construction.	Construction Footprint.	Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor during construction
AI HH3 Historic heritage	Verify compliance with EDS HH2.	0	Compliance with <i>Heritage Act 2017</i> for discovery of archaeological sites	Check compliance with EDS HH2 and specifically requirements for implementation of an unexpected archaeological finds protocol during operation.	Project area	Compliance audits to be undertaken as per the program detailed in the EMF.	Mallee CMA (in consultation with the land managers/owners) during operation
AI HH4 Historic heritage	Minimise risk of harm to historical heritage values at Takasuka Levee	C & O	Compliance with the Incorporated Document for the Project introduced through the Planning Scheme Amendment.	As required in EDS HH1 and HH2, comply with the Incorporated Document for the Project introduced through the Planning Scheme Amendment where a Heritage Overlay place is to be disturbed. Detailed recording and reporting requirements will be documented in the Incorporated Document. Inspect to check compliance with the Incorporated Document.	Takasuka Levee Bank (HO186/NT B6238)	Compliance audits to be undertaken as per the program detailed in the Environmental Management Framework.	Project partners to advise
AI HH5 Historic heritage	Minimise risk of harm to historical heritage values at Takasuka Levee	C & O	Compliance with the Incorporated Document for the Project introduced through the Planning Scheme Amendment.	As required in EDS HH1 and HH2, comply with the Incorporated Document for the Project introduced through the Planning Scheme Amendment where a Heritage Overlay place is to be disturbed. Detailed recording and reporting requirements will be documented in the Incorporated	Takasuka Levee Bank (HO186/NT B6238)	Compliance audits to be undertaken as per the program detailed in the Environmental Management Framework.	Project partners to advise

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
				Document. Inspect to check compliance with the Incorporated Document.		
AI NV1 Noise and vibration	Assess timeliness and actions taken in response to noise and vibration complaints.	С	Noise or vibration complaints from sensitive receivers (e.g. residents) located near the Construction Footprint are received.	Reviews and audits of the implementation of EDS SB1 and EDS NV1.	Project area	Response to c these are rece the Communi Engagement F Compliance as per the progra
AI NV2 Noise and vibration	All pumping infrastructure to be serviced prior to installation and maintained to manufacturer specifications	0	Pumping infrastructure has not been serviced prior to installation and/or are not maintained to manufacturer specifications	A register is kept outlining the details of maintenance associated service information. If this has not occurred then pump infrastructure to be serviced as soon as reasonably practicable to allow ongoing performance evaluation to be undertaken in line with the GED.	Pumping infrastructure locations	Compliance as per the progra
AI SB1 Social and business	Minimise the impact of the project on businesses and the community	C & O	Complaints, feedback and enquiries	Review of the implementation of EDS SB1 and SB3: The nature of complaints, feedback and enquiries received Time taken to close out complaints and enquiries Whether additional actions can be taken to address persistent complaint types Where there are opportunities identified to better communicate with or engage stakeholders. Communication processes to identify whether there are opportunities to improve.	All	Construction: Community at Engagement M Operation: in land manager procedures ar Management Engagement a Framework ar
AI TE1 Terrestrial ecology	To confirm that construction has been undertaken in accordance with EDS E1 and no unapproved vegetation is removed	с	Confirmation that no-go zones have been delineated and maintained around significant ecological values to be retained including populations of EPBC Act listed flora (if previously unidentified populations are found), FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.	The performance of EDSs would be evaluated by development and implementation of an auditing program (as detailed in the Native Flora and Fauna Construction Management Plan (EDS E2)) that would: Verify that vegetation removal is consistent with the extent of vegetation approved for removal at each site. Verify that no-go zones have been delineated and maintained to protect significant ecological values as listed in the indicator column.	Construction footprint	Weekly during inspections

	Responsibility
omplaints or feedback as eived in accordance with cations and Stakeholder Plan. udits to be undertaken as am detailed in the EMF.	Construction contractor
udits to be undertaken as am detailed in the EMF.	Mallee CMA or LMW
as specified in the nd Stakeholder Management Plan. accordance with CMA and s processes and nd Victoria's Catchment Authorities Community and Partnership nd Toolkit	Construction: LMW Operation: Mallee CMA, Land managers (DEECA and Parks Victoria), LMW
g environmental	Construction contractor

ID &						
Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency
AI TE2 Terrestrial ecology	To avoid and minimise increased weed cover during construction	С	Weed species of management concern do not increase in abundance within the construction footprint. This includes Weeds of National Significance, weeds listed under the CaLP 1994 and those listed as FFG Act threatening processes.	Pre-construction inspections of construction sites and control of high threat weeds undertaken a minimum four weeks prior to construction. Biosecurity check/inspections for plant material, seeds and soils containing organic matter in accordance with EDS E2d.	Construction footprint	Inspections of during enviro
AI TE3 Terrestrial ecology	To avoid and minimise increased presence of pests during construction	с	Presence of pests (i.e black rats, cats and foxes) does not increase in abundance within the construction footprint - evident through sightings (or motion sensing cameras near food disposal areas) or damage/ disturbance to construction laydown/office areas overnight).	All food to be disposed of in secured/locked bins and regularly cleared offsite. Sightings or damage observed.	Construction footprint, focused on laydown/office areas.	Food waste di during weekly inspections. Sightings obse
AI TT1 Traffic and transport	Verify compliance with EDS TT2 to avoid and minimise impacts on the road network	с	Compliance with the Traffic Management Plan (TMP) (EDS TT2)	Audit of compliance with EDS TT2 (TMP).	Road networks within project areas including haulage routes as detailed in the TMP	Compliance and per the progra
AI TT2 Traffic and transport	Assess impact on pavement condition of public roads.	с	Pavement condition survey	Construction site manager to undertake audits on pavement conditions as detailed in the TMP	Roads and tracks used by construction vehicles for the project including haulage routes (as defined in the TMP).	Prior to, durin construction a
l GSC1 Geology soils and contamination	Confirm suitability of soil for use	с	EPA Publication 1828.2 Fill material upper limits NEPM 2013 screening criteria relevant for protection of human health (HIL and HSL C – public open space land use) and ecological receptors (EIL and ESL for Areas of Ecological Significance) EPA Publication 655.1 Table 3: Texture based action criteria for classification of acid sulfate soil. Specific parameters to be assessed include heavy metals, pesticides, herbicides, asbestos, hydrocarbons, acid sulfate soils and geotechnical properties.	As required in EDS CM1b, detailed characterisation (sampling) of material that will be imported for use in construction in accordance with the sampling densities identified in EPA Publication IWRG701: Sampling and analysis of waters, wastewaters, soils and wastes and EPA Publication 655.1 Acid sulfate soil and rock or equivalent as updated EPA publications are forthcoming.	Borrow sites and other material source sites (if any).	Characterisati prior to comm off if investiga
l GSC2 Geology soils and contamination	Confirm presence/absence of acid sulfate soils	с	Field screening and quantitative laboratory analysis, for example chromium reducible sulfur to determine levels in accordance with EPA Publication 655.1 Acid sulfate soil	As required by EDS CM2, undertake soil samples at selected locations as identified in the acid sulfate soil management plan (ASMP). The ASMP must outline processes and procedures for identifying, reducing and minimising disturbance and oxidation of acid sulfate soils during construction.	Locations to be identified in the ASMP	To be detailed of samples pri

	Responsibility
weeds undertaken weekly nmental inspections	Construction contractor
sposal locations checked during environmental erved.	Construction contractor
udits to be undertaken as am detailed in the EMF.	Construction contractor
g and at completion of as detailed in the TMP	Construction contractor
on: encing construction (once tion sufficient)	Construction contractor
l in the ASMP. Collection or to construction.	Construction contractor