

Victorian Murray Floodplain Restoration Project

Standing Inquiry and Advisory Committee Report No. 3

ER Central – Burra Creek Floodplain Restoration Project

Environment Effects Act 1978

Planning and Environment Act 1987

7

11 October 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)

**Victorian Murray Floodplain Restoration Project Standing Inquiry and Advisory Committee - Report
No. 3 - ER Central – Burra Creek**

11 October 2023



Sarah Carlisle, Chair



Sandra Brizga, Member

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Glossary and abbreviations

Addendum Report	Burra Creek Addendum Report, June 2023
ANU Fenner School	Australian National University Fenner School of Environment and Society
AOI	Area of Investigation
AOIB	Assessment of overall improvement for biodiversity
Border	the border between Victoria and NSW
Committee	Standing Inquiry and Advisory Committee for the Burra Creek Project
DEECA	Department of Energy, Environment and Climate Action
DELWP	(former) Department of Environment, Land, Water and Planning
DO	dissolved oxygen
EDS	Environmental Delivery Standard
EES	Environment Effects Statement
EMF	Environmental Management Framework
EPA	Environment Protection Authority Victoria
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
ER	Environment Report
EVC	Ecological Vegetation Class
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
FoNVP	Friends of Nyah Vinifera Park Inc
Frood and Papas Report	Arthur Rylah Institute Technical Report <i>A guide to water regime, salinity ranges and bioregional conservation status of Victorian wetland Ecological Vegetation Classes</i> by Frood and Papas, 2016
ha	hectares
Jacobs Burra model	hydraulic model of the Burra Creek floodplain developed by Jacobs in 2014 and updated in 2017
MDBA	Murray-Darling Basin Authority
MIA	Maximum Inundation Area
ML/day	megalitres (millions of litres) per day
MNES	Matters of National Environmental Significance
N/m ²	newtons per square metre
Project	Burra Creek Project
Proponent	Lower Murray Water
RRC model	hydraulic model developed by the MDBA in 2022 and used for the NSW Reconnecting River Country project
SDLAM	Sustainable Diversion Limit Adjustment Mechanism

SIAC	Victorian Murray Floodplain Restoration Project Standing Inquiry and Advisory Committee
the Minister	Minister for Planning
VMFRP	Victorian Murray Floodplain Restoration Project
WMA	Water Management Area

Overview

Project summary

The Project	Environment Report Central (ER Central) package – Burra Creek Project.
Other ER Central projects	The ER Central package also consists of the Nyah and Vinifera Floodplain Restoration Projects. These projects were reported on in Report No. 2 of the Standing Inquiry and Advisory Committee (SIAC) dated 5 July 2023.
Brief description	The Burra Creek Project is designed to return a more natural (pre-river regulation) inundation regime to the Burra Creek floodplain. Water management infrastructure such as regulators, pumps and containment banks will be used to increase the frequency and duration of inundation, to achieve specific ecological objectives.
Project location	Approximately 54 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	<p>On 6 September 2020 the Minister for Planning determined not to require an Environment Effects Statement for the Burra Creek Project, subject to conditions including the preparation of an Environment Report (ER).</p> <p>The ER provides a description of the three ER Central projects, articulates their benefits, and assesses their potential effects on the environment. The Burra Creek Addendum Report, June 2023 (Addendum Report, see below) updates parts of the ER Central Report relating to the Burra Creek Project.</p>
Addendum Report	<p>After the ER Central report was exhibited, the Proponent identified that flood levels in the vicinity of the Burra Creek floodplain may be higher than expected due to the backwater effect of high flows from the Wakool River entering the Murray River ('Wakool effect').</p> <p>The Proponent undertook further assessment and prepared the Addendum Report to assess the implications of the Wakool effect for the Burra Creek Project.</p>
The draft Planning Scheme Amendment	Draft Swan Hill Planning Scheme Amendment C78

Standing Inquiry and Advisory Committee process

ER Central Committee – Burra Creek	Sarah Carlisle (Chair) and Sandra Brizga (Member)
Supported by	Amy Selvaraj, Senior Project Officer, Planning Panels Victoria
Directions Hearing	Video conference, 20 March 2023 (for the Nyah, Vinifera and Burra Creek Projects)
Roundtable	Video conference, 11, 16, 21, 23, 24 and 28 August 2023

Site inspection	Unaccompanied, 22 August 2023
Parties to the Roundtable	<p>Lower Murray Water (LMW, the Proponent) represented by Robert Forrester of Counsel, instructed by Clayton Utz, called expert evidence on:</p> <ul style="list-style-type: none">- 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 Chris Watson of Jacobs <p>Daniel Freitag, VMFRP Transition Project Manager at LMW gave an overview of the Burra Creek Project, existing conditions, physical context and description of proposed infrastructure and works</p> <p>Friends of Nyah Vinifera Park Inc (FoNVP) represented by Dr Jacquie Kelly</p> <p>Nicole McKay</p> <p>Peta Thornton</p>
Submitters and persons consulted	Refer to Appendix B of Report No. 2 for a list of submitters. Persons consulted were the parties listed above. See Chapter 1.7 for more detail on consultation with Traditional Owners and Interested Parties.
Citation	VMFRP SIAC Report No. 3 – ER Central (Burra Creek) [2023] PPV

Executive summary

(i) Summary

The Victorian Murray Floodplain Restoration Project

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

The natural inundation regimes of the Murray River floodplains have been disturbed by human intervention including regulation of flows in the Murray River. The overall objective of the VMFRP projects is to try and inundate various floodplains according to a more natural (pre-river regulation) regime. The projects propose to construct infrastructure to:

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

The VMFRP consists of nine projects in four packages. The Environment Report Central (ER Central) package consists of:

- the Nyah floodplain restoration project
- the Vinifera floodplain restoration project
- the Burra Creek floodplain restoration project.

This Standing Inquiry and Advisory Committee (SIAC) Report No. 3 is for the Burra Creek Project. It is to be read together with SIAC Report No. 2 dated 5 July 2023 for the Nyah and Vinifera Projects, as many of the issues are common between all three ER Central projects.

Burra Creek and its floodplain

Burra Creek is an anabranch of the Murray River extending over 50 kilometres through the Burra Creek floodplain. Its southern (upstream) junction with the Murray River is at Tooleybuc, just north of the Tooleybuc bridge. Its northern (downstream) junction with the Murray River is around 10 kilometres upstream of Wakool Junction, where the Wakool River flows into the Murray River.

Prior to regulation of flows in the Murray River, the Burra Creek floodplain would have received inundation in most years, with high flows maintaining prolonged inundation in Burra Creek and associated billabongs and low-lying wetlands. Areas of higher elevation would have also received more frequent inundation, although not in all years.

According to Lower Murray Water (the Proponent), since river regulation commenced, the reduced frequency and duration of floodplain inundation has led to a decline in the ecological condition of the floodplain including the floodplain vegetation communities and wetlands it supports. Climate change means the frequency and duration of natural inundation events is likely to decrease further, resulting in further decline in the condition of the floodplain. Managed inundation may need to occur more often in the future to achieve watering regimes that support the ecology and function of the floodplain complex.

The Wakool effect

The hydraulic modelling of the Burra Creek floodplain which informed the exhibited ER Central report (the Jacobs Burra model) was based on upstream river flows at Swan Hill. The model calculated that a flow rate of at least 30,000 megalitres per day (ML/day) in the Murray River at the Swan Hill gauge was needed to inundate the floodplain without intervention.

During the 2022 Murray River floods, the Burra Creek floodplain became inundated at a lower flow at Swan Hill. Further review by Jacobs and the Proponent revealed that in flood conditions, water levels on the floodplain are influenced by both:

- upstream flow in the Murray River (as measured at the Swan Hill gauge)
- interaction with high downstream flows entering the Murray River from the Wakool River at Wakool Junction.

The ‘Wakool effect’ occurs when high outflows from the Wakool River into the Murray River slow upstream flows down the Murray River from Swan Hill, resulting in water ‘backing up’ at the downstream end of Burra Creek. The Proponent advised that as a result of the Wakool effect, Burra Creek and the floodplain were (and are) inundated more frequently, and for longer durations than predicted in the exhibited ER.

The Wakool effect was not accounted for in the Jacobs Burra model or the Specialist Assessments of the Project’s effects and benefits, which were informed by the Jacobs Burra model. The Proponent prepared the Burra Creek Addendum Report, June 2023 (Addendum Report) which updated parts of the ER and Specialist Assessments having regard to the Wakool effect. While some new hydraulic and hydrologic assessment was undertaken to inform the updates, the Jacobs Burra model has not been updated to account for the Wakool effect.

The Project Description contains the watering objectives and strategies for Burra Creek. It has been updated to more closely replicate the natural (pre-river regulation) inundation regimes. The updated Project Description:

- does not change the infrastructure proposed, or the proposed construction methods or timing of works
- does not change the geographic extent of the Maximum Inundation Area
- *does* change the Project operational scenarios to increase the frequency and duration of inundation.

The methodology of the Jacobs Burra model, which underpinned the Specialist Assessments and the updates to the Specialist Assessments, has not been updated to account for the Wakool effect.

Submissions

When exhibited, the ER Central report attracted 14 submissions. Concerns raised in submissions generally applied across all three projects. Many submitters were concerned about the ‘artificial’ management of the floodplains and the role of the ER Central projects within the broader Murray-Darling system. Specific concerns were raised about the impact on flora and fauna and the floodplain environment. Some submitters were concerned about the consultation process and communication with First Nations people and communities.

The Committee invited further submissions in relation to the Addendum Report. Two were received – from the Environment Protection Authority Victoria (EPA) and from Environment Victoria.

A Roundtable was held in August 2023 to consider the key issues in relation to the Burra Creek Project. All parties to the Nyah and Vinifera Roundtable were invited to the Burra Creek Roundtable. Friends of Nyah and Vinifera Park Inc, Ms Thornton and Ms McKay attended the Roundtable.

The Committee's approach

The Committee has considered the exhibited ER Central report, the Addendum Report, the original submissions and further submissions, the evidence and other material put forward through the Roundtable. In accordance with its Terms of Reference it has considered the lessons learnt in the two previous processes of the VMFRP Standing Inquiry and Advisory Committee – Environment Effects Statement (EES) Central, and ER Central (Nyah and Vinifera).

Report No. 3 focuses on the issues impacted by the Wakool effect, namely hydraulics and floodplain modelling and the relationship to ecological impacts and erosion and land stability. It also considers issues specific to the Burra Creek Project. It does not repeat the analysis and findings of the Nyah and Vinifera Committee on the many common issues raised in relation to all three of the ER Central projects. Instead, this Report explains and provides cross references to the relevant parts of Report No. 2.

There are a range of issues for which this Committee directly adopts the findings and recommendations of the Nyah and Vinifera Committee. No further adjustments are required for the specific Burra Creek context, and these issues are not discussed further in this Report:

- Aboriginal cultural heritage
- Agriculture
- Air quality
- Bushfire
- Historic heritage
- Land use
- Social and business
- Landscape and visual
- Noise and vibration
- Traffic and transport.

Overall assessment

It was not demonstrated to the Committee's satisfaction that the Burra Creek Project will provide an overall benefit to the biodiversity values of the Burra Creek floodplain.

With the Wakool effect taken into account, the known hydrological requirements of existing vegetation communities on the floodplain are largely met by existing conditions, raising key questions about the need for the Project. Further, some existing vegetation communities on the floodplain will receive more inundation than recommended as a result of the updated Project Description.

Two hydraulic models are discussed in the Addendum Report – the Jacobs Burra model and the Reconnecting River Country model (RRC model). The ER and Addendum Report rely on the Jacobs Burra model.

Hydraulics on the Burra Creek floodplain are substantially and materially different to those predicted by the Jacobs Burra model, primarily because the Jacobs Burra model does not account for the Wakool effect. Despite understanding that the Wakool effect results in inundation of the

floodplain from the north (not just the south as predicted by the Jacobs Burra model), the potential effects of Project infrastructure (including containment banks) on inundation processes at the northern end of the floodplain have not been assessed.

The RRC model does account for the Wakool effect, but is not suitable in its current form to model the hydraulic conditions on the Burra Creek floodplain. Limited outputs from the RRC model were used to inform the updated surface water assessment in the Addendum Report, but the updates to the remaining Specialist Assessments continued to rely on outputs from the Jacobs Burra model. Those outputs are likely to be inaccurate for key hydraulic parameters (including depths, velocity and bed shear stress). Limited reliance can therefore be placed on these Specialist Assessments.

Aside from the doubt about the need for the Project, and the uncertainties arising from the Jacobs Burra model, the assessments undertaken to date predict that the Project will result in:

- a larger loss of native vegetation through both construction and operation compared to the Nyah or Vinifera Projects, including:
 - up to 188 Large Trees (including 76 Very Large Trees and 136 Hollow-bearing Trees) from construction and potential death of a further up to 132 Large Trees resulting from operation
 - permanent removal of up to 7.778 hectares of an endangered Ecological Vegetation Class (EVC) (EVC 103 Riverine Chenopod Woodland) through construction, with potential further loss of a small area (0.24 hectares) of Riverine Chenopod Woodland through Project operation
 - the transition of 50 hectares of Lignum Swampy Woodland on the floodplain to Lignum Swamp
- mixed outcomes for threatened flora species present or possibly occurring in the project area, as Project operation is expected to:
 - benefit 18 aquatic, floodplain and mudflat, and moisture-dependent *Flora and Fauna Guarantee Act 1988* (FFG Act) listed threatened flora species
 - have an adverse effect on 19 dryland FFG Act listed threatened flora species

For these reasons, the Committee's primary recommendation is that the Burra Creek Project not be approved.

In case the Minister does not accept the Committee's primary recommendation, the Committee has made recommendations regarding changes to the Incorporated Document and the Environmental Delivery Standards and monitoring requirements. These are largely based on the recommendations of the Nyah and Vinifera Committee, and have been modified to:

- include additional requirements that are specific to the Burra Creek context
- reflect the Minister's Assessment for the EES Central Projects.

(ii) Recommendations

The Committee's primary recommendation is:

1. The Burra Creek Project should not be approved.

The remaining recommendation is provided in the event that the Minister does not accept the Committee's primary recommendation.

2. If the Burra Creek Project proceeds:

- a) revise the Incorporated Document as shown in Appendix C**
- b) revise the Environmental Management Framework as shown in Appendix D.**

PART A: INTRODUCTION AND BACKGROUND

1 The assessment process

1.1 Introduction

The Burra Creek Project is one of the nine projects that together make up the Victorian Murray Floodplain Restoration Project (VMFRP). The VMFRP is being assessed in four packages. Burra Creek forms part of the Environment Report (ER) Central package, along with the Nyah Floodplain Restoration Project and the Vinifera Floodplain Restoration Project.

The Nyah and Vinifera Projects have already been assessed by the VMFRP Standing Inquiry and Advisory Committee (SIAC), constituted as Nick Wimbush (Chair) and Trevor Blake (Member). Sandra Brizga and Ian Hamm were Technical Advisors to the Nyah and Vinifera Committee.

Consideration of the Burra Creek Project was deferred, for the reasons set out in Chapter 1.2 below. The Burra Creek Committee was reconstituted as Sarah Carlisle (Chair) and Sandra Brizga (Member). Ms Carlisle is the Lead Chair of the SIAC. Dr Brizga was a member of the Committee considering the Environment Effects Statement (EES) Central package (the Belsar-Yungera and Hattah Lakes projects), as well as a Technical Advisor to the Nyah and Vinifera Committee, ensuring continuity in understanding between the different projects.

The Nyah and Vinifera Committee reported on those projects in SIAC Report No. 2 dated 5 July 2023. Much of the content of Report No. 2 applies to all three of the ER Central projects, including Burra Creek. This Report No. 3 does not repeat the content of Report No. 2 that applies to the Burra Creek Project. Instead, it cross references the relevant parts of Report No. 2. This Report is to be read together with Report No. 2.

1.2 Deferral of the Burra Creek Project

Chapter 1.6 of Report No. 2 explains why the Burra Creek Project was deferred, stating:

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.

1.3 Addendum Report

(i) The ‘Wakool effect’

The exhibited ER and Specialist Assessments for ER Central were underpinned by hydraulic modelling of the Burra Creek floodplain undertaken by Jacobs in 2014 and updated in 2017 (Jacobs Burra model). The modelling was based on upstream river flows at Swan Hill. It was thought that a flow rate of at least 30,000 megalitres per day (ML/day) at the Swan Hill gauge was needed to inundate the floodplain.

During the 2022 Murray River floods the Burra Creek floodplain became inundated at a lower flow rate at Swan Hill. Further review revealed that in flood conditions, water levels in the Burra Creek floodplain are influenced by both:

- upstream flow in the Murray River (as measured at the Swan Hill gauge)

- interaction with high downstream flows entering the Murray River from the Wakool River at Wakool Junction.

The Murray River carries much larger flows at Wakool Junction than further upstream at Swan Hill. Daily flows up to about 35,000 ML/day have been recorded in the Murray River at Swan Hill, whereas daily flows up to 180,000 ML/day have been recorded in the Murray River at Wakool Junction, the difference largely reflecting inflows from the Wakool River.

The ‘Wakool effect’ occurs when high outflows from the Wakool River at Wakool Junction slow upstream flows down the Murray River from Swan Hill, resulting in water ‘backing up’ at the downstream end of Burra Creek. This means the Burra Creek floodplain is inundated more frequently, and for longer periods, than indicated in the exhibited ER.

The Wakool effect does not influence the Nyah or Vinifera floodplains, both of which are located some distance further upstream of the Burra Creek floodplain.

(ii) The Addendum Report

The Proponent prepared the Burra Creek Addendum Report, June 2023 (Addendum Report) which consists of:

- a Summary Report
- Attachment 1: Updated Project Description (updated Chapter 6 of the exhibited ER)
- Attachment 2: Updated Specialist Assessments (a summary of updates to the various Specialist Assessments forming part of the exhibited ER)
- Attachment 3: Updated Assessment of Overall Improvement to Biodiversity (AOIB) (updated Attachment VII to the exhibited ER).

The Project Description includes watering regimes and objectives for the Burra Creek Maximum Inundation Area (MIA). The watering regimes and objectives¹ and operational scenarios², were updated to reflect the influence of the Wakool effect on inundation of the MIA. The updated tables are extracted in Figure 1 below.

The key changes are:

- the Seasonal Fresh operational scenario has been adjusted to achieve a median duration of inundation in the Burra Creek channel of 2.6 months (previously, it only provided for enabling through flow in Burra Creek)
- the Burra Maximum operational scenario has been adjusted to provide for three additional pumped inundation events every 10 years, and to achieve a median duration of 1.2 months
- the Burra Intermediate operational scenario has been deleted, as it is no longer needed given inundation events equivalent to the Burra Maximum operational scenario are occurring (and will occur under the revised Project Description) at a greater frequency than previously thought.

Importantly, the updated Project Description:

- does not change the infrastructure proposed
- does not change the proposed construction methods or timing of works

¹ ER Table 6.18

² ER Table 6.19

- does not change the extent of the MIA, but *does* change the frequency and duration of inundation of the MIA in the potential operational scenarios.

Figure 1 Updated Burra Creek Project Description

Table 6.18: Burra Creek watering objectives – green highlights the VMFRP objectives

Ecological Water Regime Classes	Equivalent Murray River flow threshold ¹ (ML/d) ²⁴	Watering regimes and objectives								Operational scenario that can achieve watering objectives	Additional events delivered by VMFRP ²⁵
		Frequency of watering event every 10 years				Median watering event duration (months)					
		Pre-regulation	Regulated river	Basin Plan	Basin Plan with VMFRP	Pre-regulation	Regulated river	Basin Plan	Basin Plan with VMFRP		
Seasonal Anabranch and Billabong	17,50020,000 Swan Hill	9-814	6-810	8-511	9-011	5-22.6	2-81.0	3-61.6	3-92.6	Seasonal Fresh	9 events in 10 years 1-year-in-10
Lignum Shrubland and Woodland	30,000	2.2	1.1	1.2	2.0	1.1	1.3	1.2	1.1	Burra-Intermediate	1-year-in-10
Lignum Shrubland and Woodland, Black Box Woodland and Red Gum Forest and Woodland	35,00055,000 d/stream of Wakool Junction	0-48.1	0-23.7	0-24.8	0-37.8	0-51.2	0-80.8	0-80.9	0-51.2	Burra Maximum	3 events in 10 years

¹ Flood thresholds at Burra Creek are represented by the Swan Hill gauge for flows < 25,000 ML/d at Swan Hill and by the gauge downstream of the Wakool Junction for flows >25,000 ML/d

²⁴Relating the Ecological Water Regime Classes to equivalent flow thresholds and operational scenarios is indicative only. The Ecological Water Regime Classes and operating scenarios occur over a broad range.

²⁵Subject to adaptive management requirements. Calculated as the difference between the Basin Plan and Basin Plan with VMFRP.

Table 6.19: Watering objectives, strategy and infrastructure operations for the potential operational scenarios of the Burra Creek project

Operational scenario	Watering objective	Watering strategy	Equivalent flow threshold (ML/d) ¹	Infrastructure operation
Default	No additional watering provided by the project.	Maintain prevailing catchment conditions without additional environmental watering.	Not applicable	All structures open.
Seasonal Fresh	Increase the duration of Burra Creek inundation. Allow high-river flow to generate through-flow in Burra Creek.	Allow flow peak to generate through-flow. Detain flood water and/or pump water to extend duration to a median of 2.6 months.	20,000 downstream of Swan Hill	All structures open to allow inflows. Close B1 and B2 and/or close B4 to detain pumped and flood water to achieve operational objectives.
Burra-Intermediate	Increase the frequency and duration of Lignum Shrubland and Woodland inundation.	Detain flood water to prolong inundation and potentially augment this by pumping.	20,000 to 30,000	B1, B2, B4: structures set to the height required to achieve operational objectives; (between open and 58.7 m AHD).
Burra Maximum	Increase the frequency and duration of Lignum Shrubland and Woodland, Black Box Woodland and Red Gum Forest and Woodland inundation.	Pump water to create 3 events every 10 years and achieve a median event duration of 1.2 months. Detain flood water to prolong inundation and potentially augment this by pumping.	55,000 downstream of Wakool Junction 30,000 to 35,000	B1, B2, B4: structures set to maximum level of 58.7 m AHD.

¹Relating the Ecological Water Regime Classes to equivalent flow thresholds and operational scenarios is indicative only. The Ecological Water Regime Classes and operating scenarios occur over a broad range. The operating regimes are expected to deliver water to variable heights, up to the maximum equivalent threshold nominated.

Source: Addendum Report Attachment 1 (Document B4D)

1.4 Exhibition and submissions

(i) Exhibition

Chapter 1.4 of Report No. 2 summarises the exhibition of the ER, and the key issues raised in submissions. These apply to all three ER Central projects, including Burra Creek.

The Addendum Report was provided to the Committee on 30 June 2023 (DB4A). Planning Panels Victoria uploaded the Addendum Report to the Engage Victoria website.

(ii) Further submissions

The Committee wrote to all submitters to ER Central, inviting further submissions on the Addendum Report (DB5). It received two further submissions in response to the Addendum Report, one from the EPA and one from Environment Victoria. Both raised issues in relation to the

assessment of the additional daily salt load to the Murray River that is expected to result from the revised Burra Creek operational scenarios. This issue is dealt with in Chapter 3.4. Environment Victoria's further submission also reiterated a number of issues raised in its original submission, many of which are beyond the Committee's scope and role (refer to Chapter 1.3(iii) of Report No. 2).

1.5 Roundtable

The Burra Creek Roundtable was held online in August 2023. Like the Nyah and Vinifera Roundtable, it was run on a less formal basis than a Public Hearing, structured around theme days and more opportunity for discussion and questions.

All submitters to the ER Central projects were invited to the Burra Creek Roundtable (DB5). Friends of Nyah and Vinifera Park Inc (FoNVP), Ms Thornton and Ms McKay took up the invitation.

FoNVP were critical of the fact that the Roundtable was held online rather than in person in Swan Hill. They submitted an in person Roundtable may have resulted in greater engagement from Traditional Owners and the local community. While the Committee acknowledges that this may be the case, an in person Roundtable was not practical due to limited and intermittent availability of key participants resulting from the need to defer the Burra Creek Project.

1.6 Site inspection

An itinerary for the site inspection for all three ER Central projects was provided as part of the Nyah and Vinifera Roundtable process (D3). The Proponent advised the draft itinerary for the Burra Creek locations remained appropriate, given the Addendum Report does not propose any changes to the proposed Project infrastructure.

The Committee conducted its unaccompanied inspection on 22 August 2023. The inspection was undertaken under minor flood conditions – flow in the Murray River was 22,500 ML/day at Swan Hill and 49,400 ML/day at Wakool Junction. The Committee was able to obtain access to some, but not all key locations identified on the itinerary. Some locations were inundated, and some access tracks were impassable. Nevertheless, the Committee was able to get a clear understanding of the project area and the proposed locations of project infrastructure, as well as the Wakool River.

FoNVP was critical of the fact that the Committee did not request local people or Traditional Owners to accompany it on its site inspection. It submitted that this could have resulted in the Committee having access to important local knowledge about the project area.

The Nyah and Vinifera Committee had previously provided an opportunity for input on the site inspection itinerary. No suggestions were received for the Burra Creek Project beyond the key locations identified by the Proponent. Further, a fully accompanied site inspection would have been impractical or impossible under the conditions.

1.7 Traditional Owner consultation

The Nyah and Vinifera Committee described its consultation with Traditional Owners and interested parties in Chapter 8.2 of Report No. 2. That Committee held a dedicated session for Traditional Owners and interested parties to discuss First Nations peoples' issues and concerns

with the ER Central projects. First Nations people were also in attendance most days at the Nyah and Vinifera Roundtable.

Report No. 2 provides a high level summary of the issues raised at the Traditional Owners session in Chapter 8.2. Issues related to all three of the ER Central projects (and in some cases the VMFRP projects more broadly). Issues included the need to understand the projects and their impacts on cultural heritage in the broader context of the river system as a whole, the assessment process undertaken by the Proponent for impacts on cultural heritage, and the Proponent’s consultation process. The issues raised are equally relevant to the Burra Creek Project as the Nyah and Vinifera Projects.

No Traditional Owners or First Nations people chose to participate in the Burra Creek Roundtable.

This Committee has listened to the recording of the Traditional Owners session at the Nyah and Vinifera Roundtable, and adopts the discussion and findings of the Nyah and Vinifera Committee in relation to Aboriginal cultural heritage impacts set out in Chapter 8 of Report No. 2.

1.8 The Committee’s approach

The material before the Committee is significant and includes:

- the exhibited ER Central main report, attachments and Specialist Assessments (the ER)
- the Addendum Report, including the updates to various Specialist Assessments
- the 14 submissions received in response to exhibition of the ER, plus the two additional submissions received in response to the Addendum Report
- 108 documents tabled in the Nyah and Vinifera process, 58 documents tabled in the Burra Creek process, and other documents tabled in the EES Central process and referred to by the parties to the Burra Creek Roundtable.

The Committee has assessed the Burra Creek Project on its merits, while building on the identification of key issues and lessons from EES Central and Nyah and Vinifera. It has considered in detail the SIAC’s Report No. 1 dated 24 April 2023 for EES Central, the SIAC’s Report No. 2 dated 5 July 2023 for the Nyah and Vinifera Projects and the Minister’s Assessment for EES Central released on 13 July 2023.

While the Committee has considered all issues put to it during the Burra Creek Roundtable process, it has not revisited matters that had already been addressed in Report No. 2 unless adjustments are required for the specific Burra Creek context.

For the reasons set out in this Report, the Committee recommends against approving the Burra Creek Project. It has made ‘without prejudice’ recommendations regarding mitigation measures in case the Minister does not accept the Committee’s primary recommendation. These are largely based on the recommendations of the Nyah and Vinifera Committee, and have been modified to:

- include additional requirements that are specific to the Burra Creek context
- reflect the Minister’s Assessment for the EES Central Projects.

This Report No. 3 has five parts:

- Part A: Introduction and background
- Part B: Environmental effects and benefits
 - Surface water and groundwater
 - Soils and land stability
 - Terrestrial ecology

- Aquatic ecology
- Biodiversity effects and offsets
- Matters of National Environmental Significance
- Part C: Overall Assessment
- Part D: Approvals and implementation
- Part E: Appendices.

1.9 Adoption of the findings and recommendations in Report No. 2

This Committee adopts the findings and recommendations of the Nyah and Vinifera Committee in relation to the following issues, and considers no adjustments to these are required for the specific Burra Creek context:

- Aboriginal cultural heritage
- Agriculture
- Air quality
- Bushfire
- Historic heritage
- Land use
- Landscape and visual
- Noise and vibration
- Social and business
- Traffic and transport.

Unless otherwise stated, this Committee has adopted the Nyah and Vinifera Committee's recommended changes to the Incorporated Document and Environmental Management Framework (EMF) in relation to these issues. Any changes not included in the Proponent's Day 1 version of the Incorporated Document (DB22) and EMF (DB21) are tracked in Appendices C and D of this Report. These issues are otherwise not discussed further in this Report.

1.10 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 online Roundtable, managing the document sharing platform, and providing technical support throughout the process.

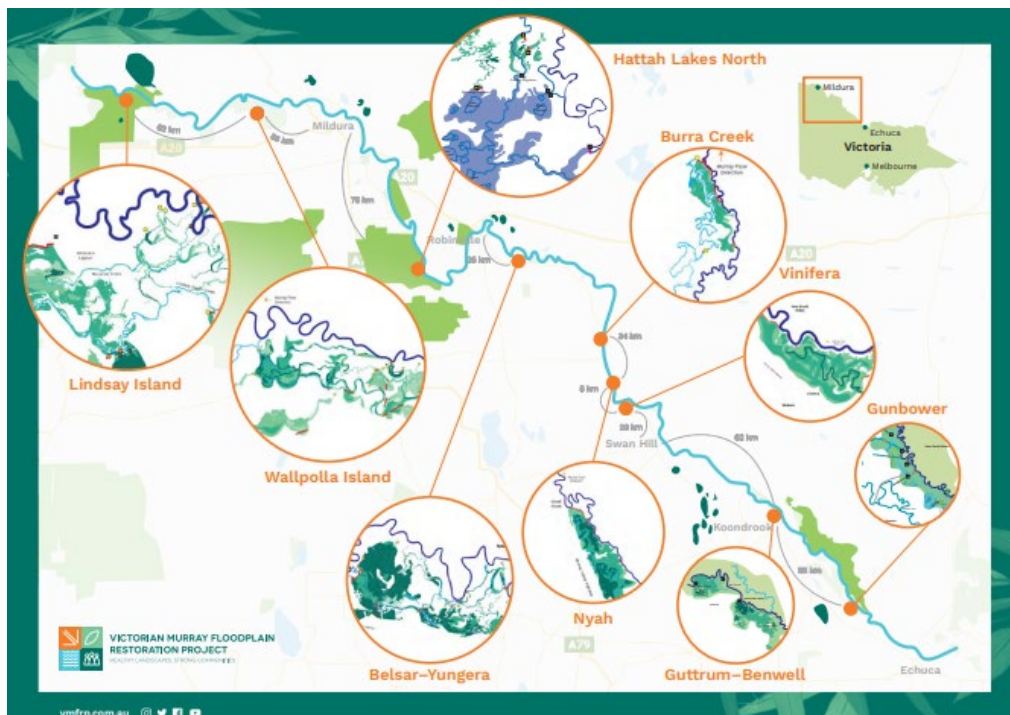
The Committee particularly thanks staff at Planning Panels Victoria for their support and assistance throughout the process, with special acknowledgement to Amy Selvaraj, Senior Project Officer.

2 The Project

2.1 Background

The Burra Creek Project forms part of the VMFRP which is a Sustainable Diversion Limit Adjustment Mechanism (SDLAM) project under the Murray-Darling Basin Plan. The Burra Creek Project can be seen in context of other VMFRP projects in Figure 2. The broader background to the VMFRP is outlined in Section 1 of the ER and section 2.1 of the EES Central Report No. 1 on the Hattah Lakes North and Belsar-Yungera projects.

Figure 2 VMFRP overview



Source: ER Section 1

2.2 Project site

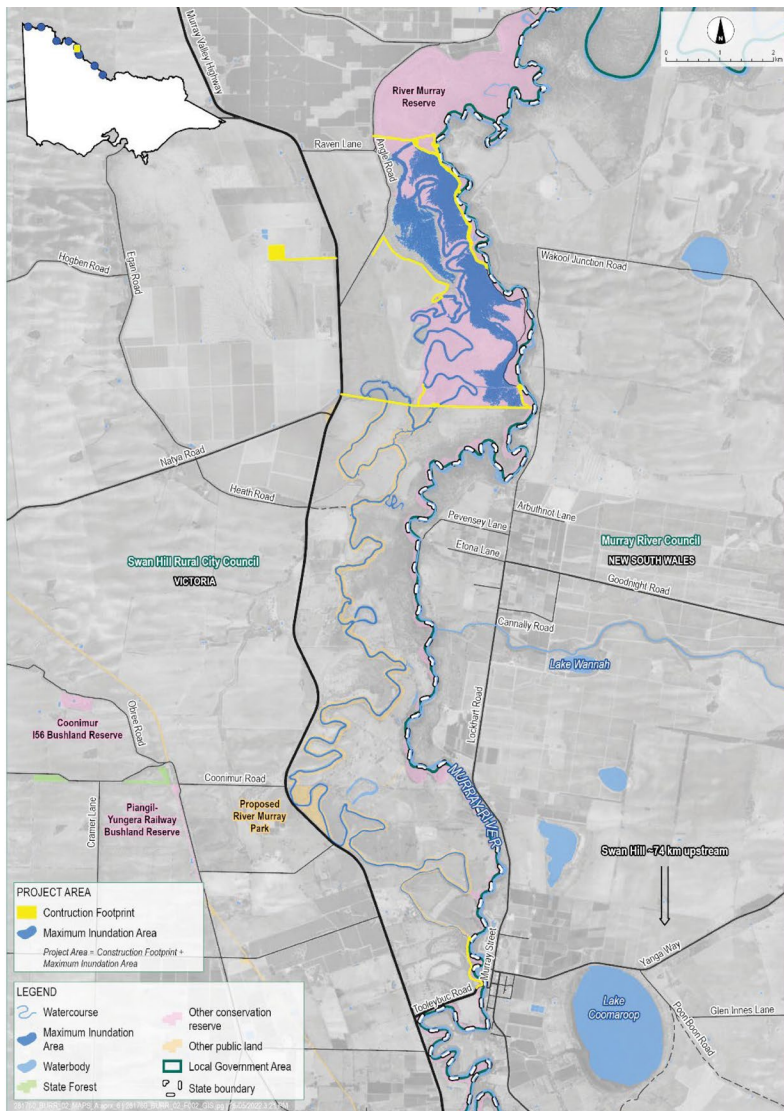
The Burra Creek project area is around 50 kilometres north-west of Swan Hill, and 25 kilometres north of the township of Nyah. It is situated on the western side of the Murray River around 10 kilometres upstream of the junction with the Wakool River.

The land between Burra Creek and the Murray River is known as Macreadie Island. The Burra Creek floodplain extends on both sides of Burra Creek, including Macreadie Island (to the east of Burra Creek), and land to the west of the creek. The topography of the floodplain is relatively flat, and includes three mapped wetlands. The northern part of the floodplain is Crown land managed by Parks Victoria under the *Crown Land (Reserves) Act 1978*, whereas the southern part is private land used for agricultural purposes, and its hydrology has been modified by irrigation and flood protection works.

The project area is shown in Figure 3. It comprises the construction footprint (containing the proposed infrastructure) and the MIA. The MIA is 403 hectares (ha), which is divided into two Water Management Areas (WMAs) by the Piambie Channel – Burra North WMA and Burra South

WMA. The Burra North WMA comprises 329 ha of high ecological value floodplain comprising of wetlands, Black Box woodland and River Red Gum forest. The Burra South WMA comprises 74 ha of wetland habitat, mainly in the Burra Creek channel and associated billabongs. Proposed inundation in the Burra South WMA is restricted to the channel of Burra Creek itself and some connected low-lying billabongs. Private land adjacent to the Burra South WMA is largely cleared and used for agriculture, and is not proposed to be inundated by the Project.

Figure 3 Burra Creek project area



Source: ER main report Chapter 1

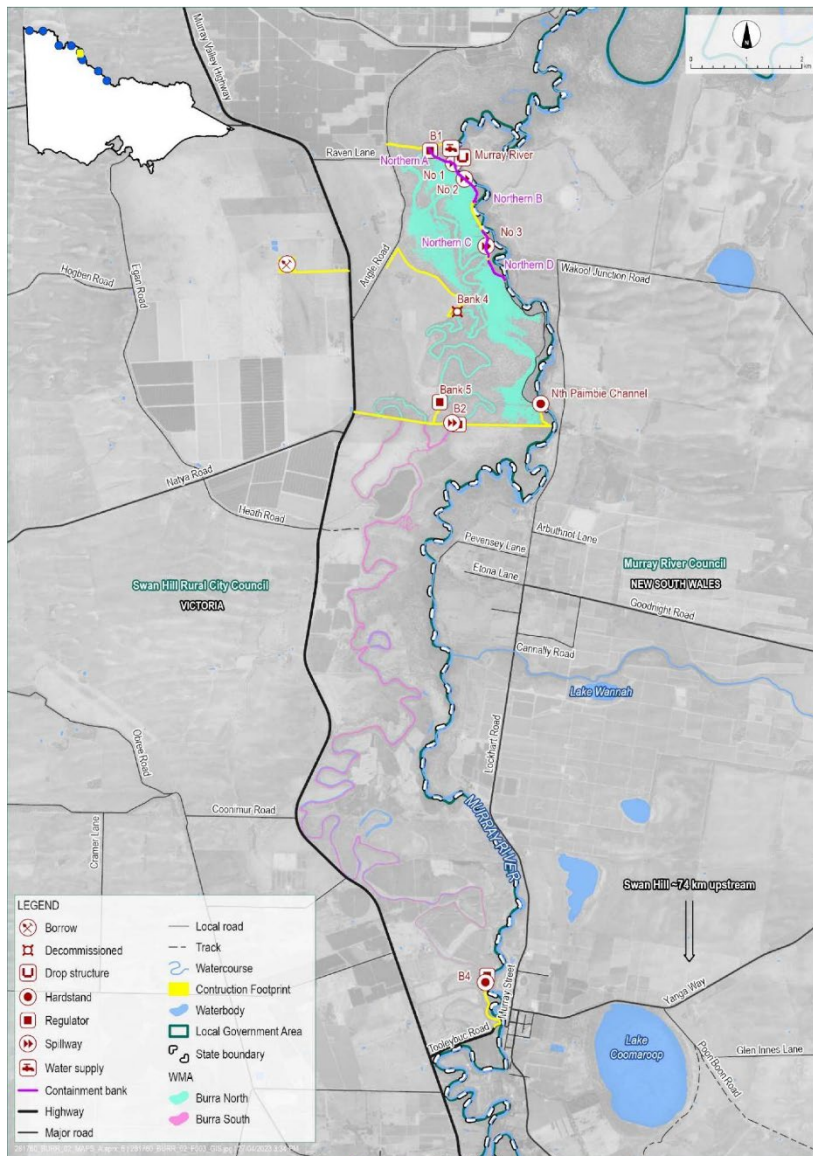
2.3 Project components

The infrastructure proposed for the Burra Creek Project is described in Chapter 6 of the ER, and shown in Figure 4. It includes:

- one large regulator (B1 main regulator)
- one small regulator (B2 box culvert regulator)
- one existing regulator (B4 pipe culvert regulator)
- 2.4 kilometres of containment banks incorporating four spillways

- a drop structure at the downstream entrance of Burra Creek into the Murray River, to provide erosion control for flows released from the B1 regulator to the river
- two permanent hardstands to be used for temporary pumps to transfer environmental water from the Murray River as required, one adjacent to the B4 regulator and the other to the north of the Piambie Channel.

Figure 4 Burra Creek Project components



Source: Addendum Report Attachment 1, Figure 6.10 (DB4C)

2.4 Project operation

The updated Project Description (Figure 1) proposes:

- increasing the frequency and duration of inundation on the Burra North floodplain (the Burra Maximum operational scenario)
- increasing the frequency and duration of inundation of the Burra Creek channel (the Seasonal Fresh operational scenario).

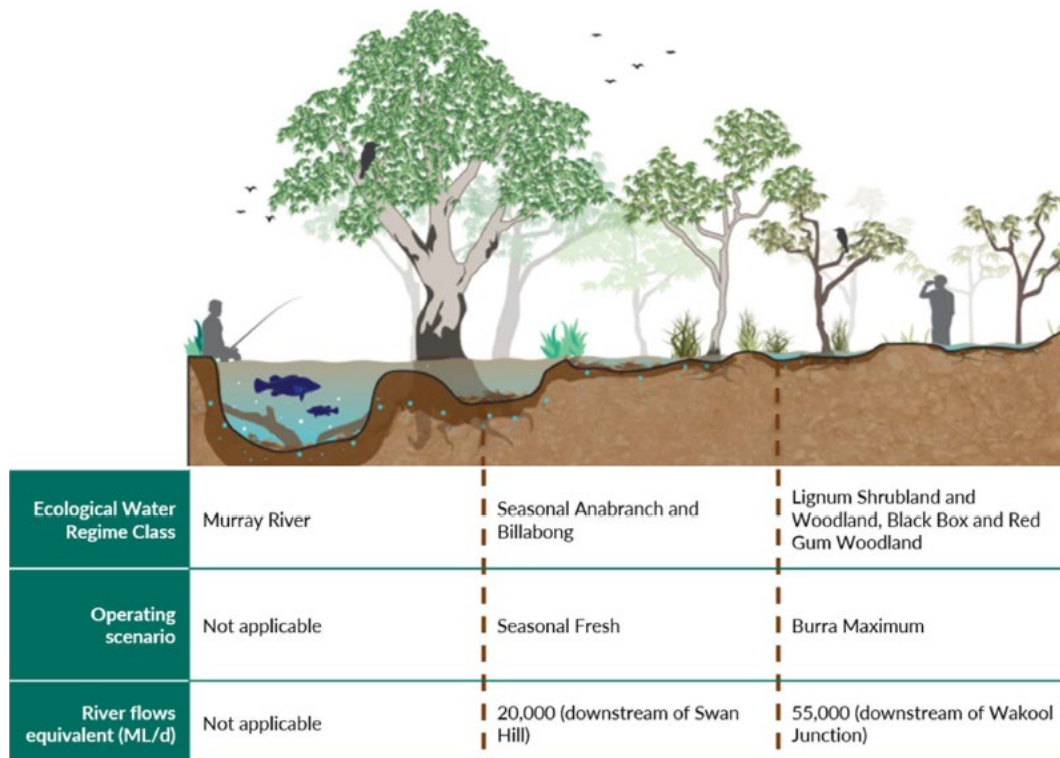
These scenarios reflect the following watering strategies:³

- Seasonal Fresh – “Allow flow peak to generate through-flow. Detain flood water and/or pump water to extend duration to a median of 2.6 months” in Burra Creek
- Burra Maximum – “Pump water to create 3 events every 10 years and achieve a median event duration of 1.2 months” on the Burra North floodplain.

Flood capture refers to a naturally occurring inundation event (rather than pumped inundation) where the water is detained by Project infrastructure to extend the event’s duration. The operational scenarios in the exhibited ER included flood capture in both the Burra Creek channel and on the floodplain.⁴

The Addendum Report does not address a flood capture scenario on the floodplain, because it says it is no longer necessary to extend the duration of naturally occurring inundation events on the floodplain (given the Wakool effect). However, the Addendum Report Attachment 1 states the Project is intended to “provide a high degree of operational flexibility enabling adaptive management principles to be implemented. Adaptability and flexibility of project operations would be critical to the successful operation of the Burra Creek Project”. Given the critical importance of operational flexibility, the Committee has considered whether flood capture would have different effects than pumped inundation of the floodplain, should it be used.

Figure 5 Burra Intermediate and Burra Maximum operational scenarios



Source: Addendum Report Attachment 1 Figure 6.11 (DB4C)

³ Addendum Report Attachment 1 (DB4C)

⁴ Addendum Report Attachment 1 (DB4C)

PART B: ENVIRONMENTAL EFFECTS AND BENEFITS

3 Surface water and groundwater

3.1 Introduction

Chapter 3.1 of Report No. 2 lists the relevant parts of the ER and Specialist Assessments dealing with surface water and groundwater. The Burra Creek specific sections are:

- ER Sections 18.1 (surface water) and 18.2 (groundwater)
- Specialist Assessment C (surface water) Part D
- Specialist Assessment D (groundwater) Part D.

The Addendum Report Attachment 2 provides revisions to Specialist Assessments C and D.

The Proponent provided the following Technical Notes:

- TN B2 – response to questions on notice (groundwater) (DB39)
- TN B6 – response to questions taken on notice (surface water) (DB48).

Additionally, the Committee had regard to:

- the Addendum Report:
 - Section 2 of Attachment 2 deals with groundwater, and updates Specialist Assessment D
 - Section 3 of Attachment 2 deals with surface water, and updates Specialist Assessment C
- relevant submissions and evidence both to this Committee and to the Nyah and Vinifera Committee
- the Proponent’s Day 1 EMF containing Environmental Delivery Standards (EDS) and Monitoring Requirements (DB21).

Table 1 lists the surface water and relevant groundwater evidence.

Table 1 Surface water and groundwater evidence

Party	Expert	Firm	Area of expertise
Proponent	Dr Simon Treadwell (DB13, DB13a and DB37)	Jacobs	Surface water
Proponent	Greg Hoxley (DB12 and DB36)	Jacobs	Groundwater

3.2 Modelling and assessment of floodplain hydraulics

(i) The issue

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

(ii) What did the ER and Addendum Report say?

The Jacobs Burra model

The exhibited ER was based on the Jacobs Burra model. The Jacobs Burra model does not extend downstream to Wakool Junction – its downstream limit is less than 1 kilometre downstream of the Burra Creek’s confluence with the Murray River. The downstream boundary conditions for the

model do not account for variable backwater from the Wakool River. Hence, the model does not simulate the Wakool effect.

The Jacobs 2017 report (DB11) warned of limitations to the Jacobs Burra model arising from the lack of model calibration. It stated that “*calibration would significantly improve confidence in the model*”, but there are no recorded water levels in the area. The available satellite images of floodplain extent were described in the Jacobs 2017 report as “*not ideal*”. It stated:

Whilst improved topographic data and observed inflows and water levels for calibration are identified as the two parameters that may have the most potential to impact the results, it was not within the scope of the current modelling study to refine either of these, nor was observed data available to undertake calibration.

The Jacobs 2017 report stated:

... it is strongly urged that the recommended works to improve the model should proceed where additional data required exists or is feasible to collect. In particular, calibration to observed events would reduce uncertainties in the model output.

The Jacobs Burra model was peer reviewed by Dr Chris Gippel who recommended a number of improvements to the model, including “*calibration to observed levels and inclusion of bathymetric data for the River Murray and key floodplain anabranches as high priorities*”. The matters raised in Gippel’s peer review were not addressed prior to the preparation of the exhibited ER, and the Jacobs Burra model remains uncalibrated.

The Reconnecting River Country model

A new Murray River hydraulic model was developed by the Murray-Darling Basin Authority (MDBA) in 2022 for use in SDLAM projects and the Constraints Measures Program, and has been used for the Reconnecting River Country project being run by the NSW Department of Primary Industries (RRC model). The RRC model covers a larger region than the Jacobs Burra model, and extends from Swan Hill to Boundary Bend. The RRC model was calibrated to the 2016 flood event, and includes representation of the Wakool effect.

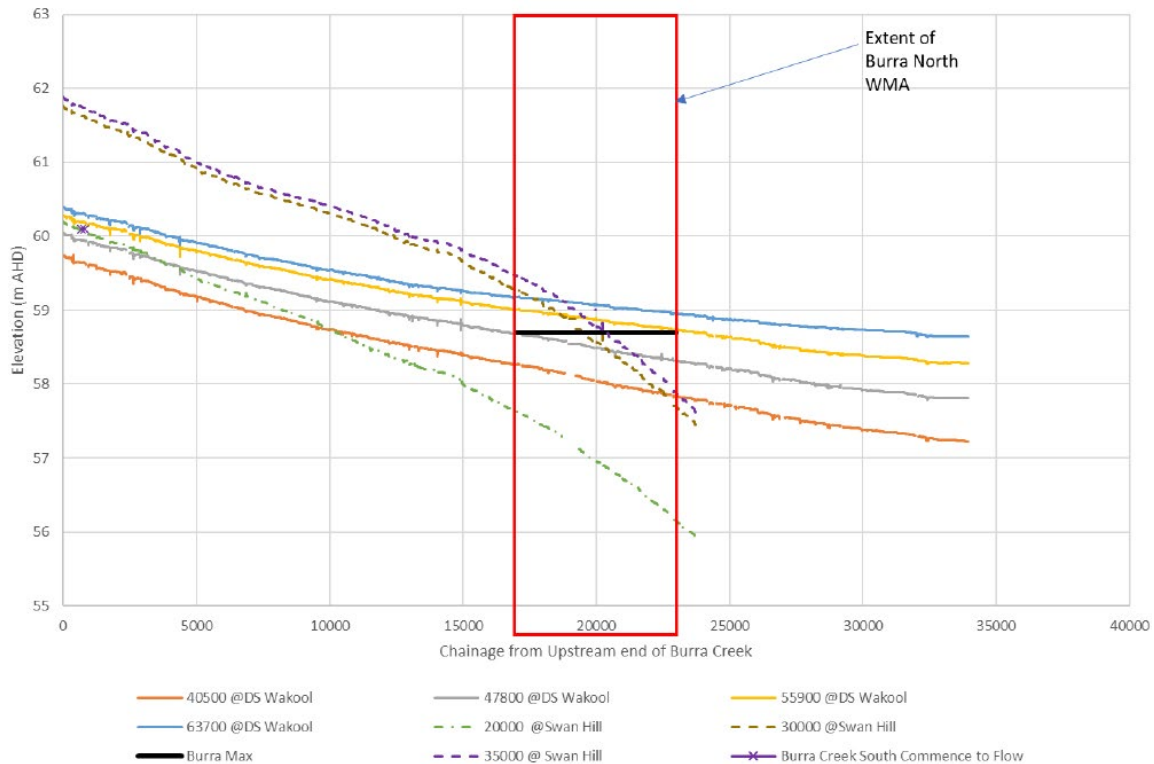
The Addendum Report presented comparisons of outputs from the Jacobs Burra model and the RRC model in relation to water level elevation profiles and other hydraulic parameters including depth, velocity and bed shear stress. It also presented comparisons of the Jacobs Burra model outputs for depth, velocity and bed shear stress under existing conditions to those in an unmanaged event, with Project infrastructure in place but regulators left open.

These comparisons were presented for events of equivalent magnitude to the revised operational scenarios, namely 20,000 ML/day at Swan Hill for the Seasonal Fresh operational scenario and 55,000 ML/day at Wakool Junction for the Burra Maximum operational scenario.

Water level elevation profiles

Figure 6 below indicates the water level elevation profiles from the Jacobs Burra model are considerably steeper than the profiles from the RRC model (as would be expected given the Jacobs Burra model does not account for the Wakool effect).

Figure 6 Comparison of water level elevation profiles for the Murray River from the Jacobs Burra model (dashed lines) and the RRC model (solid lines)



Source: Addendum Report Attachment 2 (DB4E), Figure 3.7

Floodplain inundation threshold

The floodplain inundation threshold is the flow rate in the Murray River at which the Burra Creek floodplain will be inundated. The Jacobs Burra model predicted the inundation threshold for the floodplain was a flow rate of around 30,000 ML/day at the Swan Hill gauge.

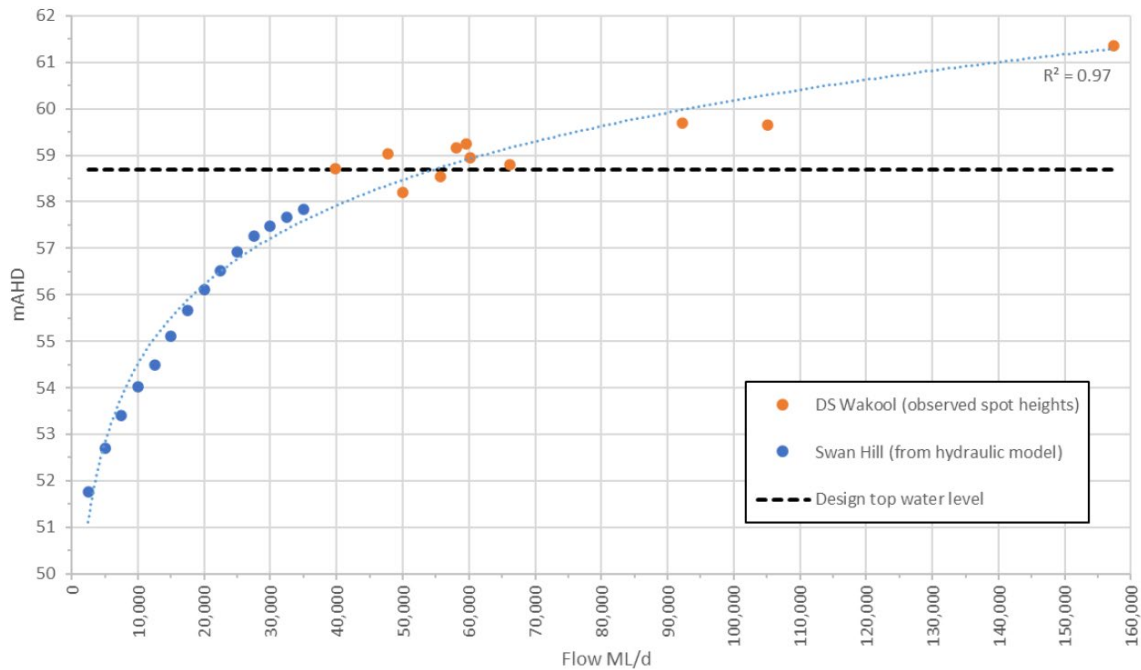
The floodplain inundation threshold needed to be reviewed and updated in light of the Wakool effect. A rating curve was developed (Figure 7) for the relationship between water levels at the northern outlet of Burra Creek, and flows in the Murray River at:

- Swan Hill (flows up to 35,000 ML/day)
- Wakool Junction (flows above 40,000 ML/day).

The Swan Hill component of the rating curve (the blue dots in Figure 7) was based on the Jacobs Burra model. The Wakool Junction component (the orange dots in Figure 7) was based on the historical extent of inundation of the Burra North floodplain observed on satellite imagery.

The rating curve shows that the inundation threshold equivalent to the proposed Project top water level (58.7 metres Australian Height Datum) was determined to be 55,000 ML/day at Wakool Junction. This was checked against and found to be consistent with the RRC model, which predicts an inundation threshold of 56,000 ML/day at Wakool Junction.

Figure 7 Rating curve for water level elevation at the northern outlet of Burra Creek based on flow in the Murray River at Swan Hill and Wakool Junction



Source: Addendum Report Attachment 2 (DB4E) Figure 3.4

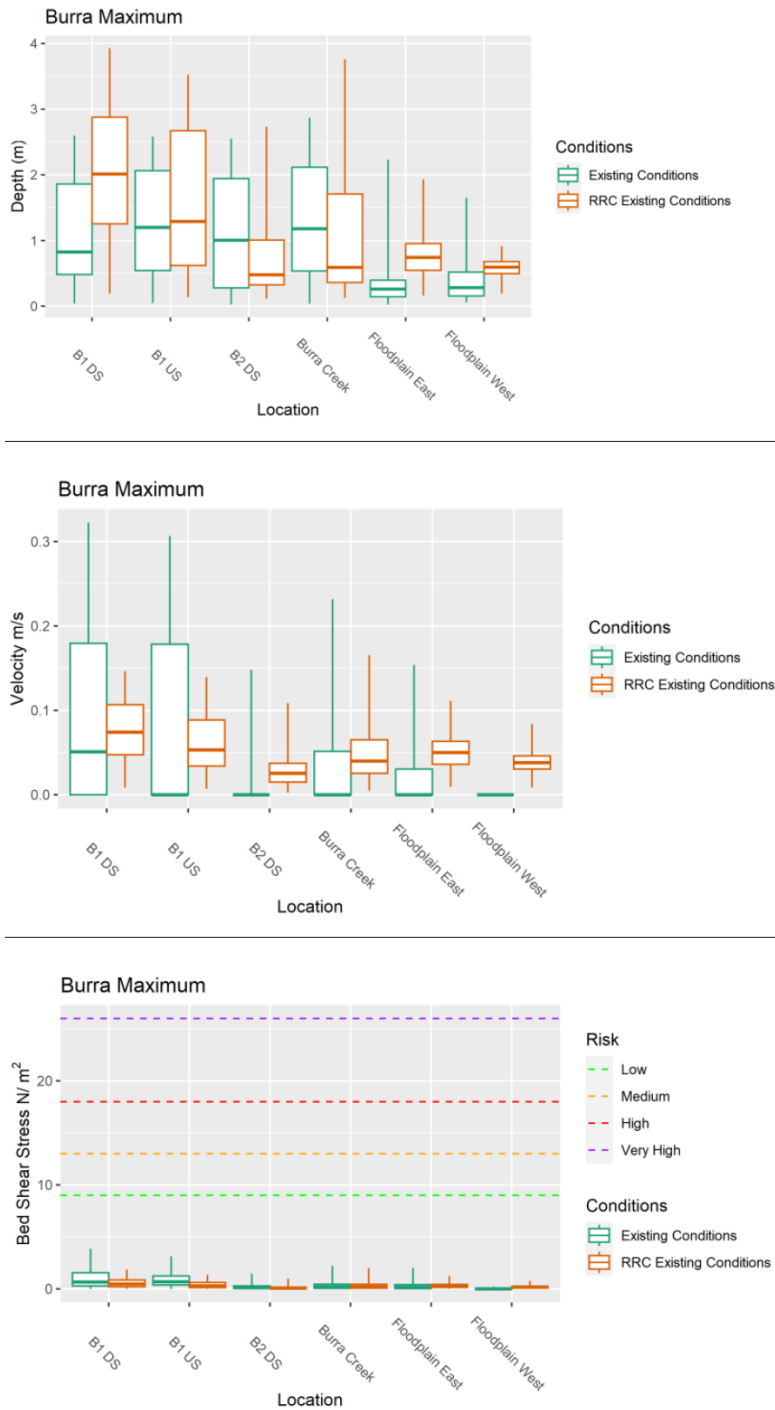
Depth, velocity and bed shear stress

Figure 8 below compares the Jacobs Burra model and the RRC model predictions of depth, velocity and shear stress for an inundation event equivalent to the Burra Maximum scenario under existing conditions. The green box plots (described as ‘existing conditions’) represent the outputs of the Jacobs Burra model and the orange box plots represent the outputs of the RRC model.

Figure 8 indicates:

- The different models generated different depths on the floodplain, particularly at the downstream end of Burra Creek.
- Depths in Burra Creek at the downstream end are likely to be higher than previously modelled by the Jacobs Burra model because of the higher downstream water level (this is most obvious in the box plots for site B1DS on Figure 8).
- Differences in depth on other parts of the floodplain are not as great, but still pronounced.
- There are some modelled differences in velocity, however overall velocities are still relatively low and indicative of a low gradient floodplain.
- For both models, bed shear stresses are predicted to be low.

Figure 8 Comparison of Jacobs Burra model (green) and RRC model (orange) - depth, velocity and shear stress for a Burra Maximum inundation event in the Burra North WMA under existing conditions

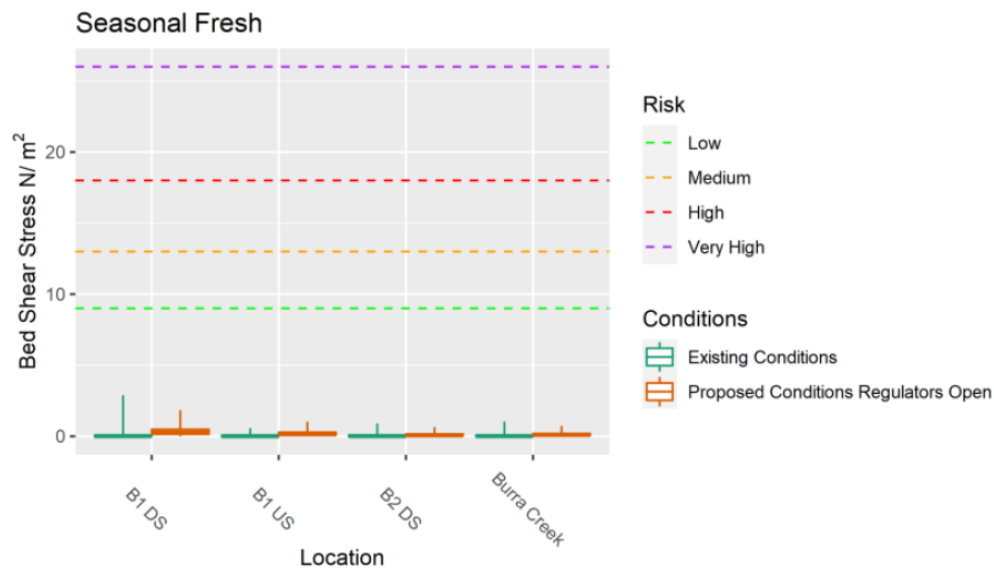


Source: Addendum Report Attachment 2 (DB4E), Figure 3.9

In the Seasonal Fresh scenario, the Burra Creek channel and connected low-lying billabongs become inundated, but not the floodplain more broadly. The Addendum Report states there is no backwater effect from the Wakool River in this scenario, so the assessment from Specialist Assessment C is unchanged. Flows are confined to Burra Creek, where increases in depth and velocity are expected due to the removal of block banks, which “creates a flowing rather than ponded waterway”.

This is shown by Figure 9, which compares velocity and shear stress under existing conditions with an unmanaged event (with the Project infrastructure in place but the regulators open). The Addendum Report does not provide information on hydraulic conditions associated with a managed Seasonal Fresh event.

Figure 9 Updated box plots for a Seasonal Fresh equivalent event (around 20,000 ML/day at Swan Hill) – velocity and bed shear stress (Jacobs Burra model)

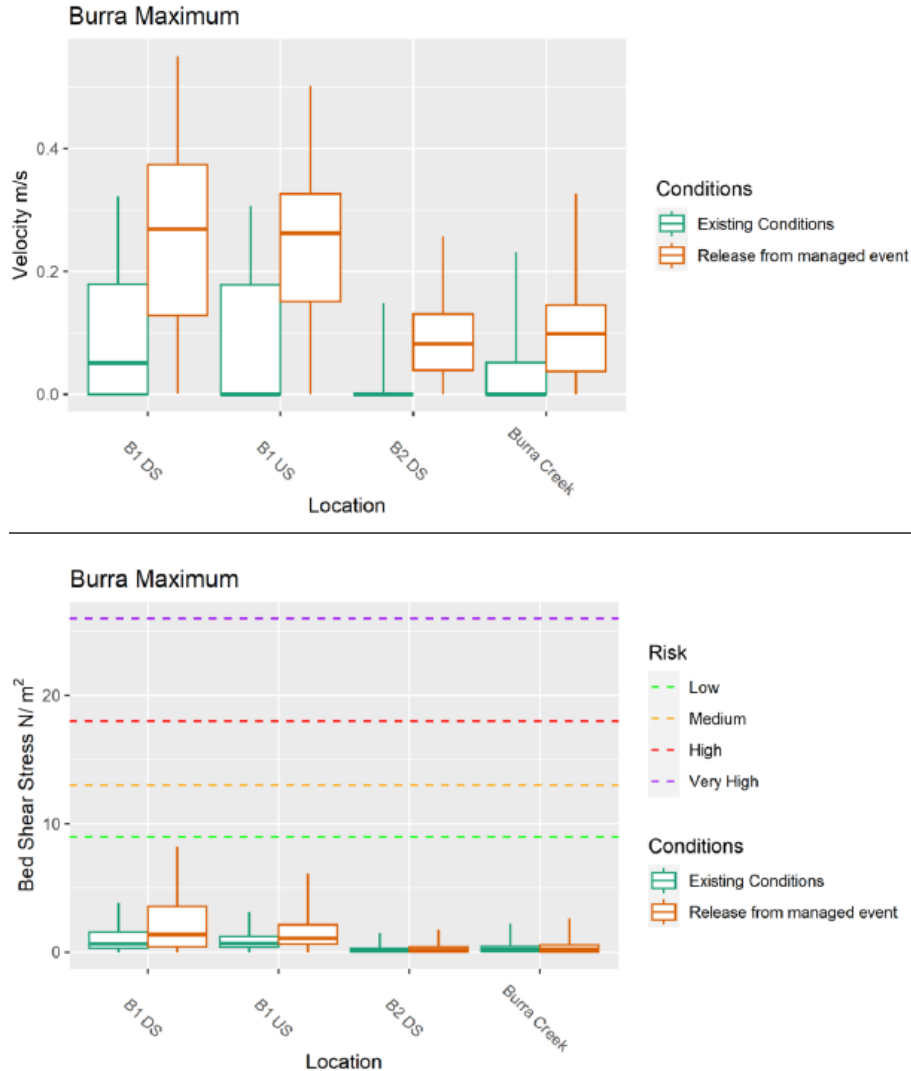


Source: Addendum Report Attachment 2 (DB4E), Figure 3.13

For the Burra Maximum scenario (where the floodplain is inundated), the Wakool effect is relevant. The Addendum Report acknowledged that the boxplots produced by the Jacobs Burra model do not reflect the influence of the Wakool effect. However, it states that the Wakool effect is not relevant for a *pumped* inundation event equivalent to the Burra Maximum scenario, because it is assumed the floodplain would be dry. During the filling and holding phases in a pumped event, the velocity would be close to zero as the water would be held back behind the B1 regulator. However, there is potential for higher velocities and bed shear stresses during the drawdown/release phase, as shown in Figure 10. In both existing conditions and an unmanaged

event, velocities are expected to be lower than predicted by the Jacobs Burra model because of the slowing effect of backwater from the Wakool River.

Figure 10 Updated box plots for a Burra Maximum equivalent event (around 55,000 ML/d at Wakool Junction) – velocity and bed shear stress (Jacobs Burra model)



Source: Addendum Report Attachment 2 Figure 3.18 (DB4E)

The updated outputs predicted that velocities in an unmanaged event will be higher than existing conditions, but bed shear stress (the main contributor to erosion) is predicted to remain below the threshold for erosion risks in both the Seasonal Fresh and Burra Maximum scenarios.

(iii) Evidence and submissions

Hydraulic models

Ms McKay (DB52) submitted:

It is of great concern that the VMFRP modellers were unaware of the backflow issue caused when the Wakool meets a high Murray.

As an engaged Councillor I was made aware of this issue by locals. There is longstanding local understanding of this phenomenon.

Other submissions in relation to the hydraulic modelling were general in nature, and applied to the modelling for all three of the ER Central projects. They are described in Chapter 3.3(iii) of Report

No. 2. None (including the further submissions) raised specific or further concerns in relation to the hydraulic modelling for Burra Creek, including the RRC modelling.

Dr Treadwell's evidence confirmed the Jacobs Burra model does not account for the backwater effect from the Wakool River. In this context, the Committee asked Dr Treadwell about the differences between Murray River water level elevation profiles from the Jacobs Burra model and RRC model upstream of the Burra North WMA (chainages 0 to 16,500 on Figure 6). A response was provided in TN B6, which stated:⁵

RRC modelled water levels at Burra South are similar to those of the Jacobs [Burra] Model at the 'commence to flow' level for the Burra South Water Management Area. As the Seasonal Fresh (20,000 ML/day) scenario is limited to bank full level, this is not anticipated to affect the extent of inundation for the Seasonal Fresh operational scenario.

This is consistent with the overlap between the Jacobs Burra model and the RRC model in the water level elevation profile for a flow of 20,000 ML/d at Swan Hill (see Figure 6 for Chainages 0 to 5,000).

TN B6 did not comment on implications of the difference in water level elevation profiles between the Jacobs Burra and RRC models for larger events, for which the difference is more than 1 metre at the upstream end (near chainage 0).

Dr Treadwell confirmed hydraulic information from the Jacobs Burra model was used in the updates to the surface water and terrestrial ecology assessments (Addendum Report Attachment 2) and the revised AOIB (Addendum Report Attachment 3). The flow event representing the Burra Maximum scenario was chosen based on having a similar inundation extent to a flow of 55,000 ML/day at Wakool Junction, even though it was known that other hydraulic parameters such as depth and velocity would not be accurately represented (because the modelling does not account for the Wakool effect).

Dr Treadwell stated it was not possible within the available timeframe to use the depth, velocity and bed shear stress outputs from the RRC model (instead of the Jacobs Burra model outputs) as the basis for revised assessments. He did not rule out the possibility of modifying the RRC model to enable it to be used to assess the Project, but was unable to identify the extent of additional work required to enable it to be used for that purpose. TN B6 notes the RRC model does not include the proposed VMFRP infrastructure. Further, the RRC model is a broader-scale model than the Jacobs Burra model, and ignores smaller flood runners and structures including culverts under existing block banks in Burra Creek.

TN B6 stated:

Further hydraulic analysis of the backwater effect may not necessarily require 'remodelling' and this issue would be appropriately addressed by the approach that was the subject of recommended EDS SW4 from EES Central. That recommendation was for further hydraulic analysis and assessment to be undertaken and for the outcomes to inform any necessary design changes prior to detailed design.

Inundation processes and flow directions

The Jacobs Burra model showed the Burra Creek floodplain is inundated from south (upstream) to north (DB11). In response to a question to Dr Treadwell from the Committee, TN B6 confirmed the Wakool effect resulted in inundation from the north (downstream) end of Burra Creek.

⁵ DB48

The Committee asked Dr Treadwell how the Project infrastructure including containment banks and spillways would alter the inundation process for the Burra Creek floodplain, given the revised understanding of existing inundation processes (in particular, inundation from the north). TN B6 stated:

The data obtained from the RRC Model and the Jacobs [Burra] Model does not include the direction of flows in and out of the floodplain. It may be possible to interpret flow scenarios to provide velocity vector (direction) information, but further consideration and investigation would be required to confirm this.

TN B6 intimated that there was limited scope for relocating the containment banks, notwithstanding their potential impact on floodwaters entering the floodplain from the north:

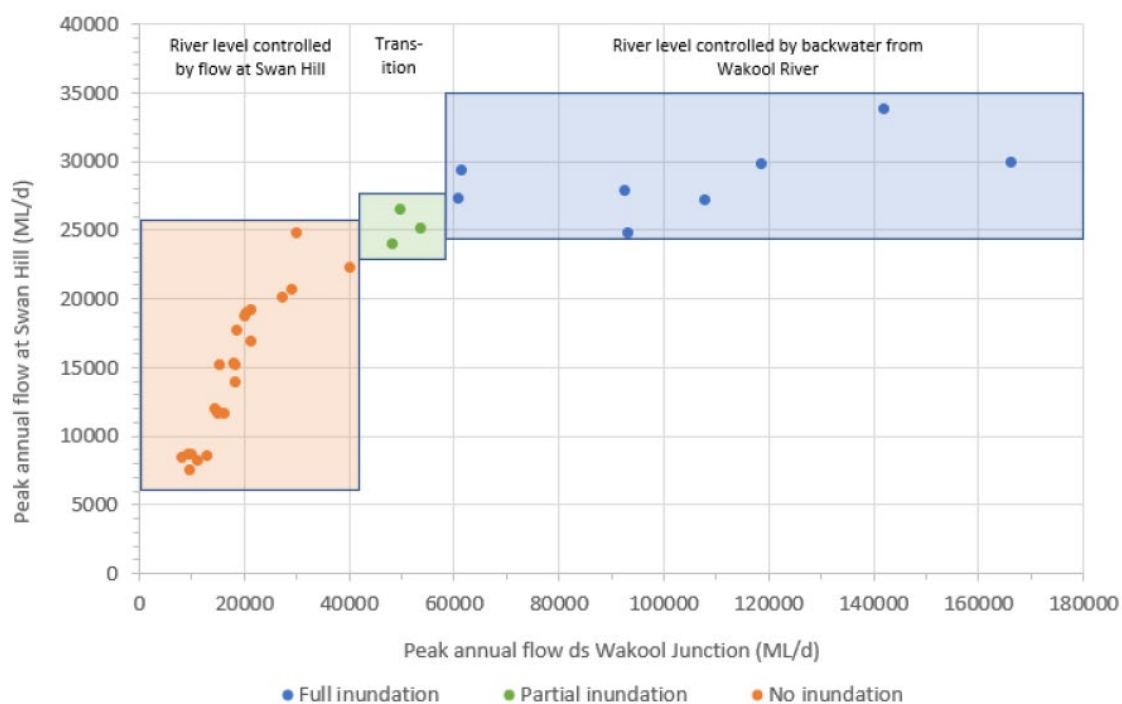
The location of the proposed containment banks has been determined based on a range of considerations. However, localised topography (i.e. high points) and the location of existing access tracks have been key considerations. For this reason, it is highly unlikely that further hydraulic analysis of the backwater effect would result in any changes to the location and alignment of the proposed containment banks for the Burra Creek Project.

Floodplain inundation threshold

The Committee asked Dr Treadwell how the rating curve in Figure 7 should be interpreted in a situation where the flow in the Murray River is less than 25,000 ML/day at Swan Hill but around 50,000 ML/day at Wakool Junction (which were the flow conditions at the time of the Committee’s site inspection). Would that result in inundation of the floodplain?

Dr Treadwell responded that uncertainties remain in the relationship between Murray River flows at Swan Hill and Wakool Junction and inundation of the Burra Creek floodplain, particularly in the ‘transition zone’ shown in Figure 11 below. For example, it was not possible to predict the extent of inundation on the Burra floodplain under the flow conditions on the day of the Committee’s site inspection.

Figure 11 Relationship between measured flow in the Murray River at Swan Hill and Wakool Junction, and inundation of the Burra North floodplain



Source: Addendum Report Attachment 2 (DB4E), Figure 3.8

(iv) Discussion

Hydraulic models

The Burra Creek Project, like the other VMFRP Projects, aims to increase the frequency and duration of floodplain inundation by manipulating floodplain hydraulics using structures such as regulators, containment banks and spillways. Given the Project is fundamentally about altering hydraulic conditions on the floodplain, a hydraulic model that is properly calibrated, and accurately represents the hydraulics of the Project area, is essential for underpinning an accurate assessment of the Project's effects and benefits.

The Jacobs Burra model does not accurately reflect hydraulic conditions on the Burra Creek floodplain because it does not simulate the Wakool effect. While the RRC model does account for backwater from the Wakool River, it is a regional flexible-mesh model. The minimum resolution in the Burra Creek project area was not reported, so it is not known whether it could be used to assess hydraulic conditions on the Burra Creek floodplain to a sufficient degree of accuracy to properly predict the Project's effects and benefits. Nor does it include any representation of the Project infrastructure.

The Jacobs Burra model was never calibrated, despite strong advice from a peer reviewer and the authors of the model that calibration would significantly improve confidence in the model. It has been demonstrated that the model is inaccurate (in not accounting for the Wakool effect). There are significant unexplained differences in water level elevation profiles between the Jacobs Burra model and the RRC model in the Murray River adjacent to the southern part of the Burra Creek floodplain, raising further questions about the accuracy of the Jacobs Burra model.

Unlike the Jacobs Burra model, the RRC model has been calibrated and validated. However, it is not suitable to underpin an assessment of the Project's effects and benefits, for the reasons stated above. In response to questions from the Committee, Dr Treadwell advised that the RRC model could potentially be modified for such use. That said, the RRC model was developed by the MDBA and used by the NSW Department of Primary Industries and may not be made available to the Proponent.

Inundation processes and flow directions

Understanding inundation processes and flow directions is important for the Burra Creek Project, due to the strong influence of backwater from the Wakool River on inundation of the Burra Creek floodplain.

The Jacobs Burra model assumed that the Burra Creek floodplain is inundated from south to north. The Wakool effect changes the understanding of how the Burra North floodplain is inundated.

Specialist Assessment C and the Addendum Report do not address the effects of Project infrastructure such as containment banks on inundation processes. Key unanswered questions include:

- Will the containment banks and raised spillways at the northern end of the Burra Creek floodplain impede the entry of floodwaters into the Burra North floodplain during unmanaged events?
- Will flood inflows into the northern part of the Burra Creek floodplain cause erosion within the MIA in the vicinity of structures that concentrate flood inflows, such as regulators and spillways?

Floodplain inundation threshold

The Committee accepts the approach to determining the revised inundation threshold for the Burra Creek floodplain, including the use of the rating curve shown in Figure 7, was adequate for the purposes of informing the updated watering objectives and strategies reflected in the revised Project Description (see Figure 1).

However, the rating curve does not provide a robust tool for determining the relationship between flow and inundation. In particular, it treats flows in the Murray River at Swan Hill and Wakool Junction as a single variable, whereas in fact they are not perfectly correlated (as can be seen from Figure 11). They should be treated as two separate variables. Flows at the two sites can differ because the Wakool River receives flows from the Wakool and Edwards systems as well as outflows from the Murray River upstream of Swan Hill, and the Murray River receives further inflows from major rivers (including the Loddon and Avoca) downstream of the outflows to the Wakool.⁶

Dr Treadwell acknowledged uncertainties in the relationship between flow and inundation in the rating curve in Figure 7. A properly calibrated hydraulic model would provide a better basis for quantifying the relationship of water levels in the Project area to inflows (measured by flows in the Murray River at Swan Hill) and backwater (influenced by water levels in the Murray River at Wakool Junction).

Depth, velocity and shear stress

The Committee does not consider the effects of the Project on depth, velocity and shear stress (and other) hydraulic parameters can be adequately assessed without a properly calibrated hydraulic model. While the Addendum Report provided updated box plots for these key parameters, they are produced by the Jacobs Burra model, which has not been updated to take account of the Wakool effect.

In relation to the Seasonal Fresh scenario, which is not affected by the Wakool effect, the Addendum Report only provided hydraulic information regarding the effects of the Project infrastructure on an unmanaged inundation event. The hydraulic effects of managed inundation (pumped and flood capture events) in a Seasonal Fresh event have not been assessed.

The updated Project Description indicates that in a managed Seasonal Fresh event, the regulators would be closed to detain pumped or captured floodwater in the creek channel, which raises questions regarding effects on depth in Burra Creek during the 'holding' phase, and velocity and shear stress in the 'drawdown/release' phase, particularly in the vicinity and downstream of the regulators.

Afflux is the increase in water level at a given location due to the presence of a structure such as a regulator, and provides a measure of increase in inundation depth as a result of the Project. The Jacobs 2014 report (DB10) presented information on afflux. The only reporting site in the Burra North WMA shows up to 2.09 metres of afflux (site WL7). The B1 regulator is proposed to be 3.7 metres high, so afflux of 2.09 metres is a credible possibility. However, neither Specialist Assessment C nor the Addendum Report discussed the likelihood, magnitude or implications of afflux.

⁶ Addendum Report page 19.

All reporting sites for afflux were near or in Burra Creek. None were on the floodplain. The Committee invited Dr Treadwell to comment on afflux. His response was that significant afflux of this magnitude (up to 2.09 metres) was only likely to occur within the Burra Creek channel because inundation depths on the floodplain were shallow.

The Committee considers the assessment of the Burra Maximum scenario in the Addendum Report is inadequate. The Addendum Report presents quantitative comparisons of unmanaged events with and without the Project infrastructure based on the Jacobs Burra model, which is known to be inaccurate for flows of this magnitude. The effects of ‘drawdown/release’ on velocity and shear stress were assessed for the Burra Maximum scenario (Figure 10), but this comparison is not likely to be conservative because the modelling of existing conditions does not account for the Wakool effect.

The effects of operation in relation to a pumped event are discussed in the Addendum Report, but are not quantified. Dr Treadwell’s evidence confirmed that a ‘regulators closed’ case was not modelled as there would be no movement in the water. The Committee considers it should have been modelled, to enable depths on the floodplain during managed inundation events to be compared with existing depths, and afflux to be determined, to properly inform the assessment of likely effects on floodplain vegetation.

General discussion

Both the EES Central and Nyah Vinifera Committees expressed concerns about the adequacy of the hydraulic assessment underpinning the environmental assessments for the VMFRP projects. This Committee shares those concerns. They are amplified in this case, as the Jacobs Burra model has been shown to be inaccurate.

The EES Central Committee found “*the EES does not adequately define the effects of the Project on floodplain hydraulics within the Project areas*”. It recommended further hydraulic assessment to confirm the effects of the projects on floodplain vegetation and to inform detailed design and operation of the projects.

Building on the findings of the EES Central Committee, the Nyah and Vinifera Committee found that while the hydraulic modelling was adequate to enable a general assessment of ecological consequences and erosion risks, it recommended further hydraulic analysis using an appropriately calibrated model prior to detailed design and implementation to:

- inform a refined assessment of the overall change in biodiversity
- provide an appropriate foundation for detailed Project design and use in adaptive management
- inform the detailed Project design to address risks of erosion and/or sediment deposition.

The Nyah and Vinifera Committee provided commentary at page 40 of Report No. 2 that more detailed modelling of the hydraulic effects of those projects is required including:

- a finer-grained analysis (at a suitable horizontal and vertical scale) of the extent and depth of inundation to better understand the implications of the Burra Creek Project for EVCs
- mapping of the depth, velocity and bed shear stress outputs of the hydraulic modelling to supplement the box plots, which may obscure significant local variations and provide limited assistance for comparing hydraulic performance

- 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 in the hydraulic modelling to adequately determine the effects of held water release on velocity and shear stress loadings.

This Committee adopts that commentary.

The inaccuracies in the Jacobs model have not been addressed by revising or replacing the model. Instead, the updates to the surface water assessment have attempted to address the deficiency in the model by a range of ‘work-around’ approaches using a limited set of outputs from the RRC model. The updates to the other Specialist Assessments and the AOIB were all based on information derived from the Jacobs Burra model.

Given the uncertainties in the model, limited reliance can be placed on the Specialist Assessments of the Project’s effects and benefits. Therefore, the Committee considers the Burra Creek Project should not be approved.

If the Minister were to disagree, it is particularly important that revised hydraulic modelling be undertaken for the Burra Creek Project before the detailed design of the Project is finalised. The revised modelling should include:

- the matters identified by the Nyah and Vinifera Committee referred to above
- assessment of the effects of Project infrastructure on inundation processes, given the updated understanding of the Wakool effect on inundation processes and flow directions on the Burra Creek floodplain
- an assessment of the full range of relevant cases (including ‘holding’ and ‘drawdown/release’) for each operational scenario.

The adequacy of the model should be confirmed by independent peer review, and issues identified by the peer reviewer should be addressed to the satisfaction of the peer reviewer.

The Committee has provided updated wording for EDS SW4 to this effect, but emphasises that its primary recommendation is that the Burra Creek Project should not be approved.

(v) Findings and recommendations

The Committee finds:

- The hydraulic modelling in the ER and Addendum Report is not adequate to enable a proper assessment of whether the environmental effects of the Burra Creek Project are acceptable, or whether the Project will deliver an overall improvement to the biodiversity values of the Burra North floodplain ecosystems.
- The Burra Creek Project should not be approved.

The Committee’s primary recommendation is:

The Burra Creek Project should not be approved.

The remaining analysis and recommendations in this Report are provided in the event that the Minister does not accept the Committee’s primary recommendation.

The Committee recommends:

If the Project proceeds, revise Environmental Delivery Standard SW4 as shown in Appendix D to include additional requirements for the Burra Creek Project that must be undertaken before the further hydraulic analysis required under SW4 is undertaken, including:

- a) **developing an accurate and properly calibrated hydraulic model for the Burra Creek project area**
- b) **obtaining an independent peer review of the hydraulic model, and making any revisions recommended by the peer reviewer to the peer reviewer's satisfaction**
- c) **using the new/revised hydraulic model to:**
 - **assess the effects of the proposed Project infrastructure on inundation processes in the Burra Creek project area during unmanaged inundation events**
 - **assess all relevant cases for each operational scenario, including 'holding' and 'drawdown/release'.**

3.3 Blackwater and algal bloom events

(i) The issue

The issue is whether managed inundation of the Burra Creek floodplain will increase the risk of blackwater and algal bloom events.

(ii) What did the ER and Addendum Report say?

Blackwater events

Blackwater events occur when organic matter in flood water is consumed by bacteria, leading to a rise in dissolved carbon in the water. The release of dissolved carbon compounds causes the water to appear black and the rise in dissolved carbon causes the sudden depletion of dissolved oxygen (DO) levels in the water.

Attachment 2 of the Addendum Report (DB4E) presents a revised assessment of blackwater effects under the updated operational scenarios for the Project, including remodelling of potential blackwater risks.

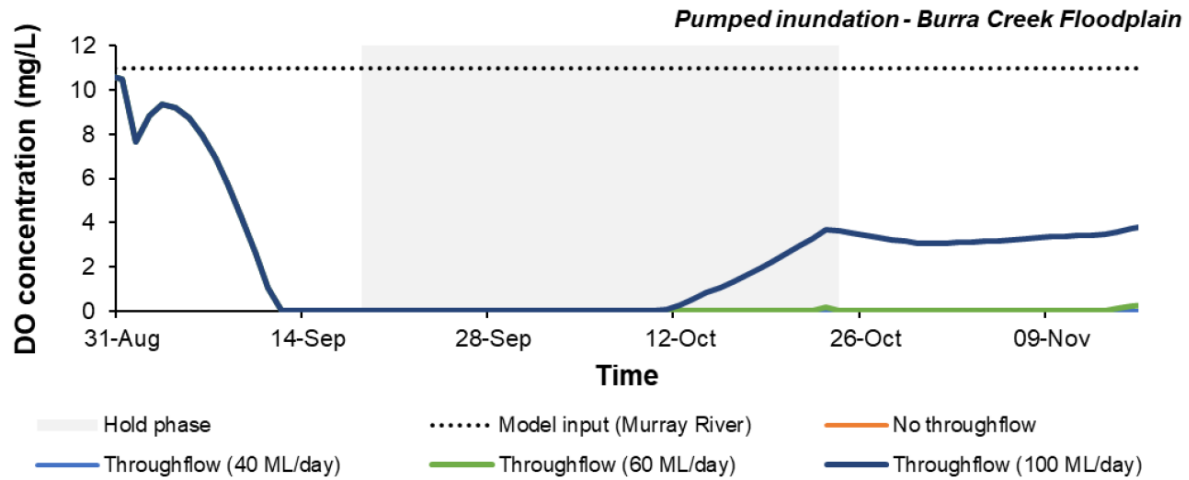
The blackwater modelling for the Burra Creek Project was undertaken using the method described in Specialist Assessment C (also used for Nyah and Vinifera), which relied on local hydraulic modelling and hydrological river system modelling as well as blackwater models.⁷ The blackwater model for the Burra Creek project area assumed the flow direction on the Burra Creek floodplain is from south to north, as represented in the Jacobs Burra hydraulic model.

The remodelling of blackwater effects focused on pumped inundation associated with the Burra Maximum scenario. The Addendum Report states that the Wakool effect is not relevant to the pumped inundation scenario, based on the assumption that pumped inundation events would only occur when the Murray River is not in flood.

⁷ The modelling is described in Appendix G to Specialist Assessment C.

Figure 12 shows the implications for DO concentration of pumped events under a range of throughflow rates. It shows that a throughflow rate of around 100 ML/day would be required to flush low DO water. However, the capacity of the temporary pumps is only 40 ML/d.⁸

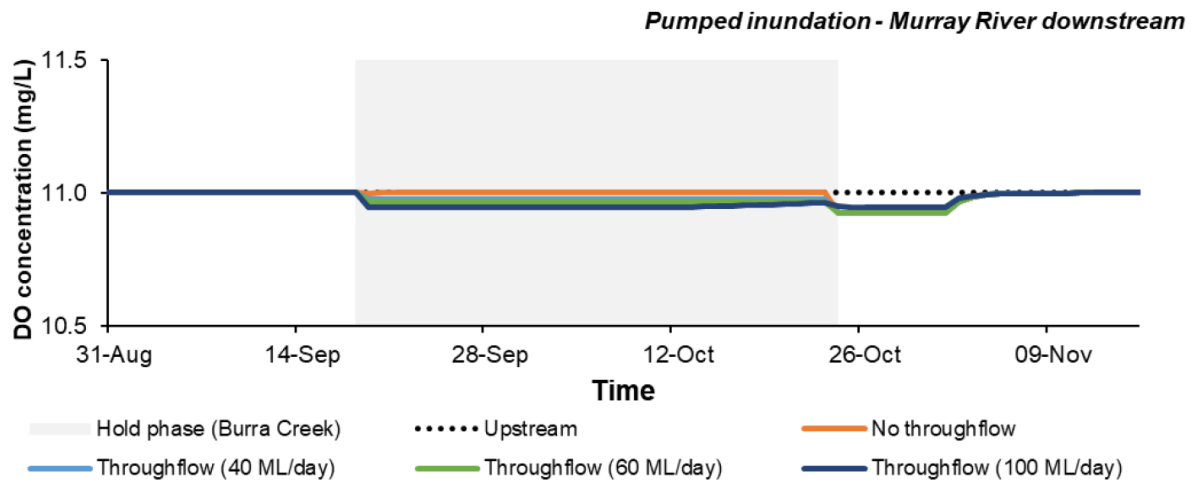
Figure 12 Dissolved oxygen concentrations on the Burra North floodplain during a pumped inundation event



Source: Addendum Report Attachment 2 (DB4E), Figure 3.22

The DO levels in the water on the Burra Creek floodplain are not expected to have a significant impact on DO conditions in the Murray River (when the water is returned to the river) because the volume of return flow water is small relative to the passing flow in the river (see Figure 13).

Figure 13 Dissolved oxygen concentrations in the Murray River associated with return flows during a pumped inundation event



Source: Addendum Report Attachment 2 (DB4E), Figure 3.23

Algal bloom events

Increased algal blooms were identified in Specialist Assessment C as a risk of the Project. However, there is no specific record of previous managed or natural flood events at Burra Creek triggering algal blooms on the floodplain or in the Murray River.⁹ The Addendum Report does not mention the risk of algal blooms.

⁸ Specialist Assessment C.

⁹ Specialist Assessment C at page 262.

(iii) Evidence and submissions

Submissions in relation to blackwater and algal bloom events were general in nature, and applied to all three of the ER Central projects. They are described in Chapter 3.4(iii) of Report No. 2. No submissions (including the further submissions) raised specific concerns in relation to the blackwater and algal bloom risks of the Burra Creek Project.

Dr Treadwell gave evidence that variable DO has been observed across the Burra Creek floodplain in unmanaged events and he expects that this would also be the case for managed events. He confirmed a throughflow rate of 100 ML/day would be required to mitigate the DO decline in pumped inundation events, and that this was larger than the capacity of the proposed pumps. Therefore it was likely that low DO would persist on the floodplain throughout a pumped inundation event.

Dr Treadwell's evidence was that, even if insufficient throughflow is available to re-oxygenate the whole floodplain, small volumes of inflow would be beneficial in terms of providing localised refuges. In addition, more frequent inundation would be beneficial for DO in the longer term by reducing the load of organic matter accumulated on the floodplain.

The Committee asked Dr Treadwell whether there were any implications for the blackwater modelling of the changed understanding of the floodplain inundation processes resulting from the Wakool effect, given the Jacobs Burra model assumed floodplain flow is from south to north. Dr Treadwell replied that this is not relevant to the pumped scenario that was modelled. However, he conceded that it is relevant to the existing situation, which has not been modelled.

Dr Treadwell's opinion was that in unregulated events, with the regulators open, the floodplain would respond in relation to blackwater in the same way as the current situation. He was not able to say whether the containment banks and spillways could impact on flow interaction between the Murray River and floodplain in unmanaged events, or whether this could make a difference to the severity of blackwater events.

Dr Treadwell advised blackwater effects in a flood capture scenario have not been reassessed and are not discussed in the Addendum Report because event duration requirements for floodplain inundation are currently being met, and flood capture is no longer required.

(iv) Discussion and findings

The Nyah and Vinifera Committee discussed blackwater and algal bloom issues in Chapter 3.4(iv) of Report No. 2. This Committee adopts that discussion in relation to Burra Creek, and agrees with the findings of the Nyah and Vinifera Committee set out in Chapter 3.4(v) of Report No. 2.

The assessment of blackwater risks in the Addendum Report focused on pumped inundation events, which are not expected to be affected by backwater from the Wakool (as they are unlikely to be implemented when the Murray River is in flood). Low or zero DO is expected but can be mitigated to varying degrees by providing throughflow. Blackwater risks associated with flood capture were not assessed in the Addendum Report because flood capture is no longer proposed in the Burra Maximum scenario. Nor was the Wakool effect, given the assumption that pumped inundation events will not occur when Murray River flows are high and the Wakool effect is present.

The Wakool effect is potentially relevant to flood capture and its implications should be considered for blackwater risks. For example, the provision of throughflow may be problematic if inflows and

outflows both occur through the B1 regulator. Further, given a high degree of operational flexibility is sought for adaptive management, the Committee considers the blackwater implications of flood capture should be considered, unless it is intended to fully exclude this mode of operation.

The Addendum Report did not assess the implications of the Project infrastructure for blackwater risks in unmanaged inundation events in view of the changed understanding of floodplain inundation processes, and Dr Treadwell was unable to provide clear advice. This issue also requires further consideration.

(v) Findings and recommendation

The Committee finds:

- If the Project were to proceed, there should be further assessment of the implications of the Wakool effect and Project infrastructure on blackwater risks, particularly in unmanaged inundation events and flood capture events (if the intention is to have the flexibility to operate the Project for flood capture).

The Committee recommends:

If the Project proceeds, insert a new Environmental Delivery Standard SW6 as shown in Appendix D to include additional requirements for the Burra Creek Project to further assess:

- a) the effects of Project infrastructure on blackwater risks in unmanaged inundation events**
- b) the effects of flood capture events on blackwater risks**
- c) further mitigation measures that may be required to minimise the impact of blackwater events.**

3.4 Groundwater and waterway salinity

(i) Issue

The issue is whether managed inundation of the Burra Creek floodplain will raise saline groundwater tables and increase the discharge of salt to the Murray River.

(ii) What did the ER and Addendum Report say?

Construction

Specialist Assessment D reported that construction of the drop structure adjacent to the Murray River is expected to intersect groundwater. Temporary dewatering will be required for a few months during construction with full recovery expected within weeks. Otherwise, there is low potential for groundwater to be intersected during project construction. The Addendum Report did not make any changes to the assessment of effects of construction as there is no change to the construction approach.

Operation

Numerical groundwater modelling of the Burra Creek project area was undertaken to quantify potential changes to water balance and groundwater levels resulting from Project operation. Simulation modelling was conducted for the period from 2000 to 2020.

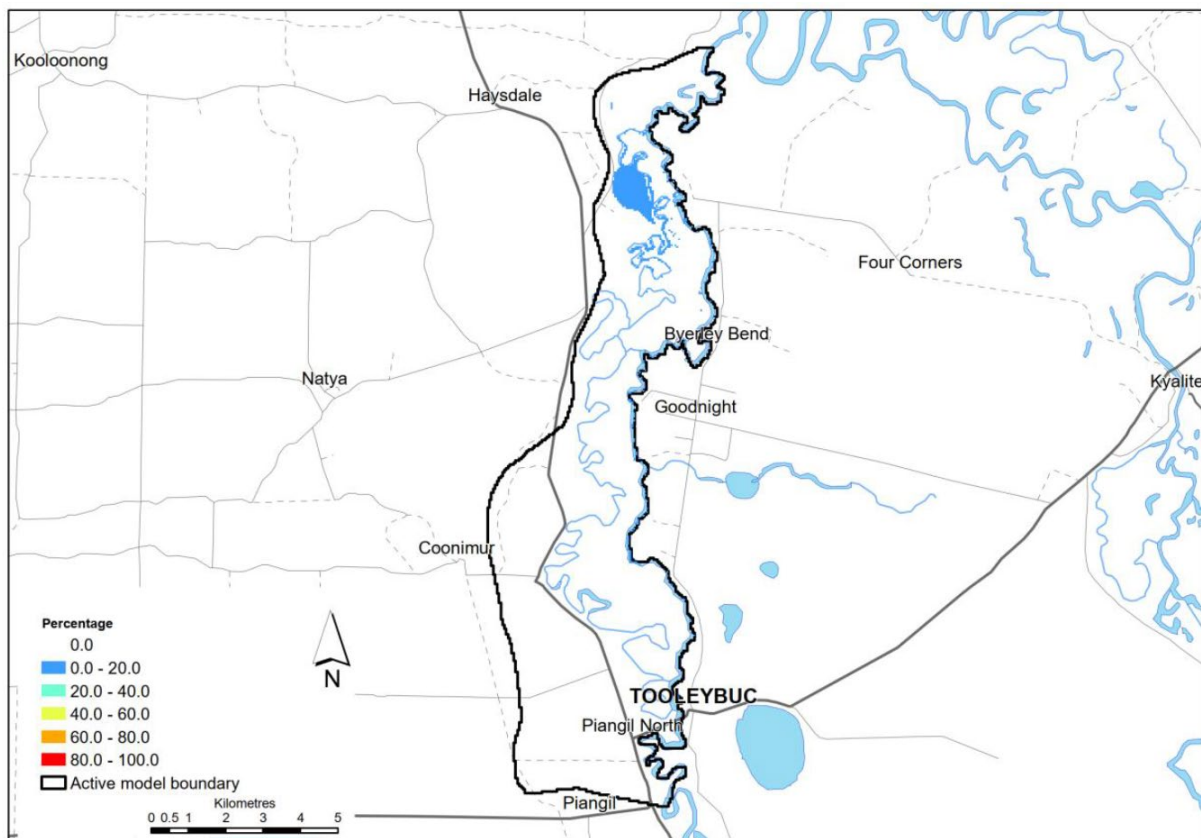
The Addendum Report indicated a number of changes were made to the model subsequent to the completion of Specialist Assessment D, including changes to:

- the modelled scenarios to represent the revised Project operational scenarios in the updated Project Description
- evapotranspiration to incorporate new information from vegetation mapping completed after the original groundwater assessment
- the maximum evapotranspiration rate from River Red Gum dominant areas.

The updated modelling predicts the Project will result in an average long term rise in the groundwater table of less than 1 metre, focussed around the northern part of the MIA. The rise in the groundwater table is associated with a small increase in evapotranspiration from deep-rooted vegetation, which is considered to be a beneficial effect.

The Project is predicted to lead to a small increase in the percentage of time that a shallow water table (less than 2 metres below the surface) is present in part of the Burra North WMA (Figure 14), resulting in a minor risk of saline groundwater.

Figure 14 Increase in percentage of time that shallow water table is modelled in the Project area



Source: Addendum Report Attachment 2 (DB4E), Figure 2.5

The Addendum Report indicated the amended Project description required recalculation of potential salinity impacts, due to the proposed increased frequency of operation and hence the potential increase in salt load. The groundwater model estimates the updated operational scenarios will result in an increased salt load to the Murray River of approximately 1,100 tonnes per year (3.1 tonnes per day). The Addendum Report Attachment 2 states:¹⁰

¹⁰ Addendum Report Attachment 2 at page 45.

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 in high flow years. ... The additional contribution from managed inundation at Burra represents ~0.73% of the annual salt load in a low flow year and would result in an increase in the salinity of the Murray River of ~3mg/L. This is ~2% 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.

The Addendum Report provided a revised estimate of the potential cumulative increase in salt loads from all VMFRP projects of around 10.6 percent (updated from 10.5 percent in Specialist Assessment C), noting that this remains a conservative estimate.¹¹

The ER noted that changes to salt loads in the Murray River are managed through the Basin Salinity Management 2030 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 Basin Salinity Management 2030 Strategy allows for long term increases in salt load to be offset by other works and measures elsewhere.

(iii) Evidence and submissions

The Nyah and Vinifera Committee summarised and reviewed evidence and submissions relating to the cumulative impacts of VMFRP (and other SDLAM) projects, including the Burra Creek Project, on salinity in the Murray River in Chapter 3.5(iii) of Report No. 2.

EPA and Environment Victoria made further submissions relating to groundwater.

EPA submitted there was an inconsistency in the reporting of the previously assessed average daily salt load to the Murray River in Attachment 2 (Sections 2.6 and 3.6) of the Addendum Report. It submitted the Proponent should be required to submit further justification of the assessment that the implications of the upward revision of the salt load increase in the Murray River will be minor, including comparison with existing conditions.

Environment Victoria's further submission argued that in order to satisfy the Scoping Requirements, further analysis must be done to investigate the cumulative impact of all VMFRP project on cumulative salt loads.

Mr Hoxley and Dr Treadwell both gave evidence that the inconsistency in the reporting of the previously assessed average daily salt load was due to a typographical error. They both advised the average daily salt load effect of the updated Burra Creek Project will be 3.1 tonnes/day compared with 2.5 tonnes/day in the exhibited ER (rather than 1.6 tonnes/day as incorrectly shown in the Addendum Report Attachment 2). Mr Hoxley explained the correct figures indicate a small increase in salinity that is only slightly above the significance threshold for reporting, which was assessed as having no ecological effects. He advised that the Burra Creek project area is in the transition zone to the Mallee, with higher salinity than Nyah and Vinifera but has a small MIA. On this basis it is not a major contributor of salinity to the Murray River.

The Committee asked Mr Hoxley how the revised groundwater modelling addressed the Wakool effect. His evidence was the groundwater model was not formally calibrated but was checked for response patterns against the general monitoring record. Mr Hoxley advised water levels in the Murray River at the Wakool Junction streamflow gauging station could not be compared directly

¹¹ Addendum Report Attachment 2, Section 3.6.

to groundwater levels because the Australian Height Datum elevation of the Wakool Junction gauging station is not known.

Mr Hoxley advised that operational risks relating to groundwater rise and salinity for the Burra Creek Project (as for the Nyah and Vinifera Projects) would be addressed by the groundwater monitoring proposed in the EMF. His evidence was the proposed groundwater monitoring sites, which are situated inside or near the Project area and already have existing groundwater monitoring wells, are sufficient to adequately determine the effects of Project operation on groundwater. Some of the monitoring wells are in the Alluvial Aquifer, which will be directly affected by the Project, while others are in the Parilla Sand Aquifer, and are relevant to assessment of potential broader groundwater effects and interactions.¹²

Mr Hoxley's evidence was that the design of the proposed groundwater monitoring program required the benefits of additional data to be balanced against the cost. In response to a question from the Committee, he agreed that an additional monitoring site targeting the area in the Burra North WMA where shallow groundwater is predicted (the area shaded blue in Figure 14) would provide useful information. However, he suggested a temporary monitoring site may suffice rather than a permanent monitoring well.

Mr Hoxley advised that annual monitoring of salinity as proposed in the EDS is sufficient to determine if the Project has any effects on salinity, because groundwater salinity in the Project area is relative stable and does not vary greatly from year to year.

In response to a question from the Committee regarding groundwater effects in relation to monitoring requirement M TE9 (monitoring of tree condition), Mr Hoxley advised that unlike the EES Central Project area, the Burra Creek project area does not have areas where trees are at heightened risk from saline groundwater.

(iv) Discussion

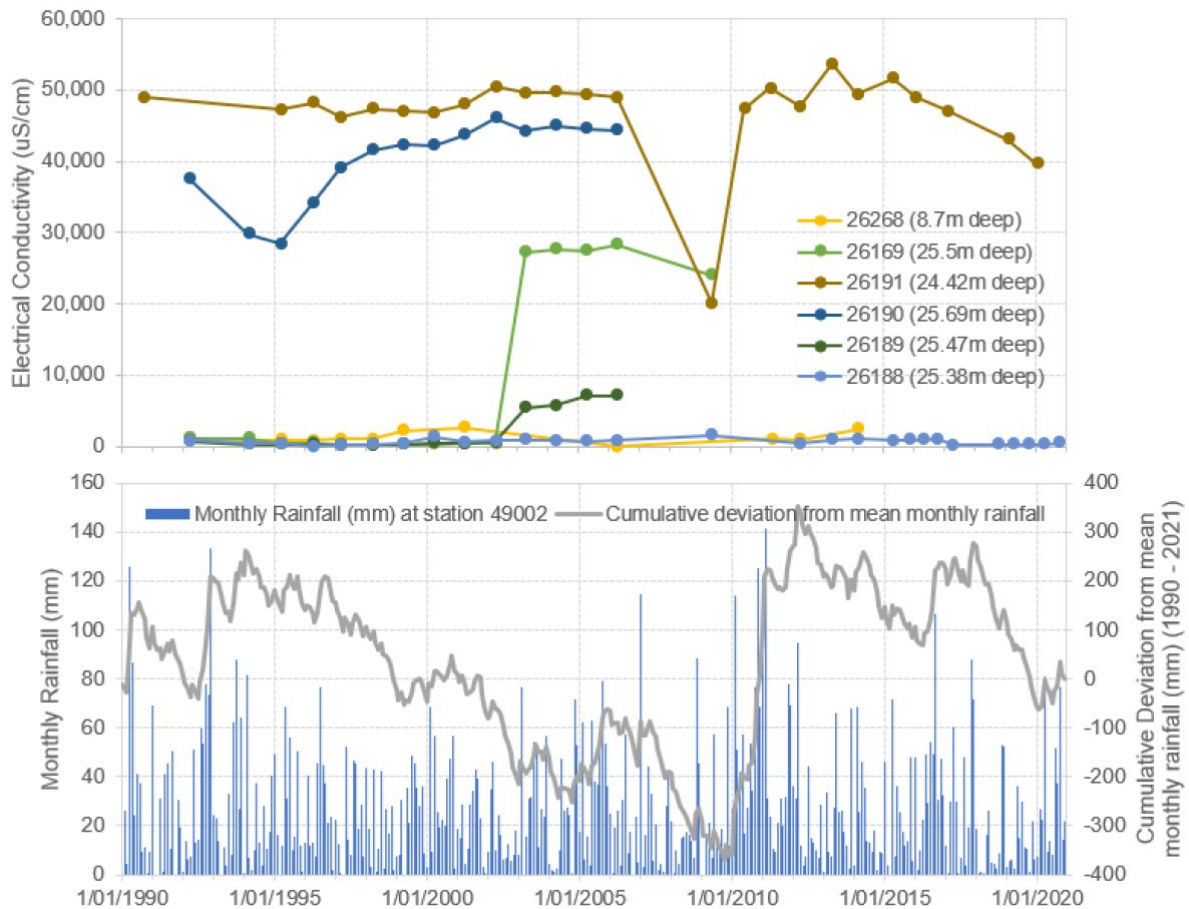
The Nyah and Vinifera Committee discussed groundwater and waterway salinity issues in Chapter 3.5(iv) of Report No. 2. This Committee adopts that discussion in relation to Burra Creek, and agrees with the findings of the Nyah and Vinifera Committee set out in Chapter 3.5(v) of Report No. 2, with the following qualifications:

- There are more existing groundwater monitoring wells in and near the Burra Creek project area than for the Nyah and Vinifera Projects, providing a better baseline.
- There is no need for specific additional groundwater monitoring to be aligned with proposed monitoring of tree condition in M TE 9, based on the advice of Mr Hoxley that the Burra Creek project area does not have areas where trees are at heightened risk from saline groundwater.

The Committee agrees with the Nyah and Vinifera Committee that it would be prudent to monitor salinity monthly. It notes Figure 11.10 in Specialist Assessment D (extracted in Figure 15) shows that groundwater salinity appears relatively stable at some monitoring sites, consistent with Mr Hoxley's advice, but at other sites there have been sharp changes.

¹² TN B2 (DB39) lists the aquifers associated with each monitoring well.

Figure 15 Groundwater salinity levels measured in the Burra Creek project area



Source: Specialist Assessment D, Figure 11.10

The Committee examined the location of the proposed monitoring wells listed in TN B2 (DB39) using the map of existing and proposed monitoring wells in Mr Hoxley’s expert witness statement and the Victorian Water Measurement Information System.¹³ Two of the wells to monitor the shallow Alluvial Aquifer are situated in the MIA of the Burra North WMA and three are situated on the Burra South floodplain near Goodnight. The other monitoring wells are situated outside the project area and/or monitor the Parilla Sand Aquifer. There are no monitoring wells within the area identified in the Addendum Report as being at risk of shallow groundwater table. The Committee recommends that an additional groundwater monitoring well be established in the Alluvial Aquifer within this area to monitor this risk.

In relation to EPA’s submission regarding inconsistency in the reporting of salt loads, the Committee accepts Dr Treadwell and Mr Hoxley’s evidence that the inconsistency was due to a typographical error that has now been corrected.

In relation to the broader issues regarding effects on salt loads in the Murray raised by EPA and Environment Victoria, the Committee notes that the contribution of the Burra Creek Project to the total salt load of the Murray River (3.1 tonnes/day) is almost as large as the combined contribution of the Nyah and Vinifera Projects (3.2 tonnes/day). However, it is satisfied this can be satisfactorily managed under the BSM2030 framework as indicated in the ER.

¹³ Available at <https://data.water.vic.gov.au/>

(v) Findings and recommendation

The Committee finds:

- The Burra Creek Project would make a larger contribution to salinity loads in the Murray River than Nyah or Vinifera, but still a relatively minor contribution to the cumulative salt loads and salinity levels in the river from the combined VMFRP projects.
- If the Project were to proceed, an extra groundwater monitoring site should be included in the part of the Burra North WMA that is at risk of a shallow water table.

The Committee recommends:

If the Project proceeds, revise Monitoring Requirement M GW1 as shown in Appendix D to require an additional bore site to monitor groundwater in the part of the Burra North Water Management Area that is at risk of a shallow water table.

4 Soils and land stability

4.1 Introduction

Chapter 4.1 of Report No. 2 lists the relevant parts of the ER and Specialist Assessments dealing with erosion and land stability. The Burra Creek specific sections are:

- ER Section 18.3
- Specialist Assessment C (surface water), Part D and Appendix E
- Specialist Assessment E (geology, soils and contamination), Part D.

The Proponent provided the following Technical Notes:

- TN B4 – Riparian buffer areas (DB43 and DB44)
- TN B6 – response to questions on notice (surface water) (DB48).

Additionally, the Committee had regard to:

- the Addendum Report:
 - Section 3 of Attachment 2 deals with hydraulics and geomorphology, and updates Specialist Assessment C
 - Section 6 of Attachment 2 deals with geology, soils and contamination, and concludes no changes were required to Specialist Assessment E
- relevant submissions and evidence both to this Committee and to the Nyah and Vinifera Committee
- the Proponent’s Day 1 EMF (DB21).

No specific soil or land stability evidence was called at the Roundtable, although Dr Treadwell addressed the hydraulic aspects of erosion risks in his expert witness report and presentation (DB13, DB13a and DB37).

4.2 What did the ER and Addendum Report say?

(i) Geomorphology of the Burra Creek project area

The geomorphology of the Burra Creek project area consists of alluvial and floodplain deposits of the ‘Northern Riverine Plain’, which are bordered by dunefields to the west and the Murray River to the east. Sodic and dispersive soils are widespread in the project area, and there is a high probability of acid sulfate soil in the eastern parts of the construction footprint and MIA.

The Burra Creek geomorphic assessment (Appendix E to Specialist Assessment C) reported that the MIA is a low gradient, low energy environment. However, it drew attention to active bank erosion in the Murray River, reporting that at one location within the Project area, the access track is located less than 10 metres from an actively eroding bank. It warned that “*bank erosion is a risk to project infrastructure*”.

(ii) Erosion impacts of the Project

The Burra Creek Project is expected to generate positive outcomes for soils and landform stability by improving soil structure and the soil’s ability to support vegetation. Improved vegetation cover is expected to stabilise soils and reduce erosion. There is, however, the potential for some adverse residual effects.

Operation of the Project would involve managed inundation in areas with soils susceptible to dispersion, erosion and instability and which are typically saline. Like the other ER Central projects, the main operational erosion risks are expected to occur during the opening and release phases of managed inundation events, particularly downstream of the B1 regulator. Residual effects (all of which are assessed as low or insignificant) include mobilising soil contamination or acid sulfate soil, and increased dispersion of sodic soils resulting from inundation events.

The exhibited ER assessed the residual erosion effects of the Burra Creek Project as ‘low’. The Addendum Report states that erosion effects are unlikely to be significantly changed by the Wakool effect. Specifically, effects are:

- unchanged during pumped inundation events, as there is expected to be no backwater effect from the Wakool River during a pumped event
- lower in an unmanaged inundation event, as the Wakool effect would result in a smaller velocity differential between the Murray River and lower Burra Creek (noting that both velocities and bed shear stress at Burra Creek are modelled as low, indicative of a low gradient floodplain).

(iii) Works within the riparian corridors

The Project Detail Maps in the ER (Attachment 1) indicate that parts of the construction footprint are situated within 30 metres of the banks of the Murray River and Burra Creek. However, the ER and Addendum Report do not include any specific assessments or mitigation measures in relation to the effects of the Project on the riparian corridors.

The Committee asked for further detail in relation to the project works proposed within the 30 metre riparian corridors. The Proponent provided Technical Note TN B4 (DB43 and DB44) in response.

4.3 Assessment of erosion risks

(i) Issue

The issues are whether erosion risks have been adequately assessed and are acceptable.

(ii) Submissions and evidence

Submissions to the exhibited ER raised general concerns in relation to erosion, which are summarised in Chapter 4.2(iii) of Report No. 2. No submissions raised specific issues in relation to erosion or land stability risks at Burra Creek.

Dr Treadwell gave evidence that the Jacobs Burra model predicted very low bed shear stress, resulting in a low erosion risk. The Wakool effect means that existing inundation depths at the downstream end of Burra Creek are likely to be higher than originally predicted and existing velocity and shear stress lower than predicted.

(iii) Discussion

General issues

On its site inspection the Committee observed locations along the banks of the Murray River in the Burra Creek project area that are affected by erosion. This is similar to the river banks in the Nyah and Vinifera project areas.

The Burra North floodplain has a low gradient, which reduces the hydraulic erosion risk on the floodplain. That said, sodic soils (which are widespread in the Burra Creek project area) are particularly susceptible to erosion. Erosion risks can be increased by disturbing the soil (through construction of infrastructure), and by water moving over the soil.

The Nyah and Vinifera Committee recommended a number of general revisions to various EDSs to better characterise and address soil stability, erosion and sedimentation risks. These recommendations apply equally to Burra Creek, however in view of the widespread occurrence of sodic soils in the Burra Creek project area, the Nyah Vinifera Committee's version of EDS CM1c should be amended to clarify that targeted soil sampling should include locations subject to soil hazards such as sodic and dispersive soils (rather than just contamination).

Bed shear stress and velocities

Erosion can be caused by high bed shear stress. Bed shear stress is related to water depth and velocity.

Specialist Assessment C established the following erosion thresholds for the Project area:

- no erosion risk if bed shear stress is under 9 N/m²
- low erosion risk if bed shear stress is between 9 and 13 N/m².

Anticipated velocities, depths and bed shear stress were estimated using the Jacobs Burra model. The modelling predicted that the highest velocities during drawdown from a managed inundation event would occur in Burra Creek upstream and downstream of the B1 main regulator.

The modelling results are set out in Specialist Assessment C.¹⁴ The initial assessment used a flood event equivalent to 20,000 ML/day at Swan Hill to represent a 'Burra Intermediate/Burra Maximum' operational scenario. The results were updated in the Addendum Report based on the revised Project description, using a flood event equivalent to 55,000 ML/d at Swan Hill to represent the 'Burra Maximum' scenario. The updated results do not account for the Wakool effect.

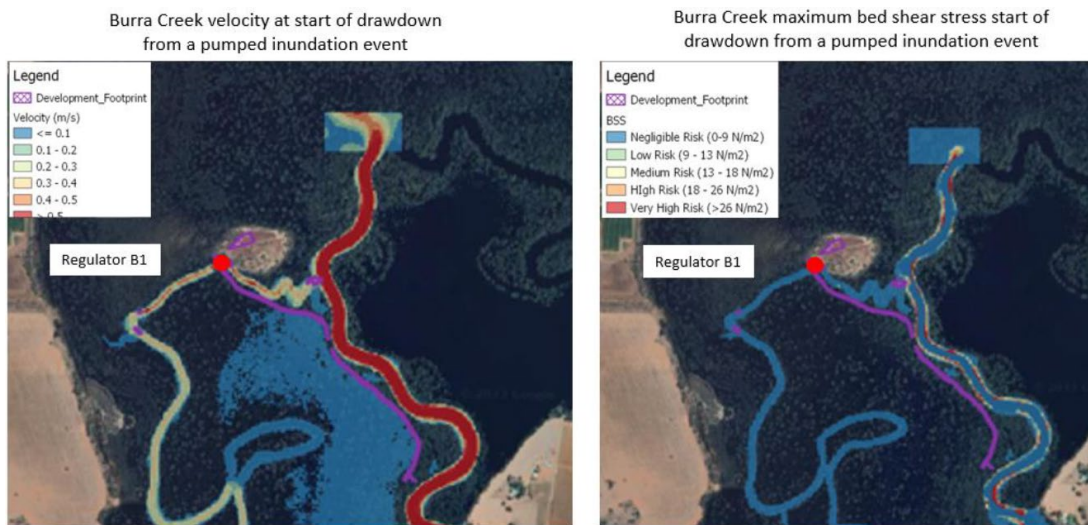
The box plots in the Addendum Report (Figure 8 in Chapter 3.2) show that in the Burra Maximum scenario, median velocities along Burra Creek upstream and downstream of the B1 main regulator will increase from less than 0.05 metres per second in an equivalent unmanaged event under existing conditions to around 0.27 metres per second in the release phase of a managed event, with the 99th percentile velocity of around 0.55 metres per second. By way of comparison, typical velocities in the Murray River are closer to 1 metre per second.

The box plots appear to combine instream and floodplain velocities along Burra Creek (based on the key locations shown in Figure B-25 of Specialist Assessment C), so they are likely to underestimate instream velocities, particularly for larger events where there is more extensive floodplain flow.

Figure 16 below shows instream velocities in Burra Creek will locally exceed 0.5 metres per second along about 1 kilometre of Burra Creek, but does not show by how much.

¹⁴ Part B.4 of Appendix B.

Figure 16 Velocity and bed shear stress during drawdown from a pumped maximum inundation event



Source: Addendum Report, Attachment 2, Figure 3.19 (DB4E)

Bed shear stress at Burra Creek is predicted to be low, due to the relatively low velocities predicted and low gradient. The box plots in the Addendum Report show the 99th percentile bed shear stress downstream of the B1 main regulator will be 9 N/m² during the release phase of a managed Burra Maximum event (Figure 10), which is below the ‘low risk’ threshold for erosion, whereas the box plots in Specialist Assessment C show that the 99th percentile bed shear stress for a ‘Burra High Flood’ event (equivalent to an unmanaged 20,000 ML/day at Swan Hill flood event) would be 12 N/m², which exceeds the ‘low risk’ threshold for erosion but is below the ‘medium risk’ threshold.

The reported velocities and shear stresses for Burra Creek are based on a daily timestep, but the highest shear stress during the release phase is likely to occur within the first 24 hours, prior to the first recorded timestep.¹⁵

The effects of the Project infrastructure on floodplain inundation processes are not understood in relation to the Wakool effect (Chapter 3.2). This extends to uncertainty regarding how the Project infrastructure will impact velocity and shear stress during the ingress and egress of floodwater during unmanaged inundation events.

If the Project were to proceed, velocities and bed shear stress should be checked and confirmed with the updated hydraulic modelling recommended in Chapter 3.2, with a focus on the Burra Creek channel. EDS GS1 should be amended to require the assessment of risks associated with the hydraulic performance of the Project to include the effects of infrastructure in addition to construction and operation. EDS GS3 should be amended to require monitoring of bank stability within the riparian corridor of Burra Creek (as well as the Murray River as already provided for).

That said, the Committee is satisfied that the erosion effects at Burra Creek (after mitigation measures are applied) are likely to be acceptable, based on:

- the relatively low velocities and bed shear stress predicted by the modelling to date
- the inclusion of a drop structure to mitigate erosion risks in Burra Creek resulting from the release of water from the MIA without tailwater support from the Murray River

¹⁵ Specialist Assessment C, Appendix E, Section E3.

- the requirement in EDS GS1 to further minimise erosion risks through detailed design (with the changes recommended by the Nyah and Vinifera Committee and the further change recommended by this Committee)
- the requirements in EDS GS2 and AI GSC2 to treat and monitor dispersive and sodic soils.

The ER states the regulators can be managed and operated to vary velocities and depths to assist in managing erosion risks should this be necessary. This requires real time observation of conditions and effects and active management of the regulators during drawdown events. The effectiveness of this measure is also strongly influenced by downstream hydraulic controls (such as the crest level of the drop structure and water levels in the Murray River). If the Project were to proceed, this would need to be confirmed as part of the detailed design, using the revised hydraulic model.

(iv) Findings and recommendation

The Committee finds:

- Based on the information before the Committee, erosion and land stability risks at Burra Creek are likely to be able to be acceptably managed, but if the Project proceeds this should be confirmed by re-assessing depths, velocities and bed shear stress based on the updated hydraulic modelling recommended in Chapter 3.2.
- Minor modifications are required to the Nyah and Vinifera Committee’s recommended wording for EDS GS1, to account for:
 - differences in relation to borrow pits (the Nyah and Vinifera borrow pit is situated adjacent to the Murray River whereas the Burra borrow pit is situated away from the Murray River and floodplain and therefore riverine erosion risks are not a consideration)
 - risks to the stability of the banks of the Murray River and Burra Creek.

The Committee recommends:

If the Project proceeds:

- a) revise Environmental Delivery Standard SW4 as shown in Appendix D to require further assessment of erosion risks of the Burra Creek Project**
- b) revise Environmental Delivery Standard CM1c as shown in Appendix D to require targeted soil sampling at locations identified to be subject to other soil hazards (as well as contamination)**
- c) revise Environmental Delivery Standard GS1 as shown in Appendix D to refer to:**
 - the Nyah and Vinifera borrow pit only
 - risks to the stability of the banks of Burra Creek (as well as the Murray River)
 - the hydraulic risks of Project infrastructure
- d) revise Environmental Delivery Standard GS3 as shown in Appendix D to require monitoring of bank stability within the riparian corridor of Burra Creek (as well as the Murray River).**

4.4 Works within the riparian corridors

(i) Issue

The issue is whether works within the 30 metre riparian corridors of the Murray River and Burra Creek are appropriate.

(ii) Context

The review of legislation and policy in the ER (Attachment 3) identified key planning policies in the Swan Hill Planning Scheme that are relevant to the Project. The list of relevant clauses includes the clauses relating the riparian zone:

- LPP Clause 12.03 River corridors, waterways, lakes and wetlands
- VPP Clause 12.03-1S River corridors, waterways, lakes and wetlands
- VPP Clause 14.02-1S Catchment planning and management.

Clauses 12.03-1S and 14.02-1S include specific requirements for the area at least 30 metres from the banks of waterway systems.

(iii) Evidence and submissions

TN B4 (DB43 and DB44) sets out the locations where the Project infrastructure or construction footprint overlaps with the riparian zone of Burra Creek and/or the Murray River. It defines the riparian zone of:

- Burra Creek based on a 30 metre setback from the centreline of the Burra Creek channel
- the Murray River based on a 30 metre setback from the border between Victoria and NSW (Border).

It notes that *“the top of the bank of the Murray River, on the Victorian side, has not been surveyed for the purposes of the Project”* and the current dataset for the Border is the best information available to the Proponent to represent the bank of the Murray River.

Works within the riparian corridor of Burra Creek include:

- new infrastructure that needs to be constructed within or near the creek channel (B1 main regulator, B2 box culvert regulator, Burra Creek to Murray River drop structure)
- existing instream infrastructure that needs to be accessed or modified for the Project (Banks 4 and 5)
- the B4 hardstand and associated access track
- construction footprints for the above infrastructure and the Northern C containment bank.

Works within the riparian corridor of the Murray River include:

- new infrastructure that needs to be located adjacent to the river bank (Burra Creek to Murray River drop structure, North Piambie Channel hardstand, B4 hardstand)
- upgrades of existing access tracks to be used for the purposes of the Project
- Northern A, B and C containment banks, Northern B containment bank passing bay, containment bank tie-ins
- construction footprints for the above infrastructure.

The construction footprints for the containment banks are in some places as close as 11.6 metres from the Border.

TN B4 explains that the Project infrastructure has been designed to correspond with the location of existing access tracks and disturbed areas to the extent practicable, to avoid and minimise impacts on native vegetation and Aboriginal cultural heritage values.

TN B4 noted that the Project design presented in the ER is a ‘preliminary design’ and there may be opportunities to increase setbacks in the detailed design, although there are significant constraints. Some parts of the Project infrastructure are relatively fixed in location, including the new regulators, drop structure and hardstand areas, and existing structures to be accessed or modified (existing Banks 4 and 5, existing B4 regulator) and need to be located within or near the waterways.

TN B4 states that the extent of the MIA would be reduced in size if the containment banks are located further away from the Murray River:

Potential relocation of Project access tracks and containment banks would need to take into account a range of considerations, including localised topography, geotechnical conditions, resultant hydrology, infrastructure designs and construction footprints.

Further:

It is also unlikely to be possible to move areas of the construction footprint outside the riparian buffer area without also moving the relevant infrastructure. This is because the construction footprint is required to provide room to access and manoeuvre machinery to undertake construction activities.

The Committee asked Dr Treadwell whether the infrastructure listed in TN B4 had been designed to address erosion risks. He responded through TN B6 (DB48), indicating that:

- Specialist Assessment C (surface water) identifies the potential risks where infrastructure is located close to the bank, especially where active bank erosion is occurring
- Specialist Assessment C identifies the potential for seepage induced bank erosion during periods of managed inundation when Murray River levels are low (such as during a pumped event)
- sodic and dispersive soils (which are widespread in the Burra Creek project area) are susceptible to erosion processes, as discussed in Specialist Assessment E (geology, soils and contamination)
- Sections 13.1.2 and 13.2.2 of Specialist Assessment E provide more detail on specific containment bank risks during construction and operation
- EDSs GS1, GS2 and GS3 provide measures to avoid and minimise potential adverse effects.

In response to questions from the Committee, Dr King and Mr Watson (the Proponent’s ecological experts) gave evidence confirming riparian corridors had not been specifically examined in the terrestrial ecology assessments.

(iv) Discussion

Riparian corridors (30 metres from the banks of a waterway) are ecologically sensitive, and often contain high quality vegetation and habitat for both aquatic and terrestrial species. They are afforded particular protection under various provisions in the Planning Scheme. Works within the riparian corridor can damage these ecologically sensitive areas and increase erosion risks, which can cause bank recession and loss of vegetation as well as additional sediment in the waterways. Risks can occur during both construction and operation.

The definition of the waterway banks used in TN B4 was not conservative. The Burra Creek riparian zone was defined in relation to the channel centreline rather than top of bank, thus underestimating the riparian zone width. The Murray River riparian zone was defined in relation to the Border, even though TN B4 noted that in some locations the aerial imagery shows the current riverbank was situated south (landward) of the Border.

TN B4 identifies a range of infrastructure proposed within the riparian corridors of the Murray River and Burra Creek. The construction footprints extend even further into the 30 metre riparian zone.

Some of the infrastructure items listed in TN B4 are necessarily located on or close to the waterways, such as the regulators, the drop structure and the decommissioning of Block Bank 4. Further, the containment banks have been designed to co-locate with existing access tracks, so as to avoid further disturbance to native vegetation and Aboriginal cultural heritage.

While this Committee understands the rationale for co-locating the containment bank and hardstand areas with existing access tracks or disturbed areas, it agrees with the Nyah and Vinifera Committee that there should be further assessment of opportunities to relocate Project infrastructure outside the riparian corridors.¹⁶ This would further reduce erosion risks, water quality risks from increased sediment, and ecological risks of the Project. That said, it would need to be balanced against potentially greater impacts on native vegetation or Aboriginal cultural heritage outside the riparian corridors.

A good example is the passing bay on Northern Containment Bank B. There is no obvious operational reason why this needs to be located within the riparian corridor, and there may be better locations for the passing bay, further from the riverbank and in an area that does not contain high value vegetation or cultural heritage.

The Nyah and Vinifera Committee recommended revisions to EDS E1 and to the requirements of the Incorporated Document to require further assessment of relevant alternatives through the detailed design process, with particular attention to avoiding and minimising impacts within 30 metres of the Murray River bank. This Committee adopts that recommendation, and considers that it should be further extended to Burra Creek.

The further assessment of works within the riparian corridors should include a review of the location of the waterway banks to ensure all proposed works within 30 metres of the current location of the top of bank of the waterways are assessed.

(v) Findings and recommendation

The Committee finds:

- If the Project were to proceed, the Proponent should further assess whether any proposed Project infrastructure could be relocated outside the riparian corridors of both the Murray River and Burra Creek, provided this would not have unacceptable impacts on native vegetation or Aboriginal cultural heritage.

¹⁶ See VMFRP SIAC Report No. 2, Chapter 5.2(iv).

The Committee recommends:

If the Project proceeds, revise clause 4.4.2 of the Incorporated Document as shown in Appendix C, and Environmental Delivery Standard E1 as shown in Appendix D, to refer to works within 30 metres of the banks of Burra Creek (as well as the banks of the Murray River).

5 Terrestrial ecology

5.1 Introduction

Chapters 5.1 and 6.1 of Report No. 2 lists the relevant parts of the ER and Specialist Assessments dealing with terrestrial ecology. The Burra Creek specific sections are:

- ER Section 17.1 (terrestrial ecology)
- Specialist Assessment B (terrestrial ecology), Part D
- ER Attachment VII (AOIB for Burra Creek)
- ER Attachment VIII (ER Project Development), Section 5.

The Proponent provided the following Technical Notes:

- TN B1 – Hydrological Analysis of EVCs in Relation to Expert Elicitation Report - Burra Creek (Ecological Associates Report) (DB23)
- TN B3 – Response to question on AOIB (DB42)
- TN B4 – Riparian buffer areas (DB43 and DB44)
- TN B5 – Potential extent of native vegetation removal (DB45).

Additionally, the Committee had regard to:

- the Addendum Report:
 - Section 5 of Attachment 2 deals with terrestrial ecology, and updates Specialist Assessment B
 - Attachment 3 updates the AOIB
- Ecological Associates Report – Burra Creek Project (DB24)
- KMZ file of photo locations contained in presentation of Drew King (DB47)
- VMFRP Ecological Monitoring, Evaluation and Reporting Plan (D44 for EES Central).
- relevant submissions and evidence both to this Committee and to the Nyah and Vinifera Committee
- the Proponent’s Day 1 EMF (DB21).

Table 2 lists the experts providing evidence on the ecological effects of construction.

Table 2 Ecological effects of construction evidence

Party	Expert	Firm	Area of expertise
Proponent	Dr Drew King (DB15, DB40 and DB47)	Jacobs	Terrestrial flora
Proponent	Chris Watson (DB16 and DB41)	Jacobs	Terrestrial fauna

5.2 Native vegetation effects (construction)

(i) The issue

The issue is whether construction impacts on vegetation communities, large trees and associated habitats have been appropriately avoided and minimised, and are acceptable.

(ii) What did the ER and Addendum Report say?

Extent of native vegetation loss

Specialist Assessment B states a total of 39.79 ha 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 21.60 ha across 9 EVCs will be potentially lost due to construction works. The largest losses would be:

- 7.78 ha of endangered EVC 103 Riverine Chenopod Woodland
- 7.54 ha of depleted EVC 106 Grassy Riverine Forest
- 4.57 ha of vulnerable EVC 823 Lignum Swampy Woodland.

These vegetation losses involve impacts on 112 Large Trees and 76 Very Large Trees, including 136 hollow-bearing trees which provide 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).

These potential losses include 92 Large Trees that would require felling as well as 96 Large Trees that are considered lost due to expected impacts within their Tree Protection Zone and/or Structural Root Zone. This estimate is considered conservative as some trees whose Tree Protection Zone or crown is affected may not die, or may remain standing if they do die and still provide habitat.

Table 17.26 in Section 17 of the ER provided estimates of the proportion of EVCs that would be lost from the construction footprint relative to the extent of the EVCs across the Murray Fans Bioregion, which indicate the EVC losses represent small proportions of their total bioregional extent.

Efforts to avoid and minimise

Attachment VIII to the ER describes the consideration of site-specific design alternatives to avoid and minimise potential impacts on native vegetation as part of the process of project development. The assessment of alternatives focused on biodiversity and habitat and cultural heritage, based on inputs from the ER specialists, project partners and Traditional Owners.

The assessment of design alternatives resulted in the following ‘avoidance’ and ‘minimisation’ of effects on native vegetation at Burra Creek:

- adopting alternatives that:
 - avoid felling or Tree Protection Zone encroachment to 34 Large and 27 Very Large trees
 - minimise impacts to another 29 Large and 33 Very Large trees by realigning the construction footprint so that the trees remain standing (though encroaching on their Tree Protection Zone)
- reducing the area of native vegetation to be removed by 0.80 ha
- reducing the construction footprint within the endangered EVC 103 Riverine Chenopod Woodland by 0.00071 ha.

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 21.599 ha of native vegetation for the Burra Creek Project.

Addendum Report

The Addendum Report stated that no change is required to the assessment of construction impacts on native vegetation in Specialist Assessment B because the construction phase is unchanged.

(iii) Evidence and submissions

Dr King's evidence (DB40) confirmed that construction of the Burra Creek Project would result in high to extreme residual risks for native vegetation, including:

- extreme risk resulting from permanent removal of vegetation, including up to 7.778 ha of endangered Riverine Chenopod Woodland (6.81 ha of which is located at the borrow site)
- high risk for impacts on up to 188 Large trees impacted (92 to be felled)
- high risk for impacts on native flora species resulting from permanent removal of vegetation and habitat
- high risk for potential introduction or spread of weeds, pest species and pathogens from construction activities.

The Proponent explained through TN B5 why a larger extent of native vegetation removal is proposed for the Burra Creek Project compared to the Nyah and Vinifera Projects. The reasons given include narrower existing access tracks bordered by denser vegetation, a dedicated borrow site, wider proposed containment banks, and a less advanced design for the Burra Creek Project.

The Department of Energy, Environment and Climate Action (DEECA) submission to the Nyah and Vinifera Committee (S12) noted that hollow-bearing trees in the Project areas provide habitat for numerous hollow-dependent species (including FFG Act listed Regent Parrot, South-eastern Long-eared Bat, Lace Monitor and Carpet Python) and recommended that a Hollow Replacement Plan be implemented to address expected losses of hollow-bearing trees.

Mr Watson's evidence to that Committee contended that a hollow replacement program would be unlikely to provide effective mitigation but if pursued would need 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.

In his evidence relating to the Burra Creek Project (DB16), Mr Watson noted the Minister's Assessment for EES Central required the development of a hollow replacement plan. He confirmed he considered hollow replacement is unnecessary for the Burra Creek Project. He noted that a key difference between the EES Central and Burra Creek project areas is that Regent Parrot does not breed in the Burra Creek project area, even though it is present. In response to a question from FoNVP, he agreed it was possible that Regent Parrot could potentially breed in the Burra Creek project area in the future, as a result of shifts in population distribution in response to climate change.

Mr Watson's evidence noted that the Burra Creek project area supports many hollow-dependent species other than Regent Parrot, including other threatened species such as Carpet Python, as well as more common species such as Yellow Rosella, Red-rumped Parrot, Galah, Little Corella, Sulphur-crested Cockatoo, Australian Wood Duck, and Grey Teal. He concluded that:¹⁷

¹⁷ DB16.

... hollow replacement will not provide meaningful mitigation for this impact beyond what fauna do when habitat is lost naturally. However, it is true that some individuals of some species may adopt artificial hollows and benefit from such a plan, and a methodical and scientific hollow-replacement plan could be beneficial.

He warned that:

... if the appropriate level of investment in the development of a hollow-replacement plan and subsequent monitoring of hollow occupancy is not done, it is unlikely to be successful (eg [The Living Murray] TLM nest boxes at Hattah).

Dr King’s response to DEECA’s submission in relation to nest boxes (DB15) gave the following advice:

... the proposed hollow replacement plan, however, does have implications for the health and longevity of trees to which nest boxes or equivalents are attached, especially in the large numbers that are proposed.

(iv) Discussion

Efforts to avoid and minimise

The Nyah and Vinifera Committee discussed general issues relating to minimising native vegetation loss in Chapter 5.2(iv) of Report No. 2. This Committee adopts that discussion in relation to Burra Creek.

Construction risks for native vegetation EVCs were rated as ‘high’ for the Nyah and Vinifera Projects due to the permanent loss of vegetation, but were rated as ‘extreme’ for the Burra Creek Project due to the permanent removal of up to 7.778 ha of an endangered EVC (EVC 103 Riverine Chenopod Woodland).

Table 3 compares the construction effects of the Burra Creek Project on native vegetation with the Nyah and Vinifera Projects. The table is based on data presented in Specialist Assessment B and Dr King’s presentations D62 (Nyah Vinifera) and DB40, with percentages calculated by the Committee.

Table 3 Construction impacts on native vegetation for Burra Creek compared with Nyah and Vinifera

	Burra Project	Vinifera Project	Nyah Project
Total area of vegetation			
Total area of native vegetation potentially lost in construction footprint (ha)	21.60	12.84	14.12
Total area of MIA (for comparison)	403	335	475
Total area of native vegetation potentially lost in the construction footprint, as a percentage of the area of land in the MIA	5.4%	3.8%	3.0%
Total number of trees			
Total number of canopy trees potentially affected by construction	188	147	145
Total number of Large Trees potentially affected by construction	112	100	100
Total number of Very Large Trees potentially affected by construction	76	47	45

	Burra Project	Vinifera Project	Nyah Project
Total number of hollow-bearing trees potentially affected by construction	136	90	27
Number of Large and Very Large Trees in the MIA (for comparison) (ER Chapter 17, pages 17 and 21)	1067	2159	3193
Total number of canopy trees potentially affected by construction, as a percentage of the number of Large Trees in the MIA	18%	7%	5%

The following key points are evident:

- The total area of native vegetation potentially lost due to construction works for Burra Creek (21.60 ha) is considerably larger than for Nyah (14.12 hectares) or Vinifera (12.80 ha).
- The MIAs of the three Projects do not vary in similar proportions, therefore, the Burra Creek Project will lead to greater loss of native vegetation proportional to the size of the MIA than Nyah and Vinifera.
- The Burra Creek Project will have greater impacts on canopy trees than the Nyah or Vinifera Projects, both in absolute terms and also proportional to the number of canopy trees in the MIA.
- Construction of the Burra Creek Project will affect a much larger number of hollow-bearing trees than the Nyah or Vinifera Projects.

The Proponent explained through TN B5 that the larger extent of native vegetation removal proposed for the Burra Creek Project is partly due to a less advanced design. However, EDS E1 allows the contractor to remove up to 21.599 ha of native vegetation. All efforts should be taken to further reduce this should the Project proceed.

Riparian setbacks were not considered in the assessment of native vegetation effects, or in the consideration of site-specific design alternatives to avoid and minimise potential impacts. Further assessment of the need for Project infrastructure within the riparian corridors (as recommended in Chapter 4.4) introduces further uncertainty regarding effects on native vegetation, as realignment of the construction footprint may be required.

The Minister’s Assessment for EES Central stated:

Given the projects are about improving the environment and associated biodiversity values in significant and sensitive environments, there is an additional imperative for the minimisation of impacts to these same environments and values during from the construction phase of the projects.

The Minister agreed with the EES Central Committee’s recommended changes to EDS E1 and made further recommendations to strengthen the EMF by including a process for further refinements to the construction footprint during the contractor procurement and construction phase to minimise native vegetation loss.

The Minister’s Assessment for EES Central expressed concern about the removal of 0.191 ha of endangered Plains Grassland EVC and recommended:

Include requirement for further consideration to reduce impacts on Plains Grassland EVC during detailed design. If impacts to Plains Grassland are unavoidable this should be explicitly addressed in the update of AOIB (recommended in EDS SW4) to inform consents under Condition 4.6 of the incorporated document.

Plains Grassland EVC has not been identified in the Burra Creek project area, but the Committee considers the same principles are relevant to endangered EVC 103 Riverine Chenopod Woodland.

This Committee considers the Minister's recommendations in this regard are relevant to the Burra Creek Project, and recommends EDS E1 be amended consistent with those recommendations, as shown in Appendix D.

Hollow replacement program

The Minister's Assessment for EES Central disagreed with the EES Central Committee's recommendation that a hollow replacement plan was not warranted for the EES Central projects based on the large number of trees remaining in the landscape and risks associated with hollow replacement. The Minister's Assessment for EES Central stated:

To support the immediate and short-term welfare of parrots and other hollow-dependent species, I therefore recommend that a new EDS (E8) is added requiring that a hollow replacement plan is to be prepared to the satisfaction of DEECA ...

I agree with the SIAC's recommendation that, if a hollow replacement plan is mandated, there is a need for careful consideration of designs to appropriately accommodate the range of hollow dependent fauna and ensure appropriate insulation against temperature extremes. This recommendation should be considered in the development of the hollow replacement plan.

The Nyah and Vinifera Committee discussed the question of hollow replacement in Chapter 5.2(iv) of Report No. 2 under the subheading 'Other construction impacts'. It considered a requirement for a limited hollow replacement program for priority fauna species was warranted for Nyah and Vinifera and recommended revisions to EDS E2e to require this.

The Committee acknowledges Mr Watson's advice regarding the failed hollow replacement program in the Hattah 'The Living Murray' project and acknowledges the complexity of issues that need to be addressed in designing an effective hollow replacement program. Mr Watson's advice in this regard is consistent with Mr Holmes' expert advice to the EES Central Committee, and this Committee notes the weight placed by the EES Central Committee on these risks.

This Committee recommends a hollow replacement plan be developed and implemented for the Burra Creek Project, along the lines set out in the Minister's Assessment for EES Central. Hollow replacement is arguably more important for the Burra Creek Project than the Nyah and Vinifera and EES Central Projects, because of the relatively large number of trees that will be detrimentally affected by construction by comparison with the relatively small number of trees in the Burra Creek MIA.

The hollow replacement program will need to:

- define target species (some or all of the hollow-dependent species present in the Burra Creek project area)
- be based on a clear understanding of the hollow characteristics required by those species
- ensure appropriate natural or artificial hollows are properly installed and adequately monitored.

Risks such as over-heating and utilisation by pest species should be addressed in the design and implementation of the program.

(v) Findings and recommendation

The Committee finds:

- Construction of the Burra Creek Project will lead to the loss of a larger area of native vegetation than the Nyah or Vinifera Projects, including 188 Large and Very Large Trees and permanent removal of up to 7.778 ha of an endangered EVC (EVC 103 Riverine Chenopod Woodland).
- It will have greater impacts on much larger numbers of canopy trees than the Nyah or Vinifera projects.
- If the Project were to proceed:
 - there is likely to be limited scope to reduce losses of native vegetation and large trees within the proposed construction footprint
 - the EDSs should be strengthened along the lines recommended in the Minister’s Assessment for EES Central
 - calculations of native vegetation losses may need to be adjusted following the investigation of options to relocate project infrastructure outside the riparian corridors, as recommended in Chapter 4.4.

The Committee recommends:

If the Project proceeds:

- a) revise Environmental Delivery Standard EDS E1 as shown in Appendix D, to reflect the recommendations in the Minister’s Assessment for EES Central**
- b) include a new Environmental Delivery Standard E5 as shown in Appendix D that requires a hollow replacement plan to be prepared.**

5.3 Native vegetation effects and benefits (operation)

(i) The issue

The issue is whether the Project is expected to result in overall benefits for vegetation communities and large trees in the MIA.

Chapter 7 addresses whether:

- the Project is expected to result in an overall improvement to biodiversity values more generally
- the proposed approach to biodiversity offsets is appropriate.

(ii) What did the ER and Addendum Report say?

Native vegetation present in the MIA

Six EVCs were identified across 403 ha of native vegetation within the Burra Creek MIA, based on refinement of the former Department of Environment, Land, Water and Planning (DELWP)-modelled EVC mapping using field surveys. This includes:

- 252.6 ha of EVC 823 Lignum Swampy Woodland
- 141.77 ha of EVC 810 Floodway Pond Herbland
- small areas of other EVCs.

Floodway Pond Herbland and Lignum Swamp occur along the Burra Creek channel. The other EVCs occur on the Burra North floodplain.

The bioregional conservation status and area of each EVC is provided in Table 4, which is based on Table 5.3 in the Addendum Report Attachment 2. Table 4 also summarises how existing vegetation in the Burra Creek project area is predicted to respond to Project operations.

Table 4 Predicted response of EVCs in the Burra Creek MIA to Project operation

EVC	Bioregional Conservation Status	Burra North WMA (hectares)	Burra South WMA (hectares)	Proposed operational scenario	Predicted response
Floodway Pond Herbland (EVC 810)	Depleted	68.14	73.63	Seasonal Fresh	Positive
Grassy Riverine Forest (EVC 106)	Depleted	2.05		Burra Maximum	Positive
Lignum Swampy Woodland (EVC 823)	Vulnerable	252.60		Burra Maximum	Positive-Neutral
Lignum Swamp (EVC 104)	Vulnerable	1.94		Seasonal Fresh	Positive-Neutral
Riverine Chenopod Woodland (EVC 103)	Endangered	0.24		Burra Maximum	Neutral
Shrubby Riverine Woodland (EVC 818)	Least Concern	4.23		Burra Maximum	Negative

The condition of the native vegetation in the Burra Creek MIA was assessed as ‘moderate’ based on Vegetation Quality Assessment surveys (otherwise known as the ‘habitat hectare’ assessment method) undertaken in 2021. Additional condition data was collected at rapid sample sites, which showed:

- eucalypt recruitment was present at only one of the 10 rapid sample sites in EVC 810 Floodway Pond Herbland along Burra Creek
- recruitment was present at eight of the 16 rapid sample sites in the other EVCs
- at least one terrestrial species was observed at 70 per cent of the rapid sample sites, generally consisting of common chenopod shrubs usually found in drier EVCs.

Specialist Assessment B interpreted “*the low levels of recruitment and evidence of early stage terrestrialisation*” as evidence of “*the decline in condition of the vegetation across the floodplain over time with the reduced inundation that has resulted from river regulation*”.

Proposed inundation regimes vs recommended inundation regimes

Recommended watering regimes for the various EVCs present in the Burra Creek MIA draw on a 2016 paper by Frood and Papas (the Frood and Papas Report) and a 2011 paper by Rogers and Ralph, as well as the ecological knowledge of the Project team.¹⁸

Table 6 in the revised AOIB (extracted in Figure 17 below) shows:

- recommended inundation regimes (represented in the ‘DELWP 2016’ column – red boxes)
- existing inundation regimes in the MIA, updated to account for the Wakool effect (represented in the ‘Regulated River case’ column – blue boxes).

Figure 17 shows that with the Wakool effect taken into account, under existing conditions:

- the recommended inundation frequencies are met or exceeded for all EVCs
- the recommended median inundation duration is not met except for EVC 103 Riverine Chenopod Woodland and EVC 810 Floodway Pond Herbland.

Figure 17 Water regime characteristics for EVCs in the Burra Creek MIA

Table 6: Comparison of water regime characteristics for flood-dependent EVCs in each Ecological Water Regime Class for Burra Creek and against the preferred water regime recommended by DELWP (2016) for the Burra Creek project.

Ecological Vegetation Class	Ecological Water Regime Class	Frequency of inundation (/10 years)					Median duration of inundation (months)				
		DELWP (2016)	Pre-regulation	Basin Plan with VMFRP	Basin Plan	Regulated river	DELWP (2016)	Pre-regulation	Basin Plan with VMFRP	Basin Plan	Regulated river
Floodway Pond Herbland (EVC 810)	Seasonal Anabranched and Billabong	3 – 10*	14	11	11	10	1 – >6	2.6	2.6	1.6	1.0
Lignum Swampy Woodland (EVC 823)	Lignum Shrubland and Woodland	3 – 7	8.1	7.8	4.8	3.7	1 – 6	1.2	1.2	0.9	0.8
Shrubby Riverine Woodland (EVC 818)	Black Box Woodland and Red Gum Forest and Woodland	0 – 3	8.1	7.8	4.8	3.7	1 – 6	1.2	1.2	0.9	0.8
Grassy Riverine Forest (EVC 106)	Black Box Woodland and Red Gum Forest and Woodland	3 – 10*	8.1	7.8	4.8	3.7	1 – 6	1.2	1.2	0.9	0.8
Riverine Chenopod Woodland (EVC 103)	Black Box Woodland and Red Gum Forest and Woodland	0 – 3	8.1	7.8	4.8	3.7	0 – 1	1.2	1.2	0.9	0.8

*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: Addendum Report Attachment 3 (DB4F), with Committee annotations

Further, some areas supporting the following EVCs will be inundated at depths greater than recommended by the Frood and Papas Report:¹⁹

- EVC 810 (Floodway Pond Herbland) in both operational scenarios
- EVC 823 (Lignum Swampy Woodland) in the Burra Maximum scenario.

Predicted response of native vegetation to Project operation

Most EVCs are predicted to have a positive or positive-neutral response to Project operations (see Table 4), but:

¹⁸ A guide to water regime, salinity ranges and bioregional conservation status of Victorian wetland Ecological Vegetation Classes, Frood and Papas, 2016 and *Floodplain Wetland Biota in the Murray-Darling Basin: Water and Habitat Requirements*, Rogers and Ralph, 2011

¹⁹ Refer to Figures 14 and 15 in the revised AOIB.

- 0.24 ha of endangered EVC 103 Riverine Chenopod Woodland at the margins of the Burra North WMA is predicted to show a neutral response
- 4.23 ha of EVC 818 Shrubby Riverine Woodland, a transitional community between the River Red-gum community along the Murray River and the Black Box dominated community on the Burra North floodplain, is predicted to show a negative response.

The updated watering objectives in the revised Project Description are expected to result in some EVC transitions. On the floodplain, Riverine Chenopod Woodland (0.24 ha) and Shrubby Riverine Woodland (4.24 ha) will potentially transition to Lignum Swampy Woodland. Some parts of Lignum Swampy Woodland (up to 50 ha) will potentially transition to Lignum Swamp. In the Burra Creek channel, Lignum Swamp will potentially transition to Floodway Pond Herbland.

The proposed inundation frequencies and durations on the floodplain may result in loss of Large Trees from a small amount of the MIA, primarily where Lignum Swampy Woodland has potential to transition to Lignum Swamp. The Addendum Report estimates (conservatively) that up to 132 Large and Very Large Trees have potential to experience long term decline. These trees would not be directly removed and if they die, and would remain as stags, providing ongoing habitat for fauna.

The Addendum Report Attachment 2 recommended an additional mitigation measure for Burra Creek, namely additional monitoring of Black Box regeneration in EVC 823 Lignum Swampy Woodland, to feed back into the adaptive management framework and implement frequencies of managed events that allow Black Box to regenerate over time, with limited risk of saplings being drowned by too frequent and/or extended inundation events.

(iii) Evidence and submissions

No submissions expressed views regarding the potential effects of Project operation on specific vegetation communities in the Burra Creek project area.

Dr King described the Burra Creek floodplain as a ‘boom-bust’ system. The vegetation condition data presented in the ER was collected in 2021 under dry (‘bust’) conditions. Dr King briefly visited the Burra Creek project area after the December 2022 flood, in February 2023 (‘boom’ conditions), and noted that tree health had visibly improved and Tangled Lignum was greatly improved in health. Relatively little weed growth was observed in flooded areas. No additional survey work was undertaken after the floods.

Dr King drew attention to the following evidence of ‘decline’ observed in 2021:

- presence of dead trees throughout the MIA
- absence of mudflat and obligate aquatic flora
- presence of terrestrial species in the ground level flora throughout the MIA, with annual weeds and chenopods common
- Tangled Lignum in poor condition, some dead.

He provided site photographs (DB47), taken in 2021, which are consistent with the descriptions in his evidence. He advised that some of the dead trees had died at an indeterminate time in the past and others more recently. The cause of the death of these trees is unknown (DB40).

The Australian National University Fenner School of Environment and Society (ANU Fenner School) (S5) submitted that the ER presented no empirical evidence for the decline in health of the

floodplain wetlands, and therefore “*no attribution can be made as to causal factors*”. Dr King responded that:²⁰

Such an assertion does not appear to take into account the evidence presented in the Specialist Assessment Ecology – Terrestrial whereby the measurements and observations at all three [ER Central] sites have been collated to show ongoing poor vegetation condition, which has been attributed to the lack of inundation compared to historical water regimes that do not meet the scientifically assessed needs of the vegetation communities present.

Dr King confirmed that with the Wakool effect, the known water requirements of the EVCs in the MIA are largely already met by existing conditions. He confirmed the proposed Project operation will exceed the recommended inundation requirements of some EVCs. He considered tree health is expected to improve for most areas, but it is possible there may be some localised deaths of Black Box trees within Lignum Swampy Woodland.

Environment Victoria’s further submission (DB7) highlighted that the residual risk rating for arboriculture (trees) at Burra Creek has increased as a result of the revised operational scenarios, and is now a ‘medium’ risk. This is attributed to the prediction that areas currently mapped as Lignum Swamp Woodland may revert to Lignum Swamp, and result in the drowning of additional large trees (mainly Black Box).

The Proponent submitted that reversal of terrestrialisation is central to the ecological benefits of the Burra Creek Project. In response to a question from the Committee, Dr King confirmed that reversal of terrestrialisation in the context of the Burra Creek Project involved shifts between different types of floodplain vegetation communities, rather than large-scale shifts between aquatic, floodplain and terrestrial vegetation communities. He considered that reversal of terrestrialisation was a key benefit of the Project.

(iv) Discussion

The Committee considers the terrestrial ecology assessments undertaken to date raises three key issues:

- evidence of decline in vegetation condition
- predicted vegetation response to Project operation
- reversal of terrestrialisation.

Evidence of decline

The Burra Creek project area is a ‘boom-bust’ system. The assessments of vegetation condition in the MIA were only undertaken under ‘bust’ conditions, and do not show the effect of ‘boom’ conditions that still periodically occur under existing conditions. While measurements and evidence may show ongoing poor vegetation condition as Dr King suggested, there are strong indications that there has been a substantial shift in condition since the December 2022 flood.

Predicted response of native vegetation to Project operation

The earlier understanding of the hydrology of the floodplain, which did not recognise the Wakool effect, indicated a significant gap between what was thought to be the existing inundation frequency and duration of the Burra Creek floodplain, and the inundation needs of the floodplain vegetation communities. However, the revised assessments based on the Wakool effect suggest

²⁰ DB15.

this is not the case. Based on the information in the ER, the Addendum Report, Dr King’s evidence and the Ecological Associates Report:

- the known needs of the native vegetation communities in the Burra Creek MIA appear to be largely met by existing conditions
- Project operations will result in some EVCs being inundated at greater frequencies and to greater depths than recommended for the existing vegetation community.²¹

This raises questions regarding the need for the Project, and uncertainties as to whether the proposed inundation regimes under the revised operational scenarios may have adverse (rather than beneficial) effects on some native vegetation in the Burra Creek MIA.

Reversal of terrestrialisation

The Addendum Report Attachment 2 defined ‘terrestrialisation’ as:

... changes in floristic composition from more flood-dependent or flood-tolerant species (aquatic, mudflat and floodplain species) (floodplain species) to those adapted to a drier environment (terrestrial species).

The EES Central Committee accepted that reversal of the following types of terrestrialisation should generally be considered a benefit of the EES Central Projects:²²

- River Redgum which have established in drying treeless wetlands
- Black Box seedlings which would be susceptible to water stress from prolonged, deep flooding
- some chenopods that have colonised drying riverine and/or previously swampy EVCs.

However, it also stated:²³

... the Committee does not agree that consideration of terrestrialisation cannot attach any biodiversity value to terrestrial species which have opportunistically inhabited the floodplain...

and:

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.

The Nyah and Vinifera Committee agreed with the conclusions of the EES Central Committee in regard to terrestrialisation. This Committee also agrees.

In the Burra Creek Project, the transition of a small area (0.24 ha) of Riverine Chenopod Woodland to Lignum Swampy Woodland raises concerns, because it is a shift from an ‘endangered’ EVC to a ‘vulnerable’ EVC. In principle, the transition of up to 1.94 ha of Lignum Swamp (‘vulnerable’) to Floodway Pond Herbland (‘depleted’) raises similar questions, although the presence of the Lignum Swamp along Burra Creek appears to be a local response to existing instream structures rather than a natural occurrence.

The expected transition of 50 ha of Lignum Swampy Woodland on the floodplain to Lignum Swamp is a shift between two EVCs of the same bioregional conservation status (‘vulnerable’), but may result in the decline or loss of up to 132 Large and Very Large Trees. These are large canopy trees, not seedlings, and there is uncertainty about whether they were already present prior to

²¹ This is clear when comparing the ‘Basin Plan with VMFRP’ columns in Figure 1 with the recommended watering requirements in Figure 18.

²² VMFRP SIAC - EES Central Report No. 1 at Chapter 7.6.

²³ VMFRP SIAC - EES Central Report No. 1 at page 90.

river regulation. The loss of 132 Large Trees is a significant proportion (12.4 percent) of the estimated 1,067 canopy trees in the MIA. The Committee is not convinced this transition and associated loss of trees will provide an overall ecological benefit.

The reversal of terrestrialisation is also expected to be associated with potential loss of FFG Act listed threatened dryland species from the Burra Creek floodplain, discussed further in Chapter 5.4.

If the Project proceeds, there needs to be further assessment of the impacts of Project operations on existing vegetation communities in the Burra Creek MIA in light of the revised hydraulic modelling, having regard to EVCs and vegetation depth preferences and tolerances. This is effectively already provided for in the EES Central's recommended wording for SW4.

(v) Findings

The Committee finds:

- The Project has failed to demonstrate it is justified with regard to the recommended inundation requirements for EVCs present on the floodplain, as:
 - the known needs of the EVCs in the Burra Creek MIA appear to be largely met by existing conditions
 - the proposed watering regimes will result in some EVCs being inundated at greater frequencies and to greater depths than recommended.
- Consequently, the proposed watering regimes are expected to cause reversal of terrestrialisation resulting in:
 - the transition of a small area (0.24 ha) of endangered Riverine Chenopod Woodland to Lignum Swampy Woodland, and a larger area (50 ha) of Lignum Swampy Woodland to Lignum Swamp
 - the potential death of up to 132 Large Trees.
- The Project has not demonstrated that this reversal of terrestrialisation will deliver an overall benefit to native vegetation.
- If the Project proceeds:
 - the impacts of Project operations on existing vegetation communities in the MIA need to be reassessed in light of the revised hydraulic modelling having regard to EVCs and vegetation depth preferences and tolerances (as provided for in SW4)
 - the AOIB needs to be updated accordingly.

5.4 Threatened flora species and communities

(i) The issues

The issues are whether the likely effects of construction and operation of the Project on threatened flora species and communities have been properly assessed and are acceptable.

(ii) What did the ER and Addendum Report say?

Construction

A total of 39 FFG Act listed threatened flora species were assessed as present or possibly occurring in the AOI, including seven species recorded during field surveys. The FFG Act listed Semi-arid Shrubby Pine-Buloke Woodland ecological community also occurs in the AOI.

No EPBC Act listed threatened flora species were recorded in the AOI. Winged Peppercross, which is listed as endangered under both the EPBC Act and FFG Act, was assessed as possibly occurring in the AOI but was not recorded in the surveys for the Project.

Operation

A total of 37 FFG Act listed threatened flora species were assessed as present or possibly occurring within the MIA. Five FFG Act listed flora species were recorded as present during field surveys, with an estimated total population of 45,798 individuals.

No EPBC Act listed threatened flora species are known to occur within the MIA. Winged Peppercross, which is considered 'possible' in the MIA, may potentially be affected by habitat transitions resulting from Project operation because it is associated with Riverine Chenopod Woodland, Shrubby Riverine Woodland and Lignum Swampy Woodland – all of which have potential to change according to the Addendum Report. The Addendum Report Attachment 2 identified an increase in the residual risk associated with operation from low to medium based on the risk of over-inundation of parts of its potential habitat.

The Addendum Report confirmed no threatened ecological communities listed under either the EPBC Act or the FFG Act have been identified in the MIA.

The Addendum Report Attachment 2 presented a revised assessment of the effects of Project operation on threatened species based on Plant Functional Groups within the MIA, which indicated:

- a positive or generally positive effect is expected for 1 aquatic flora species, 6 floodplain and mudflat flora species and 11 moisture-dependent flora species
- a negative response is predicted for 19 terrestrial dry flora species.

In relation to the terrestrial dry flora species, Specialist Assessment B concluded:

These species have potential to be removed from the Maximum Inundation Area as a result of the increased inundation regime for the Burra Maximum scenario.

Assessment of Overall Improvements to Biodiversity

The revised AOIB (Addendum Report Attachment 3) relies on Habitat Importance Maps prepared by DELWP, and balances the potential decrease in habitat importance within the construction footprint against the expected increase in habitat importance within the MIA if managed inundation were to be successfully implemented. On this basis, the Project was predicted to:

- provide benefits for Twiggy Sida, Winged New Holland Daisy, Branching Groundsel, Twin-leaf Bedstraw, Umbrella Wattle, Squat Picris, Pale Flax-lily, Scaly Mantle*, Wimmera Woodruff and Dwarf Amaranth
- have negative effects on Chariot Wheels*, Blue Mallee* and Baldoo*.

The species marked with an asterisk are not identified in the list of threatened flora considered in the likelihood of occurrence assessment for the Project, indicating they are not expected to occur in the Project area.²⁴

(iii) Evidence and submissions

The Nyah and Vinifera Committee reviewed evidence and submissions relating to the effects of construction and operation on threatened flora species and communities in Chapters 5.3(iii) and

²⁴ Refer to Appendix B to Specialist Assessment B.

Chapter 6.3(iii) of Report No. 2. The submissions were general in nature and directed to all three projects in the ER Central package, including the Burra Creek Project. No submissions expressed specific concerns regarding the potential impacts of construction of the Burra Creek Project on listed flora species or communities present in the Burra Creek project area.

DEECA (S12) submitted it does not consider the construction of the ER Central projects would pose an unacceptable risk or consequence to the State-wide population of any FFG Act listed flora or communities.

Dr King’s evidence (DB40) was that construction of the Burra Creek Project would result in a medium residual risk to threatened species and ecological communities, resulting from direct and indirect impacts. He did not consider this to be significant, as it would cause only a very minor change in populations of FFG Act listed threatened flora species (a less than 0.2 percent loss of population or habitat within Victoria).

Dr King considered Project operation would benefit most threatened flora species present in the MIA, but would result in ‘medium’ residual risk to threatened flora species and ecological communities due to possible changes to habitat extents for some more terrestrial species arising from the increased frequency of inundation. He did not regard this as significant, because the presence within the MIA of ‘supposed’ terrestrial species under existing hydrological conditions suggests they have potential to persist during Project operation.

As noted in Chapter 5.3, Dr King considered reversal of terrestrialisation a key benefit of the Project. Nevertheless, he considered the presence of supposed dryland species in the MIA suggests they may be tolerant of inundation and may continue to persist despite increased frequency of inundation resulting from Project operation. The additional frequency of inundation may also benefit plants adjoining the MIA.

(iv) Discussion

The Burra Creek project area has a larger number of FFG Act listed threatened flora species than the Nyah or Vinifera project areas (Table 5). The EPBC Act listed species Winged Peppergrass was identified as possible in all three Project areas but was not recorded.

Table 5 Number of FFG Act listed flora species present or possibly occurring in the Burra Creek project area compared with Nyah and Vinifera

	Burra	Nyah	Vinifera
Present or possible in the AOI and the MIA	43	27	24
Present or possible in the AOI	39	26	24
Recorded in the AOI during field surveys	7	6	4
Present or possible in the MIA	37	25	22
Recorded in the MIA during field surveys	5	3	3

Source: Specialist Assessment B, Tables 5.3, 5.5, 5.6, 8.3, 8.5, 8.6, 11.3, 11.5, 11.6 and pages 161, 291 and 424

Construction

Generally, the Committee is satisfied that potential effects on threatened flora from proposed construction activities have been appropriately assessed. It considers that reasonable efforts have been made to avoid and minimise impacts of the construction footprint on threatened flora species during Project development, resulting in a residual impact on three individual FFG Act

listed threatened flora plants (two individuals of Branching Groundsel and one individual of Fuzzy New Holland Daisy). The number of individuals lost due to construction impacts is equivalent to:

- less than 1 percent of the estimated population of Branching Groundsel in the MIA
- around 4 percent of the estimated population of Fuzzy New Holland Daisy in the MIA.

This Committee agrees with the Nyah and Vinifera Committee that:

- significant weight is placed on the confidence of DEECA (S12) that the projects would not have unacceptable impacts on flora listed under the FFG Act
- the detailed design process and selection of construction methods should seek to further avoid and minimise impacts on habitats of threatened species
- the Native Flora and Fauna Management Sub-Plan is an appropriate mechanism to address construction impacts on potentially affected species
- monitoring of rehabilitation outcomes as well as accountability for effective rehabilitation are needed.

The Nyah and Vinifera Committee recommended adjustments to the EDS and Monitoring Requirements to address the above findings. Those recommendations apply equally to the Burra Creek Project, and are included in Appendix D should the Project proceed.

The Nyah and Vinifera Committee recommended that a high level of rigour should be applied in the monitoring and management of environmental weeds and other pest species in relation to construction, which should be implemented through the consent under the *National Parks Act 1975*. This is equally relevant to the Burra Creek Project (and should extend to operation as well as construction). The Burra Creek project area is not a National Park so these requirements would need to be implemented through the Native Flora and Fauna Management Sub-Plan (for construction) and the Pest and Plant and Animal Monitoring and Management Plan (for operations). The Committee has included appropriate amendments to EDSs E2d and E3 in Appendix D.

Operation

The ER and Addendum Report stated that Project operation is likely to be beneficial for the 18 of the 37 FFG Act listed threatened flora species belonging to the aquatic, floodplain and mudflat, and moisture-dependent Plant Functional Groups. However, it is expected to have negative effects on the other 19 FFG Act listed threatened terrestrial dry flora species, which are expected to respond negatively to increased inundation and potentially be removed from the MIA as part of the ecological transitions involved reversal of terrestrialisation (discussed in Chapter 5.3).

The terrestrial dry flora species that are expected to respond negatively to Project operation include 27 individuals of Fuzzy New Holland Daisy and 4,648 individuals of Spreading Emu-bush in the MIA. Specialist Assessment B states the Project will impact 261 ha of potentially suitable habitat for Fuzzy New Holland Daisy, which is 0.14 percent of its total modelled habitat, resulting in a medium overall residual effect. Specialist Assessment B does not provide similar calculations for other potentially affected dryland species.

The assessment of threatened flora species and communities in the Burra Creek MIA was less detailed than in the AOI and did not include mapping. While only five threatened species were confirmed to be present, the low level of survey effort makes it impossible to confidently conclude that the other 32 species identified as possible are not actually also present. In the absence of more detailed information and in view of the risk of adverse impacts to dryland species, application of the Precautionary Principle (section 4A(d) of the FFG Act) implies the analysis should

proceed on the basis that all dryland species identified as ‘possible’ could be present in the MIA and could potentially be affected by the Project.

The Minister’s Assessment for EES Central set out the following requirements in relation threatened terrestrial dry flora species that were associated with the MIA and could potentially be displaced by operation of the EES Central Projects:

I recommend further survey is undertaken to confirm [whether these species were significantly impacted by the 2022 floods]. If the species are found to persist in the maximum inundation area, consideration to mitigating impacts to these species (e.g., seed collection prior to inundation) should be given to minimise overall impacts as a result of the project. I recommend the inclusion of a new EDS (EDS E9) which requires additional targeted surveys are undertaken in previously recorded locations for Umbrella Wattle, Club-hair New Holland Daisy and Frosted Goosefoot in the inundation areas prior to operations, with requirements for mitigation measures for the species to be covered by the OEMP should they be recorded

This Committee recommends that if the Project were to proceed, similar requirements should be applied to FFG Act listed threatened dryland flora species within the Burra Creek MIA. Targeted surveys should be undertaken to confirm the ongoing presence of dryland species recorded in the MIA in the 2021 surveys (pre-2022 flood) and also assess the presence of species identified as ‘possible’ within the MIA. Mitigation measures should be required to minimise the impacts of Project operation on species determined to be present within the MIA.

The Nyah and Vinifera Committee discussed mitigation and monitoring measures to address risks to threatened flora resulting from Project operation. This Committee adopts the Nyah and Vinifera Committee’s recommendations for changes to monitoring requirements M TE2 and M TAE2, which are shown in Appendix D.

Assessment of Overall Improvements to Biodiversity

The Habitat Importance Maps assessments presented in the AOIB 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. In principle, this claim is generally persuasive for moisture-dependent species but it is not persuasive for dryland species.

The Committee has concerns about the reliability of the assessment of effects and benefits of the Project for threatened flora in the updated AOIB, given that it highlighted benefits for one species and negative effects for three species that are not considered to be present in the Project area. The assessed benefits for Twiggy Sida are also questionable given it was assessed in Specialist Assessment B as ‘unlikely’ to occur in the MIA.

(v) Findings and recommendation

The Committee finds:

- The Project is likely to deliver mixed results for terrestrial flora species listed under the FFG Act, and the Committee was not persuaded it will deliver an overall benefit to threatened flora species and communities.
- The Project is not expected to have a significant impact on any threatened flora species listed under the EPBC Act, including the EPBC Act listed Winged Peppergrass.
- If the Project were to proceed, the EDSs need to be modified to provide for:
 - additional measures to address adverse effects on dryland species, including a new EDS based on EDS E9 in the Minister’s Assessment for EES Central

- additional measures to better manage weeds and pest species, based on the Nyah and Vinifera Committee’s recommendations in relation to the section 27 consent under the *National Parks Act 1975* for the Nyah and Vinifera projects.

The Committee recommends:

If the Project proceeds:

- a) include a new Environmental Delivery Standard E6 as shown in Appendix D requiring further surveys of threatened dryland species in the Maximum Inundation Area**
- b) revise Environmental Delivery Standards E2d and E3 as shown in Appendix D to include additional requirements for managing weeds and pest species.**

5.5 Threatened fauna species and communities

(i) The issue

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

(ii) What did the ER and Burra Creek Addendum Report say?

Table 11.20 in Specialist Assessment B indicated a total of 22 threatened fauna species are present or possible to occur in the Burra AOI, and 32 threatened fauna species are present or possible in the Burra MIA. These species are all listed as threatened under the FFG Act, and six are also listed as threatened under the EPBC Act. The difference in the number of species between the AOI and MIA is due to waterbirds being considered unlikely to occur in the AOI.

Five EPBC Act listed migratory species were identified as known or likely to occur in the Project area. Fork-tailed Swift may use the Project area as an aerial flyover. The other migratory species may visit the MIA when it is inundated.

The FFG Act listed Victorian Temperate Woodland Bird Community is considered present in the Burra Creek project area. The Victorian Mallee Bird Community occurs in the wider project area but is almost completely restricted to habitat that is dominated by mallee and does not occur within the construction footprint or MIA. The Victorian Mallee Bird Community partly corresponds with the endangered Mallee Bird Community of the Murray Darling Depression Bioregion, which was listed as a threatened ecological community under the EPBC Act in December 2021.

Potential impacts of Project construction on FFG Act listed threatened terrestrial fauna species were summarised in Table 13.11 of Specialist Assessment B. The residual effects of construction were assessed as low, given the small size of the construction footprint compared with the broader extent of habitat across the landscape.

Potential effects and benefits of Project operation on FFG Act listed threatened terrestrial fauna species were summarised in Table 13.16 of Specialist Assessment B. Many species are expected to benefit from increased frequency and duration of inundation, especially Growling Grass-Frog and wetland-dependent birds.

Project construction and operation are expected to have minor to insignificant effects on the Victorian Temperate Woodland Bird Community. Any impacts on the Victorian Mallee Bird

Community (and, by inference the EPBC Act listed Mallee Bird Community of the Murray Darling Depression Bioregion) are expected to be insignificant.

Tables 13.8 and 13.14 in Specialist Assessment B presented assessments of whether Project construction or operation would have significant impacts on the EPBC Act listed threatened and migratory species, based on the *EPBC Act Matters of National Environmental Significance: Significant impact guidelines 1.1* (Department of Environment, 2013). Significant impacts were assessed as unlikely.

The Addendum Report Attachment 2 stated the assessments of effects on terrestrial fauna were not significantly changed by the revised project description and understanding of the Wakool effect:

The potential loss of woodland habitat through transition of some areas from Lignum Swampy Woodland to Lignum Swamp is unlikely to significantly alter the area available for the VTWBC [Victorian Temperate Woodland Bird Community] and VMBC [Victorian Mallee Bird Community] given the persistence of woodland through most of the area and retention of suitable foraging habitat.

The analysis of Habitat Importance Maps (prepared by DELWP) in the updated AOIB report (Addendum Report Attachment 3) showed net benefits for Superb Parrot, Regent Parrot, Painted Honeyeater, Black Falcon, Major Mitchell's Cockatoo, Carpet Python and Grey-Crowned Babbler, and evenly balanced impacts and benefits for the Murray River Turtle, as measured by the ratio of habitat importance in the construction footprint to habitat importance in the MIA. However, Specialist Assessment B did not identify Superb Parrot as present or likely occurring in the Project area.

(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.

DEECA (S12) does not consider the Project poses an unacceptable risk or consequence to the State-wide population of any FFG Act listed terrestrial fauna.

Mr Watson confirmed that seven EPBC Act listed threatened species are likely to occur in the Burra Creek project area, including the species identified in Specialist Assessment B and White-throated Needletail. He advised construction and operation are not expected to have any adverse effects on Growling Grass Frog, Australian Bittern, Australian Painted Snipe or White-throated Needletail. He said:

- Growling Grass Frog is current absent from the Project area, but increased inundation may encourage recolonisation.
- Australian Bittern and Australian Painted Snipe, waterbirds that are rare visitors to the wetlands, are likely to benefit from improved extent and quality of habitat.
- White-throated Needletail, a strongly aerial rare visitor, could benefit from increased prey abundance in response to inundation.

Minor impacts on Regent Parrot, Painted Honeyeater and South-eastern Long-eared Bat are possible due loss of potential habitat, including within the construction footprint and temporary loss of ground-foraging areas for Regent Parrot during operation, but are unlikely to be ecologically significant. Regent Parrot and Painted Honeyeater are expected to benefit from operation.

Mr Watson outlined the potential effects on FFG Act listed threatened fauna in relation to three key groups:

- FFG Act listed wetland dependent birds (11 species) are not expected to be adversely affected by construction and are expected to benefit from increased habitat availability resulting from operation.
- FFG Act listed bush birds (16 species) and FFG Act listed reptiles (3 species) are expected to be subject to medium adverse effects due to habitat loss and deaths of individual reptiles resulting from construction. Low residual adverse effects from operation are expected, but the effects are not considered ecologically significant. The risk to reptiles of vehicle collisions is likely to increase if roads are widened or improved.

The Committee asked Mr Watson whether the ‘boom-bust’ character of the Burra Creek project area has any implications for the terrestrial fauna assessments. He responded that the terrestrial fauna assessment relied on database records, with confirmatory surveys undertaken under dry conditions from 2019 to 2021, which is consistent with usual practice. He advised he had visited the area in the vicinity of the Burra Creek project area in February 2023, after the December 2022 flood, and had observed waterbirds that were not present during the surveys undertaken during the dry. He did not consider any additional fauna surveys necessary for the purposes of Project assessment.

The Committee asked Mr Watson whether the reversal of terrestrialisation could negatively impact terrestrial fauna. He responded that Project operation could lead to loss of foraging habitat for ground-foraging species, but would otherwise be beneficial for most fauna species, including dryland species. Increased biomass in response to inundation events would increase the availability of aquatic, arboreal and aerial invertebrate prey.

(iv) Discussion

Larger numbers of threatened fauna species have been identified as present or possibly occurring in the Burra Creek project area than in the Nyah or Vinifera project areas (Table 6). The same EPBC Act listed threatened fauna species as identified for Nyah and Vinifera were identified in the Burra Creek project area plus one additional species, Australian Bittern. Two FFG Act listed threatened fauna communities, the Victorian Temperate Woodland Bird Community and Victorian Mallee Bird Community are associated with the Burra Creek project area, whereas only the Victorian Temperate Woodland Bird Community is associated with the Nyah and Vinifera project areas.²⁵

Table 6 Number of FFG Act-listed threatened fauna species present or possibly occurring in the Burra Creek Project Area compared with Nyah and Vinifera

	Burra	Nyah	Vinifera
AOI	22	16	14
MIA	32	27	25

Source: Specialist Assessment B, Tables 5.18, 8.19 and 11.19

The Nyah and Vinifera Committee discussed the effects of Project construction on threatened fauna species and communities in Chapter 5.4 (iv) of Report No. 2, and the effects of Project operation on threatened fauna species and communities in Chapter 6.4(iv) of Report No. 2.

²⁵ Specialist Assessment B.

The Nyah and Vinifera Committee found that:

- construction works for the Nyah and Vinifera Projects could exacerbate various listed threatening processes, though none critically
- construction impacts on terrestrial fauna would be generally acceptable, but 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 Nyah and Vinifera Committee found the Proponent’s Final Day version of EDSs E2c to E2e (D84) were generally acceptable, with some modifications to EDS E2e to address the above findings. Those EDSs are consistent with the Day 1 versions presented to this Committee (DB21).

There are no particular threatened species or communities present (or possible) in the Burra Creek project area that warrant any additional consideration, or a different approach to that taken by the Nyah and Vinifera Committee. Regent Parrot and Carpet Python are both present in the Burra Creek project area and were detected in field surveys between 2013 and 2021,²⁶ although Regent Parrot is not known to breed in the Burra Creek project area.²⁷

The Nyah and Vinifera Committee found Project operation was likely to have a generally beneficial effect on threatened terrestrial fauna, subject to effective control of risks posed by pest animals, plants and pathogens. However, it noted that some of the project benefits in the ER documentation appeared to be overstated, including quantitative estimates of areas of habitat gains. It recommended further qualification regarding timeframes of habitat improvements and relevant uncertainties is needed. These conclusions apply equally to the Burra Creek Project.

(v) Finding

The Committee finds:

- Should the Project proceed, impacts on threatened fauna species can be acceptably managed, subject to the Committee’s recommended EDSs which include the Nyah and Vinifera Committee’s recommended changes.

²⁶ Specialist Assessment B, Table 11.20.

²⁷ Mr Watson’s evidence presentation, Document B41.

6 Aquatic ecology

6.1 Introduction

Chapters 5.1 and 6.1 of Report No. 2 list the relevant parts of the ER and Specialist Assessments dealing with impacts on aquatic ecology. The Burra Creek specific sections are:

- ER Section 17.2
- Specialist Assessment A (aquatic ecology) Part D.

The Proponent provided the following Technical Note:

- TN B7 – response to questions on notice (aquatic ecology) (DB49).

Additionally, the Committee had regard to:

- the Addendum Report (Section 4 of Attachment 2 deals with aquatic ecology)
- relevant submissions and evidence both to this Committee and to the Nyah and Vinifera Committee
- the Proponent’s Day 1 EMF (DB21).

Table 7 lists the evidence relating to the aquatic ecological effects of the Project.

Table 7 Evidence relating to ecological effects of operations

Party	Expert	Firm	Area of expertise
Proponent	Jean-Michel Benier (DB14 and DB38)	Jacobs	Aquatic ecology

6.2 What did the ER and Addendum Report say?

The northern section of the Burra Creek system is impacted by five barriers bisecting the watercourse, which reduce creek connectivity and aquatic fauna passage. One of these (block bank 4) is proposed to be removed as part of the Burra Creek Project. A moderate cover of large woody debris and other instream habitats was observed at the proposed infrastructure locations on Burra Creek.

Several threatened aquatic species were assessed as likely to occur in the Burra Creek study area, including the EPBC Act listed Murray Cod (vulnerable) and Silver Perch (critically endangered). Murray-Darling Rainbowfish is considered present and Freshwater Catfish is considered possible (both species are listed as endangered under the FFG Act). Murray River Turtle, Broad-shelled Turtle and Eastern Snake-necked Turtle are considered possible (the two former species are listed as critically endangered and endangered under the FFG Act). Murray Spiny Crayfish is considered unlikely. No Platypus eDNA was detected at any of the sites sampled.

The Project is expected to benefit native fish and other aquatic fauna by increasing the availability of still or slow-flowing creek and floodplain habitat within the Burra Creek floodplain and removing of certain existing barriers to increase connectivity. There is, however, the potential for some adverse residual effects (after implementation of mitigation measures), primarily due to Project operations.

‘Medium’ residual effects include:

- stranding of aquatic species on the floodplain

- an increase in Common Carp (carp populations may significantly increase within the floodplain and receiving waters including the Murray River).

‘Low’ or ‘insignificant’ residual impacts include:

- reduced habitat connectivity, including impeded passage, as a result of regulator structures, containment banks and regulator operation
- entrainment of aquatic species when water is pumped from the Murray River into the MIA (to be minimised by installation of pump screens)
- changes to water quality or the water regime, including blackwater events, changes in salinity, erosion and sedimentation, and spills or leaks
- contribution to the spread or establishment of weeds, pest species or pathogens
- inundation of turtle nests and mortality of eggs
- injury or death of turtles due to vehicle collisions.

The Addendum Report Attachment 2 updated Specialist Assessment A in light of the Wakool effect. Key findings included:

- increased water availability could potentially provide further opportunities for pest terrestrial fauna, however potential residual effects to aquatic species remain low
- no change to effect pathways that could result in:
 - a loss of connectivity and impeded passage for native aquatic species
 - a decline in water quality, including blackwater events
 - the spread of weeds, pests or pathogens
- no change in the overall assessment of cumulative effects.

6.3 The issues

The issues raised in relation to impacts of the Burra Creek Project on aquatic ecology largely reflected those raised in previous SIAC processes, and included:

- entrainment of fish species during pumped inundation events
- stranding of aquatic species during drawdown
- proliferation of carp
- a loss of connectivity within the floodplain and between the floodplain and the Murray River
- degradation of aquatic habitat including through blackwater events, algal bloom events and the spread of pests, weeds and pathogens
- salinity impacts
- cumulative effects of all VMFRP projects on aquatic ecology.

6.4 Evidence and submissions

The Nyah and Vinifera Committee discussed impacts on aquatic ecology in Chapters 5.3, 5.4 and 6.6 of Report No. 2. This Committee adopts that discussion insofar as it relates to general issues common across all three of the ER Central projects. The rest of this Chapter addresses aquatic ecology impacts that are specific to the Burra Creek Project.

(i) Entrainment, fish strandings and fish passage

Mr Benier noted the updated Project Description for Burra Creek involved additional pumped inundation events, but the use of pump inflow screens will prevent fish from the Murray River

being entrained or accessing the floodplain during a pumped event. Eggs and larvae may be transferred to the floodplain during a pumped event, but native fish that reach sufficient maturity on the floodplain would be likely to re-join the river as water levels receded. Native fish respond to falling water levels by moving back to the Murray River, whereas carp do not, resulting in a greater likelihood of carp being stranded on the floodplain than native fish.

FoNVP questioned why a fishway was not proposed as part of the Burra Creek Project, noting that a fishway has recently been constructed in Gunbower Creek.

The Committee asked Mr Benier why a fishway has been constructed in Gunbower Creek, and whether it was related to the Gunbower Fish Exit Strategy, which informed the fish exit strategy proposed in EDS SW2. He explained (through TN B7 (DB49)) that Koondrook Weir has been identified as a migration barrier impeding passage of native fish (particularly larger bodied native fish) from the Murray River upstream into Gunbower Creek. A fishway at the weir had been proposed since at least 2014, and was eventually installed in 2022. The fishway is not part of the Gunbower Fish Exit Strategy, which focuses on manipulating drawdown patterns and rates after a managed inundation event to provide cues to native fish of falling water levels and thereby minimise stranding on the floodplain.

Mr Benier indicated that a fishway is not considered appropriate or necessary at Burra Creek, because:

- Burra Creek does not have a weir or similar barrier to fish passage
- Burra Creek is not suitable habitat for large-bodied native fish (other than for short-term foraging)
- passive fish passage for small-bodied native species has been considered in the design of proposed regulators at Burra Creek.

(ii) Carp

Mr Benier's evidence was that during the surveys in December 2021, juvenile carp within the Burra Creek floodplain were only found in relatively low abundance (29 individuals in total).

Notwithstanding the low numbers, this demonstrated that carp can breed in response to a natural flooding event within the Burra Creek northern floodplain complex, and are highly likely to be distributed throughout creek and any other connected aquatic habitats within the floodplain, consistent with other VFMRP project areas. Mr Benier's evidence was that carp in the Burra Creek project area are likely to spend extended periods disconnected from the Murray River and may be prone to stranding when the creek channel dries out.

(iii) Salinity

Mr Benier noted the updates to Specialist Assessment D (groundwater) predicted slightly elevated water tables as a result of the Wakool effect, which are in turn predicted to result in increased saline groundwater within the MIA, and an additional salt load to the Murray River. However, salinity concentration of the river would remain well under water quality objective concentrations *"and therefore the effect to aquatic ecology values would be insignificant"*.

(iv) Aquatic weeds

Mr Benier's evidence was that some aquatic weed species recorded at Burra Creek can be dispersed short distances by water, and have the potential to extend their current distribution within the MIA as a result of the operation of the Project. However, the Project (like the Nyah and

Vinifera Projects) would include management and monitoring requirements for aquatic weeds (EDS E3). Weed risks during construction would be monitored and controlled under the Flora and Fauna Management Sub-Plan.

























































(v) Turtles



The Committee asked Mr Benier to provide more detail in relation to the risk of inundation of turtle nests and mortality of eggs. He responded that while native turtles are considered possible in the Burra Creek project area, no evidence of turtles was seen during the ecological surveys. He thought the most likely turtle species to use the area would be the (non-listed) Eastern Snake-Necked Turtle. He considered that turtles (if present) would be able to adapt to more frequent inundation of the floodplain, noting that inundation is a natural process and occurs under existing conditions (although not as frequently, or for such durations, as proposed under the Project operational scenarios).



(vi) Project benefits

Table 13-2 of Specialist Assessment A (aquatic ecology), extracted in Figure 18 below, indicates that many aquatic species present in the Murray River in the vicinity of the Project area are declining under current conditions. All species are expected to respond positively to the Project (note that the Burra Intermediate scenario is no longer intended to be part of the Project).

Figure 18 Expected response trajectories for aquatic species

Species	Predicted response			
	Current Trajectory ^a	Seasonal Fresh	Burra Intermediate	Burra Maximum
Native Fish				
Freshwater Catfish				
Golden Perch				
Murray Cod				
Murray-Darling Rainbowfish				
Silver Perch				
Unspecked Hardyhead				
Carp Gudgeon				
Bony Herring				
Flathead Gudgeon				
Dwarf Flat-headed Gudgeon				
Australian Smelt				
Eastern Snake-necked Turtle				
Murray River Turtle				
Broad-shelled Turtle				

 populations decreasing
 current population stable

 slight improvement in populations
 large improvement in populations

Source: Specialist Assessment A (aquatic ecology)

While Specialist Assessment A was updated in light of the Wakool Effect, no updates were made to the predicted response trajectories in Table 13-2.

The Committee asked Mr Benier whether the response trajectories for aquatic species should have been updated having regard to the Wakool effect and the revised Project Description. He confirmed (through TN B7) the response trajectories are still expected to occur, except for the 'Burra Intermediate' scenario which is no longer required. His evidence was:

- the trajectories indicate that current inundation patterns are insufficient
- the strength of response trajectories to managed watering events may be lower than originally considered, given the original Burra Maximum scenario included flood capture where now it is only proposed to be implemented through pumped inundation
- however, the updated Project Description includes an increased frequency and duration of floodplain inundation, that is more consistent with historical regimes
- response trajectories are therefore expected to remain positive for the revised Project description and in light of the Wakool effect.

(vii) EES Central recommendations

The Committee asked Mr Benier to respond to the changes to the EDS related to aquatic ecology in the Minister’s Assessment for EES Central, and to advise whether he considered any of those changes should be adopted for the Burra Creek Project. He responded through TN B7 that there are sufficient differences in the aquatic values and potential impacts and risks between the EES Central projects and the Burra Creek Project that it is not necessary for the Minister's recommendations to be directly adopted for Burra Creek:

Based on the aquatic values identified in the Project area, the location and approach to construction and the operational requirements of the Project, it is my opinion that the monitoring and reporting provisions proposed within the exhibited EDS for the [Burra Creek] Project will be appropriate and sufficient to identify and mitigate potential impacts and risks during construction and operational phases, including the stranding of native aquatic fauna, provision of aquatic faunal passage and proliferation of pest species such as carp.

6.5 Discussion

(i) Construction impacts

The Wakool effect did not result in any changes to the proposed project infrastructure or to the construction methods. Should the Project proceed, construction will take place in dry conditions, as originally proposed. Construction impacts on aquatic ecology therefore remain minimal, for the reasons set out in Chapter 5.4(iv) of Report No. 2 (those reasons being equally applicable to Burra Creek as to Nyah and Vinifera).

The EES Central Committee recommended an adjustment to EDS E2f to specify that construction works should be undertaken under no-flow conditions and outside fish migration periods. This recommendation was adopted by the Minister for Planning in the Minister’s Assessment for EES Central, and by the Nyah and Vinifera Committee.

Mr Benier did not consider this change was needed for Burra Creek, as construction works for the Burra Creek Project are proposed to occur during periods when sites are dry. While the Committee acknowledges Mr Benier’s response, it considers that, for consistency across the VMFRP projects, EDS E2f should explicitly state that construction works are to be undertaken under no-flow conditions and outside fish migration periods should the Project proceed. This change is included in Appendix D.

(ii) Entrainment, fish strandings and fish passage

The updated Project Description for the Burra Creek Project involves more pumped events than contemplated in the exhibited ER. Should the Project proceed, the Committee is satisfied that this will not significantly increase the risk of fish entrainment or strandings. Pump screens will be used to prevent mature fish from being entrained or transferred to the floodplain.

While native fish eggs and larvae may be transferred to the floodplain during a pumped event, native fish are expected to attempt to leave the floodplain as water levels recede given their natural response to falling water levels. Should the Project proceed, it will be important that the fish exit strategy ensures drawdowns and releases are appropriately managed so native fish present on the floodplain respond to the cues of falling water levels and return to the Murray River, avoiding strandings.

The EES Central Committee recommended EDS SW2 be revised to require monitoring and reporting on fish strandings, and a new monitoring requirement M AE7 be added relating to fish strandings, to support adaptive management in the operation of the projects. Mr Benier did not consider these to be applicable to the Burra Creek Project. He noted specific reference is made to high value large-bodied fish species in EDS SW2 for Hattah Lakes and Belsar-Yungera. The Burra Creek floodplain is not preferred habitat for these species, even though Specialist Assessment A assessed Murray Cod and Silver Perch as likely to occur within the Project area.

This Committee accepts that large-bodied native fish species may be less likely to use the Burra Creek floodplain than Belsar-Yungera, where there is permanent aquatic habitat in Narcooyia Creek. However, should the Project proceed, fish strandings should be monitored to ensure impacts on large- and small-bodied native fish (including the Murray-Darling Rainbowfish) are acceptable. Fish are likely to use the floodplain for foraging, even if they do not use it for breeding.

This Committee supports the Nyah and Vinifera Committee's recommended wording of EDS SW2 and monitoring requirement M AE7, which refer to native fish strandings generally (and do not specifically refer to large-bodied species that are not anticipated to heavily use the Burra Creek floodplain). These changes are included in Appendix D.

The EES Central Committee recommended a new EDS SW5 to ensure regulators are designed with suitable flow velocities for target fish species, and that the design of containment banks and spillways should have regard to the facilitation of passage of turtles. The Nyah and Vinifera Committee made the same recommendation (with slightly adjusted wording). Mr Benier did not consider that EDS SW5 is applicable in the Burra Creek context, as no objectives have been established for specific fish species, and turtle species have the capability to traverse or move around containment banks.

While the Burra Creek Project may not have specific objectives for specific target fish species, it does have a general objective (like the other VMFRP projects) of protecting and restoring floodplain ecosystem biodiversity values, function and habitat components, including for key species and communities. Threatened fish species are present in the Burra Creek project area, others are considered likely to be present, and turtle species are considered possible.

Should the Project proceed, impacts to these species should be managed notwithstanding in the absence of specific objectives for specific target species. EDS SW5 as recommended by the Nyah and Vinifera Committee is the appropriate mechanism to do this, and is included in Appendix D.

The Committee accepts Mr Benier's evidence that a fishway is not required for the Burra Creek Project.

(iii) Carp

The Burra Creek Project, like all other VMFRP projects, has the potential to result in carp proliferation. The Committee takes little comfort from the relatively low numbers of carp identified in the surveys of the Burra Creek project area in December 2021. As Mr Benier's evidence pointed out, the presence of carp (even in low numbers) indicates that carp can breed on the Burra Creek floodplain.

Should the Project proceed, carp at Burra Creek will be managed in the same way as for other VMFRP projects. The Operating Plan notes the seasonal implications in the timing of filling and drawdowns for carp proliferation, and states the potential for increased carp populations should be considered when operating the Project. It also refers to implementing a fish exit strategy that

could result in carp being stranded on the floodplain, while not stranding native fish (which, unlike carp, respond to falling water levels on the floodplain by returning to the waterway channels).

Should the Project proceed, carp would be monitored under EDSs E2d (Construction weed and pest management), E3 (Pest Plant and Animal Monitoring and Management Plan) and E4c (Overall biodiversity improvement – Burra Creek). This Committee agrees with the recommendations of the EES Central and Nyah and Vinifera Committees to amend EDS E3 to include a reference to aquatic fauna species, including carp.

Mr Benier pointed to the Monitoring, Evaluation and Reporting Plan for the VMFRP projects,²⁸ which provides for monitoring of the response of fish populations (including carp) to inundation and drawdown events. In response to a question from the Committee, Mr Benier explained that the Monitoring, Evaluation and Reporting Plan provides for end of season fish surveys, to assess annual changes within the first ten years of operation. Should the Project proceed, this will further assist in assessing the impacts of the Burra Creek Project on carp (as well as native fish species), and informing the adaptive management of the Project's operations.

(iv) Salinity

The Committee accepts Mr Benier's evidence that the slightly elevated salinity levels predicted as a result of the Wakool effect will still be well within the range sought under relevant water quality objectives, and should not significantly impact aquatic species either on the floodplain or in the Murray River system itself should the Project proceed. The Committee supports the recommendations of the Nyah and Vinifera Committee to revise EDS GW2 to include groundwater monitoring wells in the parts of the project area that are expected to be the most sensitive to salinity increase, and to review project operations if a significant trend of increasing salinity is identified. These changes are included in Appendix D, and this Committee had added a requirement for an additional monitoring well in parts of the Burra Creek MIA that are susceptible to a shallow groundwater table.

(v) Aquatic weeds

The Committee accepts Mr Benier's evidence that although some aquatic weed species currently present on the Burra Creek floodplain may extend their current distribution as a result of the Project, impacts are acceptable and can be appropriately managed by the proposed EDSs and monitoring requirements, as adjusted by the Nyah and Vinifera Committee (extending monitoring requirement M TE3 to terrestrial *and aquatic* weeds). These changes are shown in Appendix D.

(vi) Turtles

The Committee accepts Mr Benier's evidence that the Project poses low risk to turtles. The Burra Creek floodplain is not considered particularly suitable habitat for turtles, and the likelihood of occurrence of turtles within the project area is relatively low. While the Committee accepts that turtles are able to adapt to inundation, the containment banks and spillways should be designed having regard to turtle passage should the Project proceed. This is addressed by the Nyah and Vinifera Committee's recommended EDS SW5, which is included in Appendix D.

²⁸ Sparrow, A., Jones, C., Bennetts, K., Bush, A., Harrow, S., Lumsden, L., Menkhorst, P., Nelson, J., Papas, P., Scroggie, M., Sinclair, S. and White, M. (2021). *Victorian Murray Floodplain Restoration Project: Ecological monitoring, evaluation and reporting plan*. Unpublished Client Report for Mallee and North Central Catchment Management Authorities. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria

(vii) Project benefits

The response trajectories for aquatic species for the Burra Creek Project (Figure 18) do not clearly quantify the likely population responses of aquatic species to the Burra Creek Project. In particular, it is not clear what is considered a ‘slight improvement’ or a ‘large improvement’ in populations. It is therefore difficult to determine the extent of benefits that the Project may deliver to aquatic species, either before or after the Wakool effect is taken into consideration.

That said, based on Mr Benier’s evidence, the Committee accepts that:

- population response trajectories of native aquatic fauna species are in decline under current conditions
- increased frequency and duration of inundation of the floodplain through the Project should improve current response trajectories.

6.6 Findings

The Committee finds:

- The Burra Creek Project will, like other VMFRP projects, pose some risks to aquatic ecology. The most significant risks are likely to be an increased risk of carp proliferation and a spread of aquatic weeds.
- Should the Project proceed, the EMF as adjusted by the Nyah and Vinifera Committee (and shown in Appendix D) is appropriate to manage impacts to aquatic ecology at Burra Creek.

7 Biodiversity effects and offsets

7.1 Context

This chapter summarises the potential biodiversity benefits and impacts of the Project which are articulated in the previous chapters, and considers the implications for offset provisions in the Incorporated Document. The implications with respect to Matters of National Environmental Significance (MNES) are considered in Chapter 8.

(i) Terms of Reference

Clauses 47(b) and (c) of the Committee’s Terms of Reference require it to advise on whether:

- the Burra Creek Project is expected to result in an overall improvement to biodiversity values in the Burra 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 (DB22) provides for an exemption from requirements for both a planning permit and an offset for native vegetation removal, based on the Conservation Work Exemption. 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 document addressing Project benefits is the AOIB report (as updated in Attachment 3 to the Addendum Report).

(iii) Policy context

The Nyah and Vinifera Committee set out the relevant policy context in Chapter 7.1(iii) of Report No. 2. It applies equally to the Burra Creek Project.

7.2 Evidence and submissions

The Nyah and Vinifera Committee reviewed the evidence and submissions relating to ecological effects and offsets in Chapter 7.2 of Report No. 2. This Committee adopts that review, and makes the following observations on matters specific to the Burra Creek Project.

Dr King confirmed that two separate assessments of impacts and benefits for terrestrial vegetation had been undertaken:

- the Specialist Assessment Ecology – Terrestrial, which used field data on the values and habitat present to assess likely benefits and impacts
- the AOIB, which draws on modelled data for both impacts and benefits.

He noted there is some conflict between the findings of the two assessments.

Dr King led the preparation of the terrestrial ecology component of the Addendum Report, including Section 5 of Attachment 2. He was not responsible for the preparation or analysis

involved in the AOIB but had reviewed it. Ms Hilary Chapman, the lead author of the AOIB reports, did not attend the Burra Creek Roundtable.

Dr King gave the following opinion in relation to offsets for the Burra Creek Project (Committee's emphasis):²⁹

I believe that the projects will result in a benefit to biodiversity and vegetation condition throughout the MIA as concluded within the Specialist Assessment. Under the monitoring requirements for the project, the improvements in biodiversity and vegetation condition will be measured over time and processes are in place to appropriately manage the operations phase to adapt the management of the project and achieve the benefits. As such I do not believe that native vegetation offsets are required for the projects.

As noted in Chapters 5.2, 5.3 and 5.4, Dr King's evidence was that for native vegetation and threatened flora species and communities:

- the hydrological requirements of floodplain vegetation communities on the Burra North floodplain as they are currently known (from the Frood and Papas Report) are largely met by the existing inundation regime
- however, the condition of aquatic and floodplain vegetation will generally benefit from environmental watering
- reversal of terrestrialisation will be an important benefit of the Project
- the potential death of up to 132 Large Trees within the MIA as a result of increased inundation leading to a shift from Lignum Swampy Woodland to Lignum Swamp would be a benefit rather than adverse effect of the Project
- while both construction and operation of the Project would result in a 'medium' residual risk to threatened flora species and ecological communities, this would not be significant, as it would cause only very minor changes in populations of FFG Act listed threatened flora species.

Mr Watson gave evidence that the overall effects of Project operation on terrestrial fauna will be beneficial.

7.3 Discussion

(i) Likely biodiversity impacts of construction

The Committee considers the potential impacts of construction of the Burra Creek Project are relatively well specified, except for the riparian corridors of the Murray River and Burra Creek.

The construction impacts of the Burra Creek Project on native vegetation (21.60 ha potentially lost in the construction footprint) and Large Trees (188 canopy trees potentially affected by construction) are substantially greater than the construction impacts of the Nyah or Vinifera Projects.

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. Two notable impacts would be the loss of two individuals of the endangered Branching Groundsel and one individual of the endangered Fuzzy New Holland Daisy within the construction footprint.

²⁹ DB40.

EDS E1 requires the Proponent to further avoid and minimise effects on threatened vegetation during detailed design and construction. Should the Project proceed:

- the Nyah and Vinifera Committee and the Minister’s Assessment for EES Central recommended changes to several EDSs to further minimise impacts on threatened flora species and communities, which are equally applicable to the Burra Creek Project
- an additional requirement should be added to EDS1 requiring further consideration of reducing impacts on EVC 103 Riverine Chenopod Woodland in the Burra Creek MIA
- EDS E6 should be added, consistent with the recommendations in the Minister’s Assessment of EES Central, to require additional surveys of threatened dryland flora species.

Considering the sensitivity and multiple values of riparian corridors, further examination of opportunities to avoid and minimise impacts on biodiversity and other values (cultural heritage, geomorphic risks, landscape amenity) within the riparian corridors is needed if the Project were to proceed. This is discussed in more detail in Chapter 4.4. The need for further assessment of options to relocate infrastructure and works outside the riparian corridors results in uncertainties about the impacts of construction.

(ii) Likely biodiversity benefits and impacts of operation

The ER, Addendum Report and expert evidence provided on behalf of the Proponent have demonstrated that the operation of the Project would:

- change the frequency and duration of floodplain inundation within the Burra Creek MIA
- have a high likelihood of improving the condition of Floodway Pond Herbland along Burra Creek
- potentially lead to reversal of terrestrialisation in a small section of Burra Creek by a shift from Lignum Swamp to Floodway Pond Herbland
- lead to the following changes the Burra North floodplain:
 - improvements in the condition of some of the vegetation
 - reversal of terrestrialisation, resulting in a potential change of up to 50 ha of Lignum Swampy Woodland to Lignum Swamp, and small areas of Riverine Chenopod Woodland (0.24 ha) and Shrubby Riverine Woodland (4.24 ha) to Lignum Swampy Woodland
- lead to the death of up to 132 Large Trees in the Burra North MIA as a result of the transition from Lignum Swampy Woodland to Lignum Swamp
- have a beneficial effect on up to 18 FFG Act listed threatened flora species in the aquatic, floodplain and mudflat, and moisture-dependent species groups
- have a detrimental effect on up to 19 FFG Act listed threatened dryland flora species
- have a generally beneficial effect on threatened fauna species listed under the FFG Act and EPBC Act
- likely lead to positive responses from native aquatic fauna species but accompanied by a range of risks including increased proliferation of carp and stranding of fish during drawdown.

The assessment of potential benefits and effects of Project operation on vegetation in the MIA is subject to significant uncertainties, as discussed in Chapter 5. A major source of uncertainty is the lack of an accurate, properly calibrated hydraulic model to underpin the hydrological, geomorphological and ecological assessments (Chapter 3.2). Another significant uncertainty is

whether the Large Trees that will potentially be killed by Project operations are part of a terrestrialisation response to river regulation, or whether they precede river regulation (Chapter 5.3).

The Proponent has argued the specific ecological outcomes which will be delivered by the reversal of terrestrialisation are 'better' than the perpetuation of existing conditions. This Committee agrees that reversal of terrestrialisation can provide ecological benefits in some situations, but it is not convinced that the predicted reversal of terrestrialisation in the Burra Creek MIA – particularly the potential transition from Lignum Swampy Woodland to Lignum Swamp with associated deaths of up to 132 Large Trees and displacement of up to 19 FFG Act listed threatened dryland species from the MIA – will provide an overall ecological benefit (see Chapter 5.3 for more detail).

(iii) Offsets for tree deaths from operation

The updated AOIB discusses offsets for native vegetation removal, but does not directly address the question of whether offsets are required for the 132 Large Trees potentially lost as a result of Project operation. It does note that these trees, if lost, would not be physically removed and would remain as stags, providing habitat for many species. Further, any losses would occur over a long time period (more than 20 years).

Clause 12.01-2S (Native vegetation management) of the Planning Scheme seeks to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation, by applying the Native Vegetation Guidelines.³⁰ The Assessors Handbook³¹ states "*The full extent of native vegetation removal must be considered*" and explains that native vegetation 'removal' includes assumed losses, including "*losses from changed water flows*".

These 132 Large Trees are not included in the native vegetation removal calculations for the Project.

The EES Central Committee made the following findings in relation to the reversal of terrestrialisation that was expected to occur in the EES Central Project:³²

- The reversal of terrestrialisation is a legitimate and beneficial objective and outcome of the Project.
- Gradual floristic changes which result in a terrestrial EVC converting to a floodplain EVC do not need to be accounted for in native vegetation impacts.
- The Committee does not agree that consideration of terrestrialisation cannot attach any biodiversity value to terrestrial species which have opportunistically inhabited the floodplain.

The examples of reversal of terrestrialisation contemplated by the EES Central Committee did not include the death of Large Trees.

The EES Central Committee contemplated implications of terrestrialisation for listed threatened species and noted that:

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.

³⁰ *Guidelines for the removal, destruction or lopping of native vegetation* (Department of Environment, Land, Water and Planning, 2017)

³¹ *Assessor's handbook – application to remove, destroy or lop native vegetation* (Department of Environment, Land, Water and Planning, 2017)

³² VMFRP SIAC – EES Central Report No. 1 at page 90.

The same principle could be argued to apply in the case of Large Trees, which also have particular values that are protected through a regulatory framework, in this instance native vegetation management regulations.

In response to concerns raised in submissions about potential drowning of mature trees, the EES Central Committee recommended further assessments to determine whether native vegetation in the MIA was at risk of drowning as a result of Project operation. It recommended that this information be used by DEECA to inform native vegetation approvals. It did not specify how DEECA should account for the death of large trees as a result of managed inundation if this were identified to be a potential impact.

DEECA's submission to the EES Central Committee (EES Central D190) explained that even if offsets are not required, information about removal, destruction or lopping of native vegetation should still be submitted to and approved by the Secretary because it also serves a number of other purposes:

- to ensure the extent of any removal is accounted for and is only to the extent necessary, which assists in ensuring that any removal is consistent with relevant biodiversity policy
- to support the monitoring and reporting obligations at condition 4.6 of the Incorporated Document (monitoring and evaluation of biodiversity improvements)
- to provide DEECA with information on native vegetation removal, as well as the extent of retained vegetation, which is used by DEECA for regional and State-wide monitoring and reporting on the 'no net loss' objective, as well as in the development of environmental policy.

The Assessor's Handbook uses the term 'remove native vegetation' to include 'remove, destroy or lop native vegetation' pursuant to relevant provisions in Victorian planning schemes. It states that native vegetation removal includes 'assumed losses', such as losses from changed water flows. On this basis, the Committee considers DEECA's submission to the EES Central Committee is relevant to the potential death of Large Trees in the Burra MIA as a result of overwatering.

For the reasons set out above, the Committee recommends that should the Project proceed, potential loss of large trees in the Burra Creek MIA as a result of Project operation should be subject to the same assessments and approvals as the removal of trees from the construction footprint. This is broadly consistent with the Nyah and Vinifera Committee's recommendations, and is reflected in the changes to clause 4.6 of the Incorporated Document shown in Appendix C.

(iv) Overall biodiversity outcomes and offset requirements

The Nyah and Vinifera Committee presented a discussion of overall biodiversity outcomes and offset requirements in Chapter 7.3(iii) of Report No. 2. This Committee adopts that discussion, with the following qualifications.

The Nyah and Vinifera Committee stated that for the Nyah and Vinifera Projects, *"it is likely but not certain that an 'overall improvement in biodiversity' will be achieved"*. For the Burra Creek Project, the benefits are less certain for a range of reasons, including that the hydraulic model used to underpin the Specialist Assessments has been demonstrated to be inaccurate.

The Burra Creek Project will enable the frequency and duration of inundation events equivalent to the Seasonal Fresh and Burra Maximum to be brought closer to pre-regulation inundation regimes, by extending the duration of Seasonal Fresh events and increasing the frequency of Burra

Maximum events. However, the effects of Project infrastructure on inundation processes in unmanaged events in the context of the Wakool effect have not been assessed.

There are significant uncertainties regarding the effects of the Project on terrestrial vegetation, a significant factor being reliance on inadequate information about the hydraulic effects of the Project.

The Committee accepts that the Project is expected to lead to improvement in the condition of 141.77 ha of Floodway Pond Herbland vegetation along Burra Creek, which is linked to smaller inundation events as illustrated by the Seasonal Fresh scenario.

The main effects of the Project on the remaining 261.23 ha of the MIA (primarily on the floodplain) are to reverse terrestrialsation and improve the health of non-dryland species. These effects are linked to larger inundation events as illustrated by the Burra Maximum scenario.

As discussed in Chapter 5, the Committee is not convinced that reversal of terrestrialsation will provide an overall benefit for biodiversity, taking into consideration the associated deaths of up to 132 Large Trees and potential displacement of up to 19 FFG Act listed threatened species from the MIA. Furthermore, the question of whether the Large Trees that would be drowned are indeed part of a terrestrialsation response to river regulation has not been rigorously tested.

This Committee is not convinced that the Burra Creek Project will provide an overall benefit, taking into account the large loss of native vegetation (including Large Trees, Very Large Trees and Hollow-bearing Trees) compared to Nyah and Vinifera, and the mixed outcomes predicted for native vegetation in the MIA. The assessment of operational effects of the Project is limited by significant uncertainties arising from an inadequate assessment of hydraulic effects in the ER and Addendum Report.

If the Project were to proceed, this Committee adopts the Nyah and Vinifera Committee's recommendation that the offset arrangements should require the final assessment of offsets to be deferred until there is clear evidence the benefits of the Project have been delivered. The offset determination should include losses of native vegetation and large trees due to construction, and deaths of large trees resulting from operation. This is reflected in the changes to clause 4.6 in the Incorporated Document shown in Appendix C.

For completeness, the Committee recommends that native vegetation calculations include native vegetation impacts from the additional groundwater monitoring wells or bores recommended in EDS GW2. This requirement should apply to all ER Central projects, not just Burra Creek.

7.4 Findings and recommendation

The Committee finds:

- The available information does not provide a compelling case that the Burra Creek Project will achieve the policy objective of ensuring no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation.
- If the Project were to proceed:
 - a final assessment of offsets should be deferred until there is clear evidence the benefits of the Project have been delivered (as recommended by the Nyah and Vinifera Committee)
 - the offsets should include the potential death of 132 Large Trees resulting from Project operation.

The Committee recommends:

If the Project proceeds, revise clause 4.6.1 of the Incorporated Document as shown in Appendix C to include details of trees and threatened Ecological Vegetation Communities in the Burra Creek project area in the vegetation information to be provided to the Secretary of the Department of Environment, Energy and Climate Action.

8 Matters of National Environmental Significance

8.1 What did the ER and Addendum Report 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. The Addendum Report Attachment 2 provided a revised assessment of the impacts of operation of the Burra Creek Project, but did not make any changes to the conclusions regarding significant impacts on MNES.

8.2 Discussion

Chapter 10.2 in Report No. 2 sets out the context for the Nyah and Vinifera Committee’s assessment of MNES, and is adopted here.

Table 8 summarises the predicted impacts of the Burra Creek Project for MNES. More detailed discussion of the Project’s likely impacts on MNES is set out in Chapters 5 and 6 of this Report and is not repeated here.

Table 8 Likelihood of significant adverse impacts and potential benefits for MNES

Species	Construction	Operations
Winged peppercross	No impacts expected	Possible minor impacts (if present)
Growling Grass Frog	No impacts expected	No adverse impacts expected Could benefit (if present)
Australasian Bittern	No impacts expected	No adverse impacts expected Could benefit
Australian Painted Snipe	No impacts expected	No adverse impacts expected Could benefit
Painted Honeyeater	Possible minor impacts, unlikely to be ecologically significant	No adverse impacts expected Could benefit
Regent Parrot	Possible minor impacts, unlikely to be ecologically significant	Minor local impacts possible, but no ecologically significant impacts expected Could benefit
South-eastern Long-eared Bat	Possible minor impacts, unlikely to be ecologically significant	No adverse impacts expected
White-throated Needletail	No impacts expected	No adverse impacts expected Could benefit
Murray cod	No impacts expected	Could benefit
Silver perch	No impacts expected	Could benefit

The Project is not expected to have a significant impact on Ramsar wetlands, the nearest of which is Hattah-Kulkayne Lakes 50 to 100 kilometres downstream of the Project area.

The Victorian Mallee Bird Community, which occurs in the wider project area, partly corresponds with the endangered Mallee Bird Community of the Murray Darling Depression Bioregion, which was listed as a threatened ecological community under the EPBC Act in December 2021. Any impacts on this bird community are expected to be insignificant (Chapter 5.5).

The Committee has adopted the recommendations of the Nyah and Vinifera Committee for the refinement and strengthening of several mitigation measures, including EDS E2d and SW2, to address key threats including pest plants and animals, and carp and fish stranding. These will assist in further reducing potential impacts to MNES should the Project proceed.

8.3 Findings

The Committee concludes:

- Impacts of the Burra Creek Project on MNES can be acceptably managed through recommended mitigation measures.

PART C: OVERALL ASSESSMENT

9 Overall assessment

9.1 Response to Terms of Reference

Clause 47 of the Committee’s Terms of Reference states:

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;
 - 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;
 - d. 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;
 - i. 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.

The Committee’s response to the substantive issues (clauses 47(a) to (f)) in relation to the Burra Creek Project is set out below. The information and analysis in support of the Committee’s conclusions are presented in Part B of this Report.

(i) Clause 47(a) – Predicted environmental effects and benefits and their respective significance and acceptability

The predicted environmental effects and benefits of the Burra Creek Project, and their significance and acceptability, are highly uncertain. The hydraulic model underpinning the assessment of effects and benefits (the Jacobs Burra model) is uncalibrated and does not accurately represent existing hydraulic conditions on the Burra North floodplain. Critically, it does not account for variable backwater from the Wakool River, which significantly affects the hydraulic behaviour of the northern end of Burra Creek and floodplain.

Recognition of the Wakool effect has led to a changed understanding of floodplain inundation processes. It is now understood that, under current conditions:

- there is a significant ingress of water at the northern end of the floodplain due to the Wakool effect, rather than flow from south to north as previously understood
- the floodplain is inundated at greater frequencies and for slightly longer durations than predicted in the exhibited ER (refer to Figure 1).

Effects and benefits of operation

The assessment of implications of Project operation for terrestrial vegetation indicates that with the Wakool effect taken into account, the known hydrological requirements of existing vegetation communities (based on the Flood and Papas Report) are already largely met by the existing inundation regime. Frequency of inundations is within the range recommended by the Flood and Papas Report, although the duration of inundation is less than recommended for some EVCs (refer to Figure 17).

The Specialist Assessments predict mixed effects on the condition of floodplain vegetation from increased inundation as a result of Project operations. Some communities and species would improve in condition in response to the increased inundation, and others would be unfavourably affected, resulting in ecological transitions that are interpreted by the ER and Specialist Assessments as reversal of terrestrialisation.

The transitions will lead to shifts between ecological communities of the same or lower conservation significance, not to communities of higher conservation significance.

The transitions would potentially lead to the death of up to 132 large trees (Black Box) comprising 12.4 percent of the total estimated number of large trees in the MIA, and displacement of 19 threatened dryland flora species from the MIA, representing 51.4 percent of the total number of threatened flora species present or possibly present in the MIA.

The trees that could potentially be killed by increased inundation resulting from Project operation include Large and Very Large Trees. Based on their size, it is possible they were already present prior to river regulation. Further assessment would be needed to confirm this, for example, analysis of historical information including historical aerial imagery, and possibly dating.

Further, the ingress of water at the northern end of the Burra Creek floodplain is not reflected in the Jacobs Burra modelling. From the hydraulic information available, the Committee is unable to determine that the Project infrastructure, including containment banks at the northern end of the floodplain, will not impede the ingress of natural floods into the Burra North floodplain.

Although it represents a small increase in total salt loads in the Murray River, the effect of the Burra Creek Project on salinity levels in the river is almost as great as both Nyah and Vinifera combined.

Effects of construction

The ecological effects of construction, both in absolute terms and relative to potential benefits, appear to be higher for the Burra Creek Project than for the Nyah or Vinifera Projects. There is more extensive loss of large trees and native vegetation resulting from construction, both in absolute terms and relative to the area of vegetation and number of trees that could potentially benefit.

Findings

The Committee finds:

- It is not able to determine that the environmental effects and benefits of the Project are acceptable.

(ii) Clause 47(b) – Advice on whether the Project is expected to result in overall improvement to the biodiversity values of the Burra North floodplain ecosystems, including MNES

The Committee is not satisfied, based on the information before it, that the Project is likely to result in an overall improvement to the biodiversity values or a net environmental benefit. This primarily stems from the use of an uncalibrated and inaccurate hydraulic model as the basis for the assessments of the Project's environmental effects and benefits.

An approach that would have the Project built and then possibly minimally operated as a result of adaptive management to avoid adverse effects arising from operation would not satisfactorily address this.

Based on the information before it, the Committee doubts the Project would deliver an overall improvement to the biodiversity values of the floodplain, particularly given the adverse effects of the Project (both construction impacts and the likelihood that the Project infrastructure may impede natural flows from the north) are primarily felt on the floodplain. It is possible the Project could deliver an improvement to the biodiversity values of the Burra Creek channel, although this would need to be confirmed by revised assessments based on updated and accurate hydraulic modelling.

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.

Findings

The Committee finds:

- It is not persuaded that the Project will deliver an overall improvement to the biodiversity values of the Burra North floodplain ecosystems.
- Impacts on MNES can be acceptably managed.

(iii) Clause 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

If the Project were to proceed, this Committee adopts the Nyah and Vinifera Committee's recommendation that the offset arrangements should require determination of the final

assessment of offsets to be deferred until there is clear evidence the benefits of the Project have been delivered. The offset determination should include losses of native vegetation and large trees due to construction and deaths of large trees resulting from operation. These are addressed in the Committee's recommended changes to clause 4.6 of the Incorporated Document (see Appendix C).

Findings

The Committee finds:

- If the Project were to proceed, the proposed arrangement to compensate for loss of native vegetation should be modified such that determination of the final assessment of offsets:
 - is deferred until there is clear evidence the benefits of the Project have been delivered
 - includes losses of large trees resulting from operation (as well as native vegetation and large trees lost due to construction).

This is reflected in the Committee's recommended changes to clause 4.6 of the Incorporated Document (see Appendix C).

(iv) Clause 47(d) – Recommendations for any feasible modifications to the Project

The Committee has not recommended any design modifications to the Project, but has recommended the following should the Project proceed:

- revised hydraulic modelling and updated ecological assessments should be undertaken before detailed design of the Project
- detailed design should include further assessment of options to relocate Project infrastructure outside the riparian corridors
- various changes to the Incorporated Document and EMF (including the EDS).

It is possible that if the hydraulic modelling and ecological assessments are revised as recommended, minor or major design modifications may be required. This could include modifying the Project to allow for Seasonal Fresh events along the Burra Creek, without the infrastructure on the floodplain required for Burra Maximum events. However, it is not possible to define any design modifications until that additional work is completed.

Findings

The Committee finds:

- It is not in a position to recommend modifications to the Project.

(v) Clause 47(e) – Findings on whether acceptable environmental outcomes can be achieved

Based on the information before it, the Committee is not satisfied the Project is likely to achieve acceptable environmental outcomes. It is possible that a revised assessment, possibly for a modified project, may achieve acceptable environmental outcomes, but that information is not before the Committee.

Findings

The Committee finds:

- It has not been demonstrated to the Committee's satisfaction that the Burra Creek Project will achieve acceptable environmental outcomes.

(vi) Clause 47(f) - Recommendations on specific measures appropriate to prevent or mitigate adverse environmental effects to achieve acceptable environmental outcomes

The Committee's primary recommendation is that the Burra Creek Project not be approved, because the hydraulic modelling in the ER and the Addendum Report is not adequate to enable a proper assessment of ecological consequences of the project.

In case the Minister does not accept the Committee's primary recommendation, the Committee has made recommendations regarding mitigation measures. These are largely based on the recommendations of the Nyah and Vinifera Committee, and have been modified to:

- include additional requirements that are specific to the Burra Creek context
- reflect the Minister's Assessment for the EES Central Projects.

The Committee's recommended mitigation measures are in Appendix C (Incorporated Document) and Appendix D (EMF) of this Report. They are further explained in Chapter 10.

Findings

The Committee finds:

- Should the Minister not accept the Committee's primary recommendation that the Project should not be approved, the Committee's recommended changes in Appendix C and Appendix D should be made.

9.2 Recommendations

The Committee's primary recommendation is:

1. The Burra Creek Project should not be approved.

The remaining recommendation is provided in the event that the Minister does not accept the Committee's primary recommendation.

2. If the Burra Creek Project proceeds:

- a) revise the Incorporated Document as shown in Appendix C**
- b) revise the Environmental Management Framework as shown in Appendix D.**

PART D: APPROVALS AND IMPLEMENTATION

10 Implementation

As previously stated, the following discussion is only relevant if the Minister does not accept the Committee’s primary recommendation that the Burra Creek Project should not be approved.

10.1 Draft Swan Hill Planning Scheme Amendment C78

The Nyah and Vinifera Committee recommended several changes to the Incorporated Document. These changes apply equally to the Burra Creek Project, and are adopted by this Committee, although some minor adjustments are required as set out in Table 9. These are identified in Appendix C by green highlighting.

Table 9 Adjustments to the Nyah and Vinifera Committee’s recommended Incorporated Document

Clause	Nyah and Vinifera Committee recommendation	Adjustment for Burra Creek
Various	The Nyah and Vinifera Committee removed references to the Burra Creek Project	Reinstate references to the Burra Creek Project (cover page and clauses 1.2 and 4.12.1)
1.5	N/A	Include a new clause to describe the Minister’s Assessments by date (as the date for the Nyah and Vinifera Assessment will differ from the date for the Burra Creek Assessment)
4.4.2	Development plans must be supported by an assessment of the need for works within 30 metres of the banks of the Murray River	Extend to include works within 30 metres of the banks of Burra Creek
4.5	The EMF must: <ul style="list-style-type: none"> - be approved by the Minister for Planning (rather than the Secretary of DEECA) - be informed by the Minister’s Assessment - contain EDSs dealing with various specified matters 	No adjustment required, other than a minor adjustment to 4.5.7(a) to require the Construction Environmental Management Plan to be informed by the Minister’s Assessment (this appears to have been left out of the Nyah and Vinifera Committee’s recommendations as a result of an oversight)
4.6	Assessment of offsets for the removal of native vegetation should be deferred for five years. Offsets must be provided unless: <ul style="list-style-type: none"> - the Secretary of DEECA agrees it has been demonstrated that the Projects provide an overall improvement for biodiversity - biodiversity responses are monitored and evaluated after five years 	Add 4.6.1(b) to require details of trees and vegetation that may be adversely affected by Project operation to be included in the native vegetation information to be provided to the Secretary of DEECA

Clause	Nyah and Vinifera Committee recommendation	Adjustment for Burra Creek
	- having considered the evaluation report, the Secretary does not then require offsets to be provided	
4.7	Monitoring and evaluation of biodiversity improvements – this clause was deleted by the Nyah and Vinifera Committee, presumably on the basis that it required a five yearly (thereafter 10 yearly) monitoring and assessment of biodiversity responses before offsets calculations were made (clause 4.6.2(b)-(d))	This Committee considers that the monitoring and evaluation requirements in 4.7 complement those recommended by the Nyah and Vinifera Committee in 4.6.2, and the clause should be retained
4.11.1	N/A	The Proponent’s Day 1 version of this clause (DB22) included some minor drafting improvements, which this Committee supports. The changes have not been shown in green in Appendix C as they are not substantive
4.13.2	Preparatory works (which may commence before the conditions of the Incorporated Document are satisfied) include buildings, works <u>and vegetation removal</u> where a permit would not be required	The Proponent’s Day 1 version of this clause (DB22) accepted the addition of vegetation removal, and included additional words in (b) <u>‘except where a planning permit for vegetation removal would ordinarily be required under the provisions of the planning schemes’</u> . These words provide additional protection and should be retained.

10.2 Environmental Management Framework

The Nyah and Vinifera Committee recommended several changes to the EMF. These changes apply equally to the Burra Creek Project, and are adopted by this Committee, although some minor adjustments are required as set out in Table 10. These are identified in Table 10 and Appendix D by green highlighting.

Table 10 Adjustments to the Nyah and Vinifera Committee’s recommended EDS and Monitoring Requirements

Ref	Adjustment for Burra Creek
ACH4	Recommended for inclusion based on Minister’s Assessment for EES Central.
CM1c	Targeted soil sampling recommended at locations identified as having potential to contain contaminated material or be subject to any other soil hazards , due to the widespread presence of sodic and dispersive soils in the Burra Creek project area (see Chapter 4).

Ref	Adjustment for Burra Creek
E1	<p>Inclusion in first paragraph of a requirement to make all efforts to reduce native vegetation losses below maximum worst case extents is based on Minister’s Assessment for EES Central First dot point, require further assessment of works within 30m of the banks of the Murray River and the banks of Burra Creek (see Chapter 4.4)</p> <p>Include an additional dot point ‘For Burra Creek, further consideration to reducing impacts on endangered EVC 103 Riverine Chenopod Woodland during detailed design...’, as a substantial amount of this EVC will be impacted by construction of the Burra Creek Project (see Chapter 5.2), and a smaller amount potentially affected by Project operation (see Chapter 5.3)</p> <p>Include an additional dot point ‘Revise native vegetation removal calculations to include the native vegetation impacts from the additional wells or bores...’, for the reasons set out in Chapter 7. This is not a Burra Creek specific recommendation, and the Committee considers it should apply (as drafted) to all ER Central projects.</p>
E2e	<p>The Nyah and Vinifera Committee recommended a hollow replacement plan be required under EDS E2e. This Committee prefers the approach in the Minister’s Assessment for EES Central of a separate EDS (E5). It is therefore not included in E2e.</p>
E3	<p>Additional requirements for the Pest Plant and Animal Monitoring and Management Plan have been included to:</p> <ul style="list-style-type: none">- reflect the requirements that the Nyah and Vinifera Committee recommended be included on the section 27 consent under the <i>National Parks Act 1975</i> (noting that no such consent is required for the Burra Creek Project)- capture the requirements in the Minister’s Assessment for EES Central relating to measures to assist private landowners deal with proliferation of weeds as a result of Project operations.
E5	<p>Recommended for inclusion based on Minister’s Assessment for EES Central (see EDS E2e above).</p>
E6	<p>New requirement to undertake additional targeted surveys for threatened dryland flora species for the reasons set out in Chapter 5.4. This is not a Burra Creek specific recommendation, and the Committee considers it should apply (as drafted) to all ER Central projects.</p>
GS1	<p>Reference to the Nyah and Vinifera borrow pit site has been added to the second dot point. The Nyah and Vinifera Committee found that hydraulic assessment is required for the Nyah and Vinifera borrow pit site because it is on the Murray River floodplain adjacent to the river. It is not required for the Burra Creek borrow pit site which is located well away from the river. Reference to the stability of the Burra Creek banks has been added to the third dot point, for the reasons discussed in Chapter 4.3.</p> <p>In the fourth dot point, modelling that meets the requirements in SW4 has been added, in light of the changes to SW4 (see below).</p> <p>In the final dot point, ‘project construction’ has been replaced with ‘project infrastructure’. This appears to have been a drafting oversight of the Nyah and Vinifera Committee. It is particularly important to correct in the Burra Creek context, as the full effects of the Project infrastructure on the hydraulics of the floodplain (in particular, water entering the floodplain from the north in unmanaged events) have not been assessed (see Chapter 3.2).</p> <p>Responsibilities are changed to Contractor and Proponent. This is not a Burra Creek specific recommendation, and the Committee considers it should apply (as drafted) to all ER Central projects.</p>

Ref	Adjustment for Burra Creek
GS3	This EDS requires monitoring of stability of the Murray River bank and riparian corridor. It has been extended to Burra Creek .
SW2	Final dot point amended to delete 'rapid increase in' . Appears to have been a drafting error of the Nyah and Vinifera Committee. This is not a Burra Creek specific recommendation, and the Committee considers it should apply (as drafted) to all ER Central projects.
SW4	<p>The Nyah and Vinifera Committee recommended different wording to the EES Central Committee for the further hydraulic assessment. This Committee considers that the EES Central wording (modified in accordance with the Minister's Assessment for EES Central) is more appropriate for the Burra Creek Project, which has taller regulators than the Nyah and Vinifera Projects, with potentially greater hydraulic effects.</p> <p>'Floodplain vegetation' has been changed to 'vegetation in the MIA'. This is necessary for the Burra Creek project given the distinction between the floodplain and the creek channel. but can equally be applied to all other VMFRP projects to ensure consistency.</p> <p>Additional Burra Creek specific requirements have been added for the reasons set out in Chapters 3.2, 4.3 and 5.3.</p> <p>Should the Minister consider consistency of wording across all three ER Central projects be appropriate, the wording of SW4 in Appendix D is suitable for the Nyah and Vinifera Projects.</p>
SW5	This Committee has adopted the Nyah and Vinifera Committee's recommended SW5 (relating to the design of the regulators, containment banks and spillways) but considers the responsibility should be the Contractor rather than the Proponent. This is not a Burra Creek specific recommendation, and the Committee considers it should apply (as drafted) to all ER Central projects.
SW6	This Committee has recommended an additional SW6 requiring further assessment of blackwater risks for the Burra Creek Project, for the reasons set out in Chapter 3.3.
M GW1	Reference to an additional monitoring bore in the Burra Creek area that is at risk of a shallow water table, for the reasons set out in Chapter 3.4.
M TE6	Additional Burra Creek specific requirements were added in the Proponent's Day 1 version (DB21). The Committee supports these additions.
M TE9	Additional Burra Creek specific requirements were added in the Proponent's Day 1 version (DB21). The Committee supports these additions.

10.3 Other approvals

The Nyah and Vinifera Committee made recommendations for other approvals. Recommendation 16 relates to licences for works on a waterway under section 67 of the *Water Act 1989*. That recommendation applies equally to the Burra Creek Project as to the Nyah and Vinifera Projects, and is adopted by this Committee. Recommendation 17 relates to section 27 consents under the *National Parks Act 1975*. That recommendation does not apply to Burra Creek, as the Burra Creek project area does not include land in a National Park. This Committee has instead recommended changes to EDS E3 to capture these requirements.

PART E: 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;
- b. 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

2. 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:

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;
 - b. 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.
9. 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.

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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*.

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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;
 - b. 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.

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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;
 - d. 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.

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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;
 - 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;
 - d. 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;
 - i. 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;

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- 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.

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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.



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 Planning.Panels@delwp.vic.gov.au.
2. For matters regarding the EES and environment report processes please contact the Impact Assessment Unit in DELWP by email environment.assessment@delwp.vic.gov.au.

Appendix B Document list

ER Central package – Burra Creek Project

The following documents were tabled in the Burra Creek Roundtable.

No.	Date	Description	Presented by
B1	9 May 23	Email from Proponent to SIAC - Update regarding Burra Creek and proposed draft schedule (dated 5 May)	Proponent
B2	19 May 23	VMFRP SIAC ER Central - Letter to Proponent regarding update on Burra Creek Project	Committee
B3	23 Jun 23	Letter from Proponent to SIAC - Update on further work and proposed timings	Proponent
B4	29 Jun 23	VMFRP SIAC ER Central - Letter to Submitters - update on Burra Creek Project	Committee
B4A	30 Jun 23	Letter from Proponent to SIAC - Burra Creek Addendum documents	Proponent
B4B	30 Jun 23	Proponent - Burra Creek Addendum - Summary Report - June 2023	Proponent
B4C	30 Jun 23	Proponent - Burra Creek Addendum - Attachment 1 - Updated Project Description (clean)	Proponent
B4D	30 Jun 23	Proponent - Burra Creek Addendum - Attachment 1 - Updated Project Description (track changes)	Proponent
B4E	30 Jun 23	Proponent - Burra Creek Addendum - Attachment 2 - Specialist Assessments	Proponent
B4F	30 Jun 23	Proponent - Burra Creek Addendum - Attachment 3 - Assessment Overall Improvement for Biodiversity (AOIB) (clean)	Proponent
B4G	30 Jun 23	Proponent - Burra Creek Addendum - Attachment 3 - AOIB (track changes)	Proponent
B5	6 Jul 23	VMFRP SIAC ER Central - Letter to Submitters - Burra Creek Project updated documents	Committee
B6	27 Jul 23	ER Central Burra Creek - Further submission	EPA
B7	28 Jul 23	ER Central Burra Creek - Further submission	Environment Victoria
B8	28 Jul 23	VMFRP SIAC ER Central – Directions, Distribution List and Roundtable Timetable (version 1)	Committee
B9	4 Aug 23	Letter to SIAC regarding Direction 1, modelling reports and expert witness statements	Proponent
B10	4 Aug 23	Hydrodynamic Modelling of SDL Sites, Burra Creek - Final Report (Jacobs, 4 December 14) (Direction 10a)	Proponent

No.	Date	Description	Presented by
B11	4 Aug 23	SDL Offset Sites Hydrodynamic Modelling Burra Creek Report (Jacobs, 22 February 17) (Direction 10b)	Proponent
B12	4 Aug 23	Expert witness statement of Greg Hoxley - groundwater	Proponent
B13	4 Aug 23	Expert witness statement of Simon Treadwell - surface water a. Annexure D	Proponent
B14	4 Aug 23	Expert witness statement of Jean-Michel Benier - aquatic ecology	Proponent
B15	4 Aug 23	Expert witness statement of Drew King - terrestrial ecology (flora)	Proponent
B16	4 Aug 23	Expert witness statement of Chris Watson - terrestrial ecology (fauna)	Proponent
B17	7 Aug 23	Email from Proponent to SIAC – Link to Ecology Mapping System [CONFIDENTIAL FOR USE OF COMMITTEE ONLY]	Proponent
B18	7 Aug 23	Email from Proponent to SIAC – Correspondence and interactive StoreyMaps (ArcGIS) links - 7 Aug 23	Proponent
B19	7 Aug 23	Proponent - Part A submission - Burra Creek Project	Proponent
B20	7 Aug 23	Proponent - Response to submissions - Burra Creek Project	Proponent
B21	7 Aug 23	Proponent - Day 1 Environmental Delivery Standards (EDS) and Monitoring Requirements - Burra Creek Project	Proponent
B22	7 Aug 23	Proponent - Day 1 Incorporated Document - Burra Creek Project - 7 August 2023	Proponent
B23	7 Aug 23	Burra Creek Project Technical Note B1 (TNB1) - Ecological Associates Report	Proponent
B24	7 Aug 23	Ecological Associates Report - Burra Creek Project	Proponent
B25	7 Aug 23	Cultural Heritage Management Plan (CHMP) update memorandum - Burra Creek Project	Proponent
B26	7 Aug 23	Operational Maps - Burra Creek	Proponent
B27	7 Aug 23	Operating Elevation Map - Burra Creek Project	Proponent
B28	7 Aug 23	Aerial Maps - Burra Creek - 7 August 2023 (Direction 9)	Proponent
B29	7 Aug 23	Contours Overview Map - Burra Creek Project	Proponent
B30	7 Aug 23	Contours and LiDAR Maps - Burra Creek Project	Proponent
B31	7 Aug 23	Freehold land parcels maps - Burra Creek Project	Proponent
B32	7 Aug 23	Road classification maps - Burra Creek Project	Proponent
B33	7 Aug 23	Presentation of Daniel Freitag (LMW) - project description	Proponent
B34	8 Aug 23	Email from DEECA to SIAC – regarding participation	DEECA
B35	10 Aug 23	Proponent - Part B submission - Burra Creek Project	Proponent

No.	Date	Description	Presented by
B36	15 Aug 23	Presentation of Greg Hoxley - Groundwater	Proponent
B37	15 Aug 23	Presentation of Simon Treadwell - Surface water	Proponent
B38	17 Aug 23	Presentation of Jean-Michel Benier - aquatic ecology	Proponent
B39	17 Aug 23	Burra Creek Project Technical Note B2 (TNB2) - response to questions taken on notice (groundwater expert evidence)	Proponent
B40	22 Aug 23	Presentation of Drew King - terrestrial ecology (flora)	Proponent
B41	22 Aug 23	Presentation of Chris Watson - terrestrial ecology (fauna)	Proponent
B42	23 Aug 23	Technical Note B3 (TNB3) - Response to question on AOIB	Proponent
B43	23 Aug 23	Technical Note B4 (TNB4) - Riparian buffer areas	Proponent
B44	23 Aug 23	Technical Note B4 (TNB4) - Attachment (Maps Series)	Proponent
B45	23 Aug 23	Technical Note B5 (TNB5) - Potential extent of native vegetation removal	Proponent
B46	23 Aug 23	Roundtable Timetable (v2)	Committee
B47	24 Aug 23	KMZ file of photo locations contained in presentation of Drew King - terrestrial ecology (flora) (TD B40)	Proponent
B48	24 Aug 23	Technical Note B6 (TNB6) - Response to questions taken on notice (surface water)	Proponent
B49	25 Aug 23	Technical Note B7 (TNB7) - response to questions taken on notice (aquatic ecology)	Proponent
B50	25 Aug 23	Proponent - Part C Submission	Proponent
B51	25 Aug 23	Proponent - Contours and LiDAR maps (55-60mAHD)	Proponent
B52	28 Aug 23	Presentation slideshow	Nicole McKay
B53	28 Aug 23	Photographs	Nicole McKay
B54	28 Aug 23	Movie – Belsar Island	Nicole McKay
B55	28 Aug 23	Movie – floodplain areas	Nicole McKay
B56	28 Aug 23	Movie – floodplain areas	Nicole McKay
B57	28 Aug 23	Movie – Pile Bend	Nicole McKay

ER Central package – Nyah and Vinifera Projects

Refer to Appendix D of Report No. 2 for the document list for the Nyah and Vinifera Roundtable.

The Proponent identified in Attachment A of tabled document B9 (above) the following documents it intended to rely on as being applicable to the ER Central Burra Creek Roundtable.

No.	Date	Description	Presented by
10	30 Mar 23	Submission on relevant key matters in contention in EES Central (Direction 1)	Proponent
11	3 Apr 23	Letter from Proponent to SIAC - Expert evidence (Direction 19) and update on Burra Creek Project	Proponent
17	5 Apr 23	Proponent - Part A Submission (Direction 17)	Proponent
18	5 Apr 23	Proponent - Response to submissions (Direction 17b)	Proponent
25	5 Apr 23	Technical Note 2 (TN02) - Conceptual models and approach to adaptive management (Direction 16)	Proponent
32	5 Apr 23	Traditional Owner consultation update	Proponent
61	18 Apr 23	Proponent - Technical Note 5 (TN05) - Drop structures	Proponent
90	24 Apr 23	Technical Note 6 (TN06) - Burra Creek Project	Proponent
96	27 Apr 23	Technical Note 8 (TN08) - response to questions taken on notice (aquatic ecology)	Proponent
97	27 Apr 23	Technical Note 9 (TN09) - response to questions taken on notice (project benefits)	Proponent
98	28 Apr 23	Technical Note 10 (TN10) - response to questions taken on notice (surface water)	Proponent

EES Central package

Refer to Appendix D of Report No. 2 for the documents tabled in the EES Central process that the Proponent identified³³ as being of relevance to all VMFRP projects, including ER Central.

³³ Nyah and Vinifera D2 - Attachment A.

Appendix C Recommended Incorporated Document

Tracked against the Proponent’s Day 1 Burra Creek version (DB22). LMW comments in DB22 have been removed (not tracked).

The Committee’s recommended version incorporates changes recommended by the Nyah and Vinifera Committee. These are tracked unless they had already been accepted in the Proponent’s Day 1 version (DB22). Further Burra Creek specific changes recommended by this Committee are **highlighted in green** (see Table 9 for a full explanation of these changes).

Minor drafting changes (eg DELWP to DEECA, numbering changes) have not been tracked.

[Committee additions](#)

~~Committee deletions~~

Victorian Murray Floodplain Restoration Project

Vinifera Floodplain Restoration Project, Nyah Floodplain Restoration Project & Burra Creek Floodplain Restoration Project

~~DRAFT – Burra Creek ‘Day 1’ Version~~

Incorporated Document

~~August~~ October 2023

Clause	
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: <ul style="list-style-type: none"> • The Vinifera Floodplain Restoration Project (Vinifera Project); • The Nyah Floodplain Restoration Project (Nyah Project); and • The Burra Creek Floodplain Restoration Project (Burra Creek Project). <p>(together, the Projects).</p>
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.
1.5.	References to the 'Minister's Assessment' are to the Minister's Assessments under the Environment Effects Act 1978 dated: <ul style="list-style-type: none"> a) [insert date] for the Nyah and Vinifera Projects b) [insert date] for the Burra Creek Project
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 SCOX on the planning scheme maps forming part of the planning schemes (Project Land).
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: <ul style="list-style-type: none"> 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;

Clause	
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;
f)	Any buildings or works or associated infrastructure or activities for the Projects including: <ul style="list-style-type: none"> 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. Restoration and reinstatement 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. ix. Constructing fences, temporary site barriers and site security. x. Erecting and displaying signage for construction, directional and identification purposes.
4.3 CONDITIONS	
4.3.1	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 Development 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: <ul style="list-style-type: none"> 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 c) be fully dimensioned and drawn to scale.
4.4.2	<u>Submitted development plans are to be supported by an assessment, to the Minister for Planning's satisfaction, of:</u> <ul style="list-style-type: none"> a) <u>The need for siting of any works within 30 metres of the banks of the Murray River and Burra Creek having regard to the considerations identified in CI 12-03-1S and CI 14.02-1S of the Swan Hill Planning Scheme and relevant alternatives; and</u> b) <u>Proposed measures to avoid and minimize 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 or Burra Creek.</u>
4.4.3	The development plans may be amended from time to time, with the approval of the Minister for Planning.
4.4.4	Any request to amend the development plans must be accompanied by: <ul style="list-style-type: none"> a) Amended plans and a schedule explaining the proposed amendment/s. b) Details of any proposed infrastructure and associated construction footprints. c) A written statement explaining and supporting the proposed amendment, including:

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	<ul style="list-style-type: none"> 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.
4.4.5	For the avoidance of doubt, the development plans do not need to show areas of environmental watering or any mitigation measures or works under Clause 4.2(a).
4.5	<p><u>Environmental Management</u></p> <p><i>Environmental Management Framework</i></p> <p>4.5.1 Prior to the commencement of development (excluding preparatory buildings and works), an Environmental Management Framework (EMF) must be prepared, and then submitted to and approved by the Minister for Planning Secretary to the Department of Energy, Environment and Climate Action (as constituted under Part 2 of the Conservation, Forests and Land Act 1987) (Secretary).</p> <p>4.5.2 The EMF must:</p> <ul style="list-style-type: none"> a) Be informed by the findings and conclusions of the environment report prepared for the Projects under the <i>Environment Effects Act 1978</i> and by the Minister's Assessment; b) Be prepared in consultation with the Department of Energy, Environment and Climate Action; and c) Include a statement of all environmental commitments for the Projects, including details of the required content and review process for additional management and monitoring plans to be developed; and d) Contain the Environmental Delivery Standards (EDSs) that are applicable to the design, construction and operation of the Projects and address the following areas and any other relevant matters: <ul style="list-style-type: none"> i. Aboriginal cultural heritage ii. Air quality iii. Bushfire 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

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4.5.3	The use and development of the Projects must be carried out in accordance with the approved EMF.
4.5.4	The EMF may be amended from time to time, with the approval of the Secretary Minister for Planning .
4.5.5	Any request to amend the EMF must be accompanied by: <ul style="list-style-type: none"> a) A description of the form and extent of any consultation undertaken with relevant stakeholders concerning the proposed amendment/s; b) Any written comments received from relevant stakeholders; and c) A written response to comments made by relevant stakeholders.
4.5.6	The current version of the EMF must be available on a clearly identifiable Project or other relevant website from the date of approval and must remain available on such website for at least 10 years after completion of construction.
<i>Construction Environmental Management Plan</i>	
4.5.7	Prior to the commencement of development (excluding preparatory buildings and works), a Construction Environmental Management Plan must be prepared, and then submitted to and approved by the Secretary. The Construction Environmental Management Plan must: <ul style="list-style-type: none"> a) Be informed by the findings and conclusions of the environment report prepared for the Projects under the <i>Environment Effects Act 1978</i> and by the Minister's Assessment; 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.
<i>Operational Environmental Management Plan</i>	
4.5.8	Prior to the commencement of works, an Operational Environmental Management Plan must be prepared, and then submitted to and approved by the Secretary. The Operational Environmental Management Plan must: <ul style="list-style-type: none"> a) Be informed by the findings and conclusions of the environment report prepared for the Projects under the <i>Environment Effects Act 1978</i> and by the Minister's Assessment; 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 and the Mallee Catchment Management Authority and Swan Hill Rural City Council; c) Document all avoidance and mitigation measures to be implemented for the Projects during operations (including the planned timing of inundation events), as well as responsibilities for implementation. d) Include the objectives, targets and indicators to be used for the monitoring and evaluation of biodiversity response in accordance with Clause 4.7, as well as the process for preparation, approval and implementation of a Monitoring, Evaluation and Reporting Plan. e) Include guidelines for any appropriate notification of inundation events to the public and relevant agencies, including the relevant fire authorities.
4.6	<u>Native vegetation</u>
4.6.1	Prior to the removal, destruction or lopping of any native vegetation, information about that native vegetation (including description of the native vegetation to be removed, destroyed or lopped , location map, relevant offset requirements, site assessment report and information about impacts on rare or threatened species habitat) in accordance with Application Requirements 1, 5 and 9 of Table 4 and 10 and 11 of Table 5 (as applicable) of the <i>Guidelines for removal, destruction or lopping of native vegetation</i> (Department of Environment, Land,

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	<p>Water and Planning, 2017) must be submitted to and approved by the Secretary. Information submitted must include:</p> <p>a) details regarding the timing of the removal, <u>destruction or lopping</u> of native vegetation <u>for construction works</u></p> <p>b) <u>for the Burra Creek Project, details of the Large Trees, Very Large Trees and any threatened Ecological Vegetation Communities that may be adversely affected by inundation from Project operation</u></p> <p><u>Information may be submitted separately or subsequently, as directed, in relation to any likely or observed destruction of native vegetation that is attributable to managed inundation enabled by each Project.</u> (NOTE – offset requirements are not applicable if offsets are not required under Clause 4.6.2)</p>
4.6.2	<p>Prior to the removal, destruction or lopping of any native vegetation (except for preparatory buildings and works in accordance with Clause 4.13), 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 that:</p> <p>a) it has been demonstrated that the removal, <u>destruction or lopping</u> of native vegetation <u>is necessary to enable the use and development of the Projects</u> provides for <u>and is reasonably likely to achieve</u> an overall improvement for biodiversity; <u>and</u></p> <p>b) <u>monitoring and evaluation of biodiversity responses is to be implemented by or on behalf of the operator of the Project in accordance with clause 4.5.8(d) and clause 4.7 to the satisfaction of the Secretary; and</u></p> <p>c) <u>an evaluation of the overall biodiversity changes attributable to the construction and operation of each Project is to be provided by the operator of the Project to the satisfaction of the Secretary within five years of the completion of Project construction or such other timeframe that the Secretary may approve; and</u></p> <p>d) <u>the party responsible for the construction and operation of the Project has agreed to provide such native vegetation offsets that the Secretary may require after considering the evaluation of overall biodiversity changes.</u></p> <p>The agreement must address and be consistent with all relevant matters set out in the Minister’s Assessment under the Environment Effects Act 1978 dated <u>[insert date]</u>.</p>
4.6.3	<p>Any secured offsets for the Projects must be reconciled within six months of the completion of construction, <u>or such other timeframe that the Secretary may decide</u>, in accordance with the <i>Assessor’s handbook – Applications to remove, destroy or lop native vegetation</i> (Department of Environment, Land, Water and Planning, 2018) or its successors. (NOTE – not applicable if offsets are not required as per condition 4.6.2)</p>
4.6.4	<p>Evidence that any required offsets have been secured for the projects must be provided in a report to the Secretary within six months of the last vegetation removal, <u>destruction or lopping, or alternatively, within six months of a decision by the Secretary under condition 4.6.2(d)</u>. (NOTE – not applicable if offsets are not required as per condition 4.6.2)</p>
4.6.5	<p>The Secretary may vary the timing of the requirement for <u>implementing</u> offsets <u>and may consider offset requirements for construction works and in relation to losses attributable to managed inundation separately</u>. (NOTE – not applicable if offsets are not required as per condition 4.6.2)</p>
4.7	<u>Monitoring and evaluation of biodiversity improvement</u>
4.7.1	<p><u>Monitoring activities to evaluate the extent to which an overall improvement for biodiversity has been achieved must be carried out during operation of the Projects, and a report of monitoring results must be submitted to the Secretary 5 years after the first environmental watering and thereafter every 10 years, unless otherwise agreed by the Secretary. The report must be prepared and submitted to the satisfaction of the Secretary and must identify any adverse or</u></p>

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	unintentional impacts on biodiversity values, and any adaptive management proposed to be undertaken to provide for an increase in overall biodiversity improvements.
4.8	Heritage management
4.8.1	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, and then submitted to and approved by the Minister for Planning.
4.8.2	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, and then submitted to and approved by the Minister for Planning. The survey must show: <ul style="list-style-type: none"> 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. <p>Once approved by the Minister for Planning, a copy of the full archival photographic survey must be provided to the relevant Council.</p>
4.9	Road access
4.9.1	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.
4.10	Floodplain management
4.10.1	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.
4.11	Bushfire protection measures
	<i>Bushfire risk management during construction</i>
4.11.1	Prior to the commencement of development (except for preparatory buildings and works), a Bushfire Emergency Response Plan must be submitted to and approved by the Minister for Planning. The Plan must be prepared in consultation with and to the satisfaction of the relevant land manager, emergency management and fire authorities (including Department of Energy, Environment and Climate Action - Forest Fire Management Victoria), and show: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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.

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- 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 Access Road Plan

4.11.2 Before the commencement of works on roads, a Fire Access Road Plan must be prepared showing the following to the satisfaction of the relevant fire authority:

- a) Identification of the operational fire access roads,
- b) Identification of the strategic fire access roads,
- c) Identification of other roads that are not part of the strategic fire access road network and not operational fire access roads,
- d) Except 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 constructed 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 *Department of Environment, Land, Water and Planning – Parks Victoria Road Management Plan October* (Department of Environment, Land, Water and Planning, 2019) and must meet the *Guide to Road Design* (Ausroads, 2021).
- e) Except with approval of the Secretary, how roads that form part of the strategic fire access road network and which are part of the land 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 *Department of Environment, Land, Water and Planning – Parks Victoria Road Management Plan October* (Department of Environment, Land, Water and Planning, 2019).
- f) Information addressing:
 - i) how the proposed roads meet the objectives and standards contained in the *Guide to Road Design* (Ausroads, 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 crossings 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).

The Fire Access Road Plan does not apply to the following works which may be carried out within the existing horizontal or vertical footprint of any road or access track on land used for the Projects:

- a) Repairing potholes and ruts;
- b) Shoulder grading for improved drainage;
- 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

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e)	Re-sheeting and re-gravelling, of the wearing surface of formed and gravel roads.
<i>Managing changes to bushfire risk arising from environmental watering operations</i>	
4.11.3	Increased bushfire risk to life and property resulting from the operation of the Projects must be mitigated in accordance with <i>Code of Practice for Fire Management on Public Land</i> (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 <i>Conservation, Forests and Lands Act 1987</i>).
4.11.4	The plans and other documents listed in Clause 4.11.1 and Clause 4.11.2 may be amended from time to time to the satisfaction of the Minister for Planning or relevant fire authority, respectively.
4.12	<u>Other conditions</u>
4.12.1	Unless otherwise stated, the plans and other documents listed in Clause 4.3 to Clause 4.11.2 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.
4.12.2	The plans and other documents listed in Clause 4.3 to Clause 4.11.2 may be amended from time to time to the satisfaction of the relevant authority specified in Clause 4.3 to Clause 4.11.2. 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.
4.13	<u>Preparatory and other works</u>
4.13.1	Preparatory buildings and works may commence before the conditions and requirements set out in Clause 4.0 Clauses 4.3 to 4.12 are satisfied.
4.13.2	Preparatory buildings and works for the Projects includes: <ul style="list-style-type: none"> a) Buildings and works, and vegetation removal, where a planning permit would not be required under the provisions of the planning scheme. b) Investigation, testing and preparatory works to determine the suitability of land, and property condition surveys except where a planning permit for vegetation removal would ordinarily be required under the provisions of the planning schemes. 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	<u>EXPIRY</u>
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 if any of the following circumstances apply: <ul style="list-style-type: none"> 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 D Recommended Environmental Delivery Standards and monitoring requirements

Tracked against the Proponent’s Day 1 version (DB21). LMW comments in DB21 have been removed (not tracked).

The Committee’s recommended version incorporates changes recommended by the Nyah and Vinifera Committee. These are tracked unless they had already been accepted in the Proponent’s Day 1 version (DB21). Further Burra Creek specific changes recommended by this Committee are highlighted in green, as are minor changes to the wording of some EDSs to that recommended by the Nyah and Vinifera Committee (see Table 10 for a full explanation of these changes).

Minor drafting changes (eg DELWP to DEECA, numbering changes) have not been tracked.

[Committee additions](#)

~~Committee deletions~~

Environmental Delivery Standard		Project phase	Responsibility
EMF1	<p>Environmental Management System</p> <p>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.</p>	Design, Construction	Contractor
EMF2	<p>Construction Environmental Management Plan</p> <p>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.</p> <p>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.</p>	Construction	Contractor
EMF3	<p>Operational management</p> <p>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:</p> <ul style="list-style-type: none"> • Operation Environmental Management Plan • Environmental Water Management Plan • Seasonal Watering Plan • Operating Plan • Operations and Maintenance Plan. <p>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.</p>	Operation	Mallee CMA LMW
EMF4	<p>Operation performance management</p> <p>Operation of the projects will be monitored, evaluated and reported on in accordance with:</p> <ul style="list-style-type: none"> • Operation Environmental Management Plan • Ecological Monitoring, Evaluation and Reporting Plan • Socio-economic Monitoring, Evaluation and Reporting Plan • Environmental Watering Management Plans <p>Annual Operational Environmental Performance Reports will be prepared to report on performance against the EDSs and other operational obligations.</p> <p>As part of this process the Plans will address the management of, and access to, baseline and monitoring data.</p> <p>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.</p>	Operation	Mallee CMA
ACH1	<p>Cultural Heritage Management Plan</p> <p>Comply with the approved Cultural Heritage Management Plans (No. 16902, No. 16900 and No.16901) approved by First Peoples – State Relations for the Burra Creek, Nyah and Vinifera projects under the <i>Aboriginal Heritage Act 2006</i>.</p>	Design and construction <u>and operation</u>	LMW Contractor
ACH2	<p>Connection to Country</p> <p>Integrate Aboriginal knowledge, values, and aspirations into the planning, delivery and evaluation of the Burra Creek, Nyah and Vinifera projects.</p> <p>Create opportunities for enhancing and sharing cultural connection to Country.</p>	Design, <u>construction and operation</u> and construction	Mallee CMA Parks Victoria
ACH3	<p>Cultural Heritage Management – Operation</p> <p>Operate the projects in accordance with the existing Victorian environmental watering management framework, including via Environmental Watering Management Plans, Seasonal Watering Proposals and/or Delivery Plans (or equivalent), to:</p>	Operation	Mallee CMA

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> 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 Aboriginal 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 must be developed in consultation with Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable). <p>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 for 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 determined and agreed between the land manager and Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable).</p>		
<p>Cultural Heritage Management – Effects of Inundation</p> <p>ACH4 Review and update the assessment of residual effects on Aboriginal cultural heritage (particularly ancestral remains) associated with inundation, based on the outcomes of the further hydraulic analysis required by EDS SW4.</p> <p>This assessment should have particular regard to the potential for indirect impacts associated with erosion and sedimentation as well as increased water availability and fluctuations in moisture content.</p>	Design	LMW
<p>Construction air quality management: dust</p> <p>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 emissions to air in accordance with the requirements of the <i>Environment Protection Act 2017</i>, subordinate legislation and other relevant statutory requirements and guidelines. Measures should include:</p> <ul style="list-style-type: none"> 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 receptor 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, record 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 <u>with reference to, and</u> in accordance with the following publications: <ul style="list-style-type: none"> Managing stockpiles (EPA Publication 1895) Managing soil disturbance (EPA Publication 1894) Managing truck and other vehicle movement (EPA Publication 1897) Undertake visual observations of nuisance dust and reactive continuous/realtime dust monitoring (as defined in Guideline for assessing and minimising air pollution in Victoria (EPA Publication 1961)) where construction and/or haulage on unsealed roads occurs within 20m of occupied residences. <p>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 PM10 of 100 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 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.</p>	Construction	Contractor
<p>Dust nuisance and complaints</p> <p>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 hotline to 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.</p>	Construction	Contractor
<p>Pumping equipment</p> <p>All pumping infrastructure involving diesel plant to be serviced within appropriate servicing frequencies and maintained to manufacturer specifications (where available).</p>	Operation	LMW Mallee CMA
<p>Bushfire management during construction</p> <p>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 DELWP Forest Fire Management Victoria). The Bushfire Emergency Response Plan must include:</p> <ul style="list-style-type: none"> Training and equipment requirements for on-ground personnel 	Construction	Contractor

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> • 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 • 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: <ul style="list-style-type: none"> - 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. 		
<p>Bushfire management during operation</p> <p>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 processes (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 commencement of operation:</p> <p>BF2</p> <ul style="list-style-type: none"> • 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 include maps 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 with any relevant restrictions as applicable <p>Before a watering event notify landowners and managers, emergency management agencies and DELWP-DEECA Forest Fire Management Victoria of the timing and type of event (confirm the watering scenario) regarding any changes to access/egress.</p>	<p>Operation</p>	<p>LMW Mallee CMA Parks Vic (as land manager)</p>
<p>Contaminated land duties</p> <p>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 requirements and the requirements of the <i>Environment Protection Act 2017</i>, the Environment Protection Regulations 2021, and the following EPA publications as appropriate and as amended or replaced from time to time:</p> <ul style="list-style-type: none"> • 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 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 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. <p>Specifically, the Construction Environmental Management Plan must include:</p> <p>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 the EPA of contamination.</p> <ul style="list-style-type: none"> • 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 waste 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 stormwater run-off 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 legislation and guidelines listed above. This must include: <ul style="list-style-type: none"> - Creating and maintaining a dangerous goods register - Disposing of any hazardous materials, including asbestos, in accordance with the Environment Protection Regulations 2021 and relevant guidelines <p>CM1a</p> <ul style="list-style-type: none"> • Implementing requirements for the installation of bunds and precautions to reduce the risk of spills 	<p>Construction</p>	<p>Contractor</p>

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> Contingency and emergency response procedures to handle fuel and chemical spills, including availability of on-site hydrocarbon spill kits. 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 identify asbestos and (if present) manage this soil in accordance with the WHS Act and Regulations and Safe Work Australia. 		
<p>Water, Soils and Waste Management Sub-plan</p> <p>A Water, Soils and Waste Management plan must be prepared as a sub-plan to the Construction Environmental Management Plan to:</p> <p>Comply with the General Environmental Duty as per the <i>Environment Protection Act 2017</i></p> <ul style="list-style-type: none"> 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 construction 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 accordance with the Environmental Protection Regulations 2021 and supporting EPA guidelines. Characterisation will also consider the National Environment Protection Measures (Assessment of Site Contamination) 2013 to confirm the material is suitable for the proposed end use (to be determined based on the identified re-use location). This will include: <ul style="list-style-type: none"> 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 health or the 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 off-site disposal to landfill as far as reasonably practicable. 	Construction	Contractor
<p>Soil characterisation</p> <p>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 potential (existing) contamination or hazardous conditions or soil sensitivity or degradation at the following locations:</p> <ul style="list-style-type: none"> 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) <p>This characterisation will include:</p> <ul style="list-style-type: none"> 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 other information that may have changed (e.g. 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 or be subject to any other soil hazards. <p>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.</p> <p>Soil will be managed in accordance with the Water, Soils and Waste Management Sub-plan as per EDS CM1b.</p>	Construction	Contractor
<p>Acid sulfate soils</p> <p>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:</p> <ul style="list-style-type: none"> 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 Sulphate Soils Guidance – A synthesis National acid sulphate soils sampling and identification methods manual Guidelines for the dredging of acid sulphate soil sediments and associated dredge spoil management Land manager policies and requirements. <p>The ASMP must include measures to:</p> <ul style="list-style-type: none"> Identify areas of acid-sulfate soils and potential acid sulfate soils within the proposed construction footprint 	Construction	Contractor

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> Characterise and manage acid sulfate soils in accordance with: <ul style="list-style-type: none"> EPA Victoria, 2009, Publication 655.1 Acid Sulfate Soil and Rock Murray Darling Basin Authority, 2010, Detailed Assessment of Acid Sulfate Soils in the Murray-Darling Basin Manage stockpile 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. 		
<p>Contaminated land duties</p> <p>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, and the requirements of the legislation and other relevant statutory regulations and guidelines as detailed in EDS CM1a. Specifically, the Operation Environmental Management Plan must include:</p> <ul style="list-style-type: none"> 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 duty to notify the EPA of contamination 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, sediment 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 project infrastructure/operational activities. Controls must include: <ul style="list-style-type: none"> 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 CM1a. This must include: <ul style="list-style-type: none"> 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. 	Operation	Mallee CMA LMW Parks Victoria
<p>Native vegetation and habitat design minimisation</p> <p>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 project, and 21.599 ha for the Burra Creek project. <u>All efforts should be made to further reduce native vegetation removal below these maximum worst-case extents</u></p> <p>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:</p> <ul style="list-style-type: none"> <u>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, including within 30 metres of the top of the Murray River Bank and the banks of Burra Creek</u> <u>For Burra Creek, further consideration to reducing impacts on endangered EVC 103 Riverine Chenopod Woodland during detailed design. If impacts to EVC 103 Riverine Chenopod Woodland are unavoidable this should be explicitly addressed in the update of the Assessment of Overall Improvement to Biodiversity (AOIB) recommended in EDS E7 to inform consents under Condition 4.6 of the Incorporated Document.</u> Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near waterways, wetlands, endangered EVCs and fauna 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 design phase 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 minimise 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 Environmental 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 flora within 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.) <u>Revise native vegetation removal calculations to include the native vegetation impacts from the additional wells or bores recommended in EDS GW2. Any additional clearance should be accommodated in the current worst-case figures.</u> <p><u>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.</u></p>	Design and construction	Contractor
<p>Construction biodiversity administrative processes</p> <p>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 must include auditable specific commitments, and identify requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including:</p> <ul style="list-style-type: none"> The matters required by EDS E2b, E2c, E2d, and <u>E2e and E2f.</u> 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. checking that works are occurring in approved areas, no-go zone delineation is accurately in place, pre-clearance surveys are proceeding appropriately) If EPBC Act or FFG Act listed threatened species (individuals or population) are encountered which were not assessed within the Environment Report assessment: 	Construction	Contractor

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP DEECA as relevant - Notify a suitably qualified ecologist to determine the significance of any potential impacts - Seek any relevant approvals from the relevant authority if removal/impacts cannot be avoided. <ul style="list-style-type: none"> • 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 biodiversity (e.g. native vegetation, threatened species) implications, including approval requirements, re-quantification of impacts. 		
<p>Construction vegetation management</p> <p>The Native Flora and Fauna Management Sub-Plan must include the following requirements for vegetation removal activities:</p> <ul style="list-style-type: none"> • 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 (eg. Reducing the number of trees felled) • 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 will be 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 systems to be 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 accordance with 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 Amenity Trees • Vegetation clearing, pruning and excavation controls and protection measures, including the following protocols: <ul style="list-style-type: none"> - 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) up to 24 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	Contractor
<p>Construction fauna management</p> <p>The Native Flora and Fauna Management Sub-Plan must include the following requirements for terrestrial and aquatic fauna management during construction:</p> <ul style="list-style-type: none"> • 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. a 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 should fauna (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 Authority 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: <ul style="list-style-type: none"> - 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) - 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 of 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: <ul style="list-style-type: none"> - 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 construction - 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 on sound and 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 ongoing chronic disturbance to wildlife. 	Construction	Contractor
<p>Construction weed and pest management</p> <p>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:</p> <ul style="list-style-type: none"> • 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 Australian frogs (Murray et al. (2011)) • Weed, pest animal and pathogen management and monitoring and reporting requirements. 	Construction	Contractor

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> 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 required 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. <p>These measures must be auditable and linked to management outcomes such as:</p> <ul style="list-style-type: none"> 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 working between multiple waterways (excluding vehicles and plant using the constructed access route). <p>For the Burra Creek project, implement the following additional measures to address environmental weeds to the satisfaction of Parks Victoria:</p> <ul style="list-style-type: none"> Monitoring of any increase of environmental weeds within or adjoining all sections of the construction footprint, including proximate downstream sections of waterways, for the first 12 months following construction or such longer period as Parks Victoria may direct. Measures to control any local proliferation of environmental weeds associated with the project works to the satisfaction of Parks Victoria Monitoring of the cover and quality of rehabilitation of indigenous vegetation within the construction footprint. 		
<p>Construction rehabilitation management</p> <p>The Native Flora and Fauna Management Plan must include the following requirements for rehabilitation following construction:</p> <ul style="list-style-type: none"> Where possible, reuse timber and logs from felled trees on site with habitat improvement uses prioritised 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 managers 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 stabilising non-invasive species in other areas), as agreed with the land manager Borrow sites rehabilitation works are to be addressed in Property Management Plans, developed in agreement with the relevant land owner <p>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.</p>	Construction	Contractor
<p>Aquatic fauna management</p> <p>In addition to the handling and salvage protocols for aquatic fauna as detailed in EDS E2c implement the following:</p> <ul style="list-style-type: none"> Where works in waterbodies require coffer-damming that completely blocks the waterway: <ul style="list-style-type: none"> 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 coffer dam Monitor water quality (specifically dissolved oxygen) and depths upstream and downstream of the coffer dam during construction period to maintain similar conditions on both sides of the construction site 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. 	Construction	Contractor
<p>Pest Plant and Animal Monitoring and Management Plan</p> <p>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 managed environmental watering events, including carp. The Plan may be prepared for multiple VMFRP projects, and will include:</p> <ul style="list-style-type: none"> 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. <p>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 activity. Locations must include culturally sensitive locations relevant to EDS ACH3.</p> <p>The Pest Plant and Animal Monitoring and Management Plan should include:</p> <ul style="list-style-type: none"> Monitoring of any increase of environmental weeds within the MIA to the satisfaction of Parks Victoria Measures to control any local proliferation of environmental weeds associated with project operation to the satisfaction of Parks Victoria Measures to assist private landowners with the increased risk of pest presence and activity due to managed environmental watering events. Measures should include raising awareness to inform landowner monitoring and reporting, appropriate measures to manage any pest presence or activity, providing support to implement measures by coordinating efforts. 	Operation	Contractor, Parks Victoria

Environmental Delivery Standard	Project phase	Responsibility
<p>Overall biodiversity improvement – Vinifera</p> <p>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.</p> <p>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, as applicable):</p> <ul style="list-style-type: none"> • Operation Environmental Management Plan • Environmental Water Management Plan • Seasonal Watering Proposal • Operating Plan • Operations and Maintenance Plan • Monitoring, Evaluation and Reporting Plan 	Operation	Mallee CMA
<p>Overall biodiversity improvement – Nyah</p> <p>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 species’ habitat and native vegetation.</p> <p>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, as applicable):</p> <ul style="list-style-type: none"> • Operation Environmental Management Plan • Environmental Water Management Plan • Seasonal Watering Proposal • Operating Plan • Operations and Maintenance Plan • Monitoring, Evaluation and Reporting Plan 	Operation	Mallee CMA
<p>Overall biodiversity improvement – Burra Creek</p> <p>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, threatened species’ habitat and native vegetation.</p> <p>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, as applicable):</p> <ul style="list-style-type: none"> • Operation Environmental Management Plan • Environmental Water Management Plan • Seasonal Watering Proposal • Operating Plan • Operations and Maintenance Plan • Monitoring, Evaluation and Reporting Plan 	Operation	Mallee CMA
<p>Hollow Replacement Plan</p> <p>A Hollow Replacement Plan is to be prepared to the satisfaction of DEECA. The Hollow Replacement Plan must address the following requirements:</p> <ul style="list-style-type: none"> • definition of the target species for the hollow replacement program and the hollow requirements of the target species by a suitably qualified zoologist, based on available scientific knowledge • the number and type of artificial hollows to be installed is to be commensurate with the number and type of utilised hollows estimated to be removed, as determined by a suitably qualified zoologist, based on available scientific knowledge; • supplementary nesting sites/artificial hollows are to be installed in adjacent areas prior to the removal of large hollow-bearing trees; • the agreed location and specification of artificial hollows are to be incorporated into site maps and as a Project GIS layer prior to the commencement of works; and • monitoring and adaptive mitigation measures to determine and respond to the success/failures of artificial hollows 	Construction, Operation	Contractor Mallee CMA
<p>Surveys of Threatened Dryland Flora Species in the MIA</p> <p>Undertake additional targeted surveys to assess the presence of FFG Act listed threatened dryland species in the MIA and to confirm the ongoing presence of FFG Act listed threatened species recorded in the MIA in previous surveys prior to commencement of operations.</p>	Operation	Mallee CMA

Environmental Delivery Standard	Project phase	Responsibility
<p>Determine requirements for mitigation measures for the species (e.g., seed collection prior to inundation) to be covered by the OEMP should they be recorded during these additional surveys</p>		
<p>Minimising erosion and sedimentation through design</p> <p>Design the projects having regard to:</p> <ul style="list-style-type: none"> -soil characterisation, with the objective of dispersing water flows and minimising water velocities to minimise the potential for erosion and sedimentation, to 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 Murray River, and at the Nyah and Vinifera borrow pit site risks to the stability of the Murray River and Burra Creek banks resulting from seepage of water ponded by the Project. <p>In addition to the assessment in SW4, undertake a hydraulic assessment of floodplain erosion risks to inform the project design and implementation:</p> <ul style="list-style-type: none"> By using a hydraulic model that has been calibrated to reflect local conditions and that is suitably scaled to inform the detailed project design and that meets the requirements in SW4 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 drawdown phases, 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 delete 'construction' from the Nyah and Vinifera Committee's recommended version and add 'infrastructure' and operation and provide for their mitigation 	Design	Contractor LMW
<p>Erosion and Sediment Control Plan</p> <p>The Construction Environmental Management Plan must include an Erosion and Sediment Control Plan which details measures to:</p> <ul style="list-style-type: none"> 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. 	Construction	Contractor
<p>Soils and landform stability</p> <p>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 adaptive management and/or any measures to ensure structural integrity of infrastructure.</p> <p>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 structural responses to address accelerated erosion, if required.</p> <p>Monitoring of the stability of the Murray River bank and Burra Creek:</p> <ul style="list-style-type: none"> 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 within the riparian corridors (30 metres inland from the Victorian bank of the Murray River, and 30 metres either side of the centreline of Burra Creek) 	Operation	LMW
<p>Construction groundwater management</p> <p>The Construction Environmental Management Plan must include measures to manage groundwater impacts in accordance with the requirements under the <i>Environment Protection Act 2017</i>, subordinate legislation and other relevant statutory requirements and guidelines.</p> <p>Measures must include:</p> <ul style="list-style-type: none"> 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 to be 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. 	Construction	Contractor
<p>Operational groundwater management</p> <p>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 minimise the risk of 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.</p>	Operation	Mallee CMA

Environmental Delivery Standard		Project phase	Responsibility
HH1	<p>Management of Historical Heritage during construction</p> <p>The Construction Environmental Management Plan must include:</p> <ul style="list-style-type: none"> 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 management protocol 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 Victoria of the find, obtaining consent to deal with the find, and dealing with the find in accordance with the consent 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. 	Construction	Contractor
HH2	<p>Management of Historical Heritage during operation</p> <p>In accordance with the <i>Heritage Act 2017</i>, manage historical heritage impacts including:</p> <ul style="list-style-type: none"> 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 protocol 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 Victoria of the 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 <i>Heritage Act 2017</i> where an archaeological site is to be disturbed, and comply with the conditions of that consent. 	Operation	Mallee CMA Parks Victoria
LV1	<p>Avoid and minimise visual impacts through design</p> <p>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 practicable.</p>	Design and construction	Contractor
LV2	<p>Avoid and minimise visual impacts during construction</p> <p>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 Plan) and otherwise incorporate screening measures such as hoarding where necessary. Remove construction equipment and temporary construction infrastructure when no longer required.</p>	Construction	Contractor
LV3	<p>Minimise construction and operation lighting impacts</p> <p>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 Outdoor Lighting), to protect the amenity of adjacent sensitive receptors (as identified in the Operations Environment Management Plan).</p> <p>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 impacts (such as 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 (bats and birds)).</p>	Construction and operation	Contractor Mallee CMA
NV1	<p>Construction noise and vibration management</p> <p>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 times in 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 Construction, Building and Demolition guide (CCBD guide), EPA publication 1834. The Construction Environmental Management Plan must include (but not be limited to) measures, such as:</p> <ul style="list-style-type: none"> 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 Implement contingency measures wherever there is risk of harm associated with the residual noise 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: <ul style="list-style-type: none"> 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 assessment by the IEA that <ul style="list-style-type: none"> 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 	Construction	Contractor

Environmental Delivery Standard	Project phase	Responsibility
<ul style="list-style-type: none"> - 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 • 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). 		
<p>Operational noise management</p> <p>NV2 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).</p>	Operation	Mallee CMA
<p>Waste management</p> <p>RU1 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:</p> <ul style="list-style-type: none"> • Litter management • Construction and demolition wastes • Organic wastes. 	Operation and construction	LMW Mallee CMA
<p>Community and Stakeholder Engagement Management Plan</p> <p>SB1 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:</p> <ul style="list-style-type: none"> • 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 communicate alternate access arrangements. • Notify relevant agencies (e.g. DELWP DEECA) to engage with license holders (e.g. apiary and other) to provide information on the timing of construction activities. • Establish a project specific hotline to receive queries or complaints. • Investigate and respond to community complaints or enquiries, as soon as practicable. • Prepare incident notification and governance protocols for relevant Councils and land managers <p>Timing and type of notification to potentially affected stakeholders will be determined in consultation with the relevant stakeholder prior to the commencement of construction (other than preparatory buildings and works), and may be amended from time to time, subject to agreement.</p>	Construction	Contractor
<p>Minimise social and business impacts – Construction</p> <p>SB2 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.</p>	Construction	Contractor
<p>Communication and Stakeholder Engagement activities – Operation</p> <p>SB3 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:</p> <ul style="list-style-type: none"> • 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. DELWP) 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. <p>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</p>	Operation	Mallee CMA

Environmental Delivery Standard	Project phase	Responsibility
<p>Surface water management – Construction</p> <p>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>, subordinate 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:</p> <ul style="list-style-type: none"> • 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 established 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. <p>* Designated waterways are named or unnamed, permanent or seasonal, and range in size from a river to a natural depression.</p>	Construction	Contractor
<p>Surface water management – Operation</p> <p>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 outline the operational arrangements including identification of overarching operating risks and mitigation measures associated with the delivery of environmental water.</p> <p>The Catchment Management Authority is to develop the Operating Plan in consultation with relevant stakeholders prior to the first watering event.</p> <p>Operation of the project to consider and seek to avoid, minimise and manage where practicable <u>risks of producing adverse water quality, or ecological or erosion outcomes from managed inundation events, and in particular:</u></p> <ul style="list-style-type: none"> • Adverse <u>Protracted hypoxic or</u> anoxic water quality conditions or (blackwater)-events. • Excessive algal growth. • <u>Constraining the breeding and movement of native fish, including stranding of native fish on the floodplain during drawdown events</u> • <u>Stimulating the proliferation of introduced or pest plants or animals (including increased Carp) population.</u> • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during <u>inundation</u> filling and drawdown. <p><u>Relevant measures will include but not be limited to the following:</u></p> <ul style="list-style-type: none"> • <u>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 the likelihood of creating suitable breeding conditions for Carp and to reduce the risk of hypoxic or anoxic blackwater events and algal blooms.</u> • <u>Maintain throughflow during managed inundation if appropriate and possible to mitigate hypoxic/anoxic conditions</u> • <u>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 short inundation with throughflow or consider staged inundation)</u> • <u>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 on the Murray River</u> • <u>Develop and evaluate a native fish exit strategy to allow native fish to migrate from the floodplain</u> • <u>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> • <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 (delete 'rapid increases in' from the Nyah and Vinifera Committee's recommended version) elevated velocity and shear stress downstream of regulators.</u> <p>This will include consideration of the following measures as appropriate:</p> <ul style="list-style-type: none"> • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are resent then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. 	Operation	Mallee CMA

Environmental Delivery Standard	Project phase	Responsibility
<p>SW3 Surface water – Monitoring</p> <p>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 (e.g. through the <i>Operating Arrangements for the Environmental Water Holdings of the Murray System</i> and the Ecological Monitoring, Evaluation and Reporting Plans).</p>	Operation	Mallee CMA
<p>SW4 Surface water – assessment of floodplain hydraulics and implications for floodplain vegetation prior to detailed design</p> <p>Committee note: The Committee has used the EES Central wording rather than the Nyah and Vinifera wording as a base, for the reasons set out in Table 10 in this Report. Changes to the EES Central Committee’s version are highlighted in green – see Table 10 for an explanation.</p> <p><u>Undertake the following 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):</u></p> <ul style="list-style-type: none"> <u>Mapping of key hydraulic parameters (depth, velocity and shear stress) for each operating scenario (including managed inundation events and comparable natural and existing flood events) at key stages of managed inundation events (including filling, holding and releasing with regulators closed and open)</u> <u>‘Difference maps’ should be used in conjunction with mapping of the key hydraulic parameters for each scenario to determine the locations where the key hydraulic parameters will be changed by the Projects, and the magnitude of the change.</u> <u>Undertake further assessment to determine implications of hydraulic effects of the Project for vegetation in the MIA having regard to EVCs and vegetation depth preferences and tolerances.</u> <p>For the Burra Creek Project, the following additional actions must be undertaken prior to the additional hydraulic analysis, in order to accurately inform the hydraulic analysis:</p> <ul style="list-style-type: none"> Develop an accurate and properly calibrated hydraulic model for the Burra Creek project area, either by modifying an existing model, or developing a new model. Obtain an independent peer review of the hydraulic model, and make any revisions recommended by the peer reviewer to the peer reviewer’s satisfaction. Use the new/revised hydraulic model to assess the effects of the proposed Project infrastructure on inundation processes in the Burra Creek project area during unmanaged flood events, and to assess all relevant cases for each operational scenario, including ‘holding’ and ‘drawdown/release’. <p><u>Outcomes of this hydraulic analysis and further assessment should be used to inform:</u></p> <ul style="list-style-type: none"> for the Burra Creek Project, further assessment of: <ul style="list-style-type: none"> the effects of proposed Project infrastructure on inundation processes in the Burra Creek project area during unmanaged flood events erosion risks under GS1 blackwater risks under SW6 for the Burra Creek Project, an updated Assessment of Overall Improvements to Biodiversity (ie update Attachment 3 to the Burra Creek Addendum Report dated June 2023). <u>any necessary design or operational changes</u> <u>an updated assessment of the overall improvements to be provided to the Secretary of Department of Energy, Environment and Climate Action under Clause 4.5.1 of the incorporated document</u> <u>consideration of the outcomes of this further analysis and report updates in relevant project approval decisions and secondary consents, including those related to native vegetation removal and the proposed alternative offset arrangement</u> <u>inclusion of the VMFRP (with Basin Plan) scenario in the updated AOIB reports.</u> 	Design	LMW
<p>SW5 Surface water design – regulators, containment banks and spillways</p> <p>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.</p> <p>The design of the containment banks and spillways should facilitate turtle passage.</p>	Design	LMW Contractor
<p>SW6 Surface water – blackwater (Burra Creek Project)</p> <p>For the Burra Creek Project, prior to detailed design, undertake further assessment of whether and to what extent:</p> <ul style="list-style-type: none"> Project infrastructure may contribute to blackwater events in unmanaged inundation events flood capture events may contribute to blackwater events. <p>The further assessment of blackwater effects must be based on the further hydraulic analysis and assessment undertaken under SW4, and must include consideration of the implications of backwater effects from the Wakool River.</p> <p>Determine any further mitigation measures that may be required to minimise the impact of blackwater events of the Project.</p>		

Environmental Delivery Standard		Project phase	Responsibility
TT1	<p>Safety in road design</p> <p>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 transport network user safety. Implement relevant recommendations from the audit as appropriate.</p>	Design	Contractor
TT2	<p>Traffic Management Plan</p> <p>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 must clearly outline measures to:</p> <ul style="list-style-type: none"> 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, noise, 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 road and areas dedicated for construction and roads and areas available for public use (e.g through fencing, 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 pavement damage has occurred due to construction activity (including the requirement for pre and post construction road pavement reports). 	Construction	Contractor
TT3	<p>Safety during operation – recovery equipment</p> <p>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 that are bogged or stuck and blocking access.</p>	Operation	LMW
TT4	<p>Safety during operation – signage</p> <p>During operation, the land manager is to provide:</p> <ul style="list-style-type: none"> Advisory signage on closed or inaccessible tracks Public advice regarding changes in-park/forest conditions (eg. Via websites). 	Operation	Parks Victoria (as Land manager)
TT5	<p>Track maintenance program</p> <p>Land managers to continue implementing a track maintenance program (according to regional priorities) to facilitate continued safe access for park users and emergency services consistent with the Fire Access Road Plan required in the Incorporated Document.</p>	Operation	Parks Victoria (as Land manager)

This table is the Proponent’s Day 1 Version of the Projects Monitoring Register for the ER Central Projects, which is Table 18.13 in the EMF. It reflects the proponent’s position as at the date of the document.

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	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
M AQ1 Air quality	Minimise dust within 20m of stationary human sensitive receptors	C	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/m ³ 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.	O^	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
M AE3 Aquatic ecology	To assess the benefits of floodplain watering for small-bodied fish productivity. To assess the effects of floodplain watering and mitigation measures on carp populations	O^	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
M AE7 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	O^	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
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.	O^	Visual indicators (e.g., notching, bank slumping) of induced soil, water or wave erosion/sedimentation.	Visual inspections (including photo points) of constructed infrastructure and waterways.	Infrastructure locations (including, but not limited to, regulators and containment banks) and waterways connecting the Project areas to the Murray River.	Before, during and after an environmental watering event	Asset owner (infrastructure) and Mallee CMA (waterways)

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
M GW1 Groundwater	Identify changes to groundwater levels as a result of environmental watering	O^	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.	<p>Burra Creek: 26268 26188 26189 26190 26191 WRK50581 26192 26197 26196 WRK50578 26270 26169 26170 26180 26171 26181 26172 26185 26173 WRK119924 WRK119924 WRK119927</p> <p>Nyah: WRK119931 WRK119928 WRK119926</p> <p>Vinifera: WRK119926 WRK119930 26271 26182 26155 26156 119389 119388</p> <p>New groundwater monitoring sites:</p> <p>Establish new groundwater monitoring sites within the Maximum Inundation Areas of all Projects, including:</p> <ul style="list-style-type: none"> • at the tree condition monitoring sites for M TE9 • in targeted areas that are predicted to be most sensitive to groundwater rise, particularly where there is high groundwater salinity • in the part of the Burra Creek Project MIA that is at risk of a shallow water table 	<p>Monthly</p> <p>Following the first maximum inundation event, undertake an interim review of monitoring outcomes and identify appropriate adjustments to the monitoring program.</p> <p>Following the second maximum inundation event, undertake a comprehensive review of monitoring outcomes and identify appropriate adjustments to the monitoring program.</p> <p>Including re-assessment of performance against modelling results to confirm the expected effects.</p>	Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
M GW2 Groundwater	Identify changes to groundwater quality as a result of environmental watering	O^	Groundwater salinity trends over time compared with the forecast	Groundwater salinity as measured by electrical conductivity or total dissolved solids	<p>Burra Creek: 26268 26188 26189 26190 26191 26270 26169 26170 26180 26171 26181 26172 26185 26173 WRK119924 WRK119924 WRK119927</p> <p>Nyah: WRK119931 WRK119928 WRK119926</p> <p>Vinifera Forest: WRK119926 WRK119930 26271 26182 26155 26156 119389 119388</p> <p>New groundwater monitoring sites: The new monitoring sites established to meet the requirements of M GW1</p>	<p>Annual Monthly. Following the first maximum inundation event, undertake an interim review of monitoring outcomes and identify appropriate adjustments to the monitoring program. Following the second maximum inundation event, undertake a comprehensive review of monitoring outcomes and identify appropriate adjustments to the monitoring program. Including re-assessment of performance against modelling results to confirm the expected effects.</p>	Mallee CMA
M GW3 Groundwater	Identify changes to surface water levels that influence groundwater Identify changes in surface water salinity, including the effect of groundwater discharge	O^	Water level, salinity and flow	Measure surface water levels, flow and salinity at specific locations.	Burra Creek: B1 Regulator Nyah: North Bank Regulator Vinifera: V1 Regulator	<p>Daily. Following the first maximum inundation event, undertake an interim review of monitoring outcomes and identify appropriate adjustments to the monitoring program. Following the second maximum inundation event, undertake a comprehensive review of monitoring outcomes and identify appropriate adjustments to the monitoring program. Including re-assessment of performance against modelling results to confirm the expected effects.</p>	Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
M SW1 Surface water	Assess the effect of the project's construction on surface water quality.	C	<p><u>Routine field-based monitoring:</u></p> <p>Electrical conductivity (salinity) Turbidity Dissolved oxygen pH Temperature Visual and olfactory inspection for oils and greases, litter and algal growth. If hydrocarbons are suspected to be present, a sample will be collected for laboratory analysis of oils and grease and total petroleum hydrocarbons. If algae are suspected to be present, a sample will be collected for laboratory analysis of nutrients (total nitrogen and total phosphorus), chlorophyll and identification of algal species.</p> <p><u>Contingency monitoring:</u></p> <p>Indicators identified during contaminated land assessment that could leach to surface waters due to construction activities at levels above objectives outlined in the NEPM 2013 or Environment Reference Standard as a result of the project (in accordance with EDS CM1). Contaminants accidentally spilled with potential to pollute watercourses.</p>	<p>Specific monitoring programs for each construction location to be developed and documented in the CEMP prior to project commencement. This will include:</p> <p>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.</p> <p>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.</p>	<p>Specific monitoring programs for each construction location to be developed and documented in the CEMP prior to project commencement. This will include:</p> <p>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).</p> <p>Contingency monitoring Upstream and downstream of affected areas, including multiple downstream sites to detect extent of potential impact.</p>	<p><u>Routine monitoring:</u> Weekly for one month prior to construction to establish baseline (if water is present) At least weekly during construction whenever water is present, or more frequently during and after: hot weather/ rainfall event. If algae are suspected to be present, a sample will be collected for laboratory analysis.</p> <p><u>Contingency monitoring</u> As required by the nature of the event being responded to (e.g. daily) to show duration of potential impact and effectiveness of rectification actions.</p>	Construction contractor
M SW2 Surface water	Assess the effect of environmental watering on surface water quality on the floodplain and within the Murray River.	O^	<p>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:</p> <p>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.</p>	<p>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:</p> <p>Monitor flow at outlet regulators</p> <p>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.</p> <p>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.</p>	<p>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).</p> <p>* immediately downstream of the floodplain return flow and further downstream if adverse effects are detected after floodplain outflows and the Murray River are mixed.</p>	<p>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</p>	Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
			Parameters requiring laboratory analysis (as needs basis): <ul style="list-style-type: none"> Total nitrogen Total phosphorus Organic carbon (dissolved and particulate) Chlorophyll Algal species identification and quantification (if an algal bloom occurs). 	Results from managed inundation events should also be used to inform subsequent managed inundation events.		monitoring for parameters requiring laboratory analysis if in-situ monitoring indicates degraded water quality that could affect sensitive values. Note: location, frequency of sampling and specific parameters may be adjusted by the relevant water manager in line with access and existing programs.	
M TE2 Terrestrial ecology	To meet land manager and landowner post-construction requirements for site condition and rehabilitation including vegetation cover .	C & O^	Area within Construction Footprint left as per 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. Monitoring of cover and diversity of native plant species in areas retained or rehabilitated with native vegetation. 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 under the National Parks Act 1975 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 (leg through section 27 consent)
M TE3 Terrestrial ecology	To assess the change in terrestrial and aquatic weed occurrence and cover as a result of project environmental watering	O^	Occurrence or cover does not increase above threshold set in PPAMP for high threat weeds (i.e. Weeds of National 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.	10x10 m vegetation quadrats to document species cover-abundance, including weeds. Monitor weeds within and adjoining the Maximum Inundation Area. This includes monitoring populations on ground and active management as required (e.g. infestations of high threat weeds using appropriate treatment techniques). This will include: <ul style="list-style-type: none"> Vegetation quadrat monitoring to identify species presence. 	Sufficient quadrats must be sampled to evaluate the statistical significance of watering effects. Quadrats should represent all 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.	Annual for at least 15 years, with continued need to be reviewed thereafter every 3 years	Mallee CMA
		O^		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 least 15 years, with continued need to be reviewed thereafter every 3 years	Parks Victoria
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	O^	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	Frequency to be determined for each pest species in PPAMP, for at least 15 years, with continued need to be reviewed after every 3 years	Parks Victoria

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
					will be determined by comparison to control areas outside the MIA.		
M TE5 Terrestrial ecology	To assess the change in the abundance of cats and foxes as a result of project environmental watering	O^	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 determined in PPAMP, for at least 15 years, with continued need to be reviewed after every 3 years.	Parks Victoria
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: <ul style="list-style-type: none"> • Vinifera: Vinifera WMA – 335 ha. • Nyah: Nyah WMA – 475 ha. • Burra Creek: Burra North WMA - 331 ha, Burra South WMA – 74 ha. 	Monitor the: <ul style="list-style-type: none"> - level - duration; and - extent of managed environmental watering events. 	Within Maximum Inundation Area	At an appropriate interval during the event. CMA/PV to advise on frequency, consistent with current practices.	Mallee CMA
M TAE2 Terrestrial and aquatic	To assess improvement in water-dependent vegetation in wetlands and floodplain lakes in response to environmental watering	O*	For wet wetlands: characteristic 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. Transect surveys across margins of inundated areas to detect presence of any threatened flora species either within or adjoining the inundated area.	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. Sufficient transects to sample habitats (within or adjoining the inundated area) within which have been assessed to be suitable for threatened species	Annual quadrat sampling for at least 15 years, with continued need to be reviewed thereafter every 3 years. Transect sampling within six months of each inundation event for at least 10 years.	Mallee CMA
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	O*	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*	10x10 m vegetation quadrats to document species occurrence (including PFGs) and cover-abundance. Saplings counted also. Where required, number of Black Box seedlings and saplings also counted/estimated	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	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	Responsibility
			<p>For Black Box and Lignum EWRC sites presence of Black Box saplings meets targets*</p> <p>*Targets to be defined in the Environmental Water Management Plan</p>		<p>with contrasting water regimes at other VMFRP sites.</p> <p>Quadrats should include areas where Black Box and/or Acacia stenophylla (Eumong) canopy have died.</p> <p>Quadrats should include areas within Lignum Swampy Woodland at Burra Creek to assess regeneration of Black Box.</p>		
		O*	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 condition to be reported every five years at year 0, 5, 10 and 15. Ongoing field plot data to be collected to validate and verify model as required.	Mallee CMA
M TE7 Terrestrial ecology	To assess the response of native fauna species over time to environmental watering.	O*	<p>Species richness, relative abundance, recruitment, presence of threatened/notable species is meets targets* for:</p> <p>Wetland birds</p> <p>Woodland birds</p> <p>Species richness, relative abundance, recruitment, extent of distribution, presence of threatened/notable species meets targets* for frogs</p> <p>* Targets to be defined in the Environmental Water Management Plan</p>	<p>Wetland birds – complete counts at wetlands, monitoring of breeding events (multiple counts required)</p> <p>Woodland birds – 20 min 2 ha counts (multiple counts required)</p> <p>Frogs – acoustic detectors with sufficient sampling to detect a significant effect of watering</p>	<p>Wetland birds, woodland birds and frogs at sites established through the MER within the MIA</p> <p>The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP sites.</p>	<p>Wetland birds – during and after every managed inundation event (up to 6 trips).</p> <p>Woodland birds – twice annually (spring, autumn)</p> <p>Frogs – acoustic detectors during and after each watering event</p> <p>Monitoring to occur for at least 15 years, with continued need to be reviewed thereafter every 3 years.</p>	Mallee CMA
M TE9 Terrestrial ecology	River Red-gum and Black Box condition does not deteriorate over time in areas susceptible to inappropriate inundation regimes rising saline groundwater in response to environmental watering	O^	<p>For River Red Gum trees, crown extent and/or stand condition score is the same or greater than baseline.*</p> <p>For Black Box trees, crown extent and/or stand condition score is the same or greater than baseline.*</p> <p>*Baseline quadrat data collected prior to commencement of environmental watering.</p>	<p>Tree condition assessment, including crown condition score either a) based on TLM method or b) crown condition index (Crome 2004).</p> <p>Note: location, frequency of sampling and specific parameters may be adjusted by the relevant water manager in response to adaptive management and existing programs.</p>	<ul style="list-style-type: none"> 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) At Burra Creek within the Maximum Inundation Area EVC 103 Riverine Chenopod Woodland, EVC 818 Shrubby Riverine Woodland and EVC 823 Lignum Swampy Woodland, EVC 104 Lignum Swamp within the Burra Creek channel (as mapped in the ER Central Terrestrial Ecology Specialist Assessment) 	Every three years 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	Responsibility
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	O	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.	<p>The locations selected 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 earth mound sites and Ancestral Remains predictive mapping results overlaid with areas of proposed inundation.</p> <p>In addition to these sites control sites will be selected in comparable locations where environmental watering is not likely to have an effect.</p> <p>Exact locations to be identified by the Land Manager in consultation with the Traditional Owners and interested parties (as applicable).</p>	Baseline assessment prior to each environmental watering event at applicable locations. Subsequent monitoring events to be undertaken as per risk-based approach outlined in EDS ACH3.	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).
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	O	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.	<p>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.</p> <p>In addition to these sites control sites will be selected in comparable locations where environmental watering is not likely to have an effect.</p> <p>Exact locations to be identified by the Land Manager in consultation with the Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable).</p>	Baseline assessment prior to each environmental watering event at applicable locations. Subsequent monitoring events to be undertaken as per risk-based approach outlined in EDS ACH3.	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 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	O	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.	<p>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.</p> <p>Reporting will include a review of the causes of any change and provide recommendations for management if justified.</p>	As necessary at sites assessed under the baseline monitoring –	Monitoring would be required at for least one event, with the number of monitoring events to be agreed with Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable) and documented in EWMP (or similar mechanism).	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).

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
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	O	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 would be required at for least one event, with the number of monitoring events to be agreed with Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable) and documented in EWMP (or similar mechanism).	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).
AI ACH1 Aboriginal Cultural Heritage	Verify compliance with the CHMP	C	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 accordance with CHMP No. 16898 and No. 14330. Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor
AI ACH2 Aboriginal Cultural Heritage	Verify compliance with EDS GS2 and SW1	C	Compliance check with EDS requirements	Compliance with GS2 and SW1	Within the Construction Footprint	Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor
AI ACH3 Aboriginal Cultural Heritage	Verify compliance with EDS E3, GS3, SW2 and SW3	O	Compliance check with EDS requirements	Compliance with E3, GS3, SW2 and SW3	Within the Maximum Area of Inundation	Compliance audits to be undertaken as per the program detailed in the EMF.	Mallee CMA during operation
AI AQ1 Air quality	Minimise dust during construction	C	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 environmental inspections	Construction contractor
AI AQ2 Air quality	Minimise diesel emissions from pumping infrastructure	O	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 audits to be undertaken as per the program detailed in the EMF.	LMW
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	C	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 contractor: weekly environmental inspections.	Construction contractor
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	C	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	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 inspections during construction	Construction contractor

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
			specific location, to be determined in the CEMP.				
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.	C	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: weekly or after a rainfall event.	Construction contractor
AI GSC3 Geology soils and contamination	Confirm implementation and effectiveness of management of soil related wastes during construction and assess need for additional measures	C	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 during construction. Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor
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	O	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	O	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 GSC5 Geology soils and contamination	Confirm implementation and effectiveness of management of soil related wastes during operation and assess need for additional measures	O	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 and Mallee CMA

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
AI HH1 Historic heritage	Minimise risk of harm to historical heritage values at Takasuka Levee	C	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.	C	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.	O	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 HH3 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 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 NV1 Noise and vibration	Assess timeliness and actions taken in response to noise and vibration complaints.	C	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 complaints or feedback as these are received in accordance with the Communications and Stakeholder Engagement Plan. Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor
AI NV2 Noise and vibration	All pumping infrastructure to be serviced prior to installation and maintained to manufacturer specifications	O	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 audits to be undertaken as per the program detailed in the EMF.	Mallee CMA or LMW
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	All	Construction: as specified in the Community and Stakeholder Engagement Management Plan. Operation: in accordance with CMA and land managers processes and	Construction: LMW

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
				<p>Time taken to close out complaints and enquiries</p> <p>Whether additional actions can be taken to address persistent complaint types</p> <p>Where there are opportunities identified to better communicate with or engage stakeholders.</p> <p>Communication processes to identify whether there are opportunities to improve.</p>		<p>procedures and Victoria's Catchment Management Authorities Community Engagement and Partnership Framework and Toolkit</p>	<p>Operation: Mallee CMA, Land managers (DELWP and Parks Victoria), LMW</p>
AI TE1 Terrestrial ecology	To confirm that construction has been undertaken in accordance with EDS E1 and no unapproved vegetation is removed	C	<p>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.</p>	<p>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:</p> <p>Verify that vegetation removal is consistent with the extent of vegetation approved for removal at each site.</p> <p>Verify that no-go zones have been delineated and maintained to protect significant ecological values as listed in the indicator column.</p>	Construction footprint	Weekly during environmental inspections	Construction contractor
AI TE2 Terrestrial ecology	To avoid and minimise increased weed cover during construction	C	<p>Weed species of management concern do not increase in abundance within the construction footprint. This includes Weeds of National Environmental Significance, weeds listed under the CaLP 1994 and those listed as FFG Act threatening processes.</p>	<p>Pre-construction inspections of construction sites and control of high threat weeds undertaken a minimum four weeks prior to construction.</p> <p>Biosecurity check/inspections for plant material, seeds and soils containing organic matter <u>in accordance with EDS E2d</u>. This applies to:</p> <p>All earth moving equipment and vehicles that have been involved in stripping and handling of topsoil prior to entering the Construction Footprint</p> <p>All other vehicles entering the Construction Footprint for the first time. Following this initial check, biosecurity checks not required each time the vehicle comes into the Construction Footprint if that vehicle has not travelled more than 100km from the Construction Footprint. If plant material, seeds and soil is detected, clean downs on equipment and vehicles (i.e. shovel clean down).</p>	Construction footprint	Inspections of weeds undertaken weekly during environmental inspections	Construction contractor
AI TE3 Terrestrial ecology	To avoid and minimise increased presence of pests during construction	C	<p>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</p>	<p>All food to be disposed of in secured/locked bins and regularly cleared offsite.</p> <p>Sightings or damage observed.</p>	Construction footprint, focused on laydown/office areas.	Food waste disposal locations checked during weekly during environmental inspections. Sightings observed.	Construction contractor

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility
			damage/ disturbance to construction laydown/office areas overnight).				
AI TT1 Traffic and transport	Verify compliance with EDS TT2 to avoid and minimise impacts on the road network	C	Compliance with the TMP (EDS TT2)	Audit of compliance with EDS TT2 (Traffic Management Plan).	Road networks within project areas including haulage routes as detailed in the Traffic Management Plan.	Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor
AI TT2 Traffic and transport	Assess impact on pavement condition of public roads.	C	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 Traffic Management Plan).	Prior to, during and at completion of construction as detailed in the Traffic Management Plan.	Construction contractor
I GSC1 Geology soils and contamination	Confirm suitability of soil for use	C	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).	Characterisation: prior to commencing construction (once off if investigation sufficient)	Construction contractor
I GSC2 Geology soils and contamination	Confirm presence/absence of acid sulfate soils	C	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 in the ASMP. Collection of samples prior to construction.	Construction contractor