Vinifera and Nyah Floodplain Restoration Projects

Minister's Assessment under Environment Effects Act 1978

OCTOBER 2023

Acknowledgement


The Victorian Government acknowledges Aboriginal and Torres Strait Islander people as the Traditional Custodians of the land and acknowledges and pays respect to their Elders, past and present.

List of abbreviations

ARI	Arthur Rylah Institute
AOIB	Assessment of overall improvement to biodiversity
BERP	Bushfire emergency response plan
CEMP	Construction environmental management plan
CFA	Country Fire Authority
CHMP	Cultural heritage management plan
CMA	Catchment management authority
DBH	Diameter breast height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEECA	Department of Energy, Environment and Climate Action
DELWP	Department of Environment, Land, Water and Planning
DTP	Department of Transport and Planning
EDS	Environmental delivery standard
EES	Environment effects statement
EES Central	EES for the Belsar-Yungera and Hattah Lakes North floodplain restoration projects
EMF	Environmental management framework
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ER	Environment report
ER Central	ER for the Vinifera, Nyah and Burra Creek floodplain restoration projects
EVC	Ecological vegetation class
FFG Act	*Flora and Fauna Guarantee Act 1988* (Vic)
FoNVP	Friends of Nyah Vinifera Park
GL	Gigalitres
ha	Hectares
ILUA	Indigenous land use agreement
km	Kilometres
LMW	Lower Murray Urban and Rural Water Corporation
LUAA	Land use activity agreements
m	Meters
MDBA	Murray Darling Basin Authority
mg/L	Milligrams per litre
ML/day	Megalitres per day
MNES	Matters of national environmental significance
MRSD Act	*Mineral Resources (Sustainable Development) Act 1990* (Vic)
OEMP	Operational Environmental Management Plan

Projects	Vinifera and Nyah floodplain restoration projects
PSA	Planning Scheme Amendment
RAP	Registered Aboriginal Party
SCO	Specific controls overlay
SIAC	Standing Inquiry and Advisory Committee
SMM	Source Murray Model
TPZ	Tree protection zone
TRG	Technical reference group
VEWH	Victorian Environmental Water Holder
VMFRP	Victorian Murray Floodplain Restoration Project
VMBC	Victorian Mallee Bird Community
VTWBC	Victorian Temperate Woodland Bird Community

Contents

Executive summary

On 7 July and 11 June 2020, following receipt of referrals from Lower Murray Urban and Rural Water Corporation (LMW), the Minister for Planning decided under the *Environment Effects Act 1978* that an environment effects statement (EES) was not required for the Vinifera and Nyah Floodplain Restoration Projects (respectively), subject to conditions being met. The Minister's decisions for each project set out specific conditions requiring appropriate environmental assessment and management, particularly for potentially significant environmental impacts. This included requirements to prepare an environment report (ER), completed to the satisfaction of the Minister for Planning.

LMW prepared an ER and a draft planning scheme amendment (PSA) covering the Vinifera, Nyah and Burra Creek projects, which were exhibited for public comment from 30 January 2023 to 10 March 2023. The Minister for Planning appointed the Victorian Murray Floodplain Restoration Project (VMFRP) Standing Inquiry and Advisory Committee (SIAC) to inquire into, and report on, the environmental effects of the VMFRP and draft PSAs. Planning Panels Victoria received 14 submissions on the exhibited ER, which were considered at a roundtable forum from 13 April 2023 to 26 April 2023 for the Vinifera and Nyah projects, and the SIAC provided their report to me to consider on 5 July 2023. The SIAC's report, ER documentation and other material including submissions and documents tabled at the roundtable forum have informed the preparation of my assessment of the environmental effects of Vinifera and Nyah projects. A separate minister's assessment of the Burra Creek project is expected to be prepared once the public review process is completed for that project.

The VMFRP consists of nine projects located along the Murray River that aim to return a more natural flood regime to a total of approximately 14,000 ha of high-ecological-value Murray River floodplains in Victoria. The engineered, managed flooding will occur through the modification of existing infrastructure and construction of new infrastructure. The Vinifera and Nyah projects are two VMFRP projects located in the Nyah-Vinifera Park adjacent to the Murray River. The Vinifera and Nyah projects are among the smaller VMFRP projects proposed with maximum inundation areas of 335 ha of floodplain and 475 ha of floodplain respectively. The projects would require construction of infrastructure such as regulators, containment banks, drop structures and access tracks. This infrastructure would allow engineered environmental watering of the floodplains to occur within the project inundation areas, with the objective of restoring and enhancing the floodplain environments, their ecosystems, biodiversity values (particularly listed threatened species and communities), water quality, and cultural values.

It is my overall assessment that while both the Vinifera and Nyah projects will give rise to significant adverse environmental effects during construction, they can proceed with acceptable effects, and can achieve an overall improvement to biodiversity in the long term within these floodplains. The acceptability of adverse effects is subject to the completion of some specific, further detailed analysis, as well as the implementation of an environmental management regime consistent with that endorsed by the SIAC and refined through the findings and recommendations of this assessment.

Consistent with the findings of the SIAC, I consider that both the Vinifera and Nyah projects are likely to result in long term improvement to biodiversity values of the floodplains. However, along with the SIAC, I recommend additional analysis to provide greater certainty on the effects of managed inundation on floodplain vegetation communities as well as soil erosion risks, to inform the detailed design and operational parameters. I have also recommended further analysis to inform an update to the assessment of overall improvement to biodiversity for each project. The outcomes of this further analysis (along with other recommendations of this assessment) will need to be considered in relevant project approval decisions and secondary consent matters.

While both of the projects can achieve overall benefits to biodiversity values during operations, the construction and operation of the projects will require careful management to ensure appropriate minimisation of adverse impacts, particularly with respect to ecological values, Aboriginal cultural heritage values and surface water management. The loss of native vegetation proposed within the construction footprints remains a significant impact for both of the projects. However, I consider that the proposed environmental delivery standards (EDSs), including amendments recommended by the SIAC and this assessment, will provide appropriate measures to ensure that the adverse effects of both construction and operations are further minimised and managed to acceptable levels. This also takes account of the

predicted benefits for these same biodiversity values in the floodplain environments that will experience improved environmental watering.

I have made recommendations to support further avoidance and minimisation during the detailed design and construction phases, as there is an imperative to continue to improve environmental outcomes (short and long term) for both projects. Further avoidance and minimisation of vegetation clearance and other impacts is considered possible when the projects are designed, constructed and operated, and therefore should be undertaken, consistent with state policy.

The proposed environmental management framework (EMF) includes an adaptive management regime for both the Vinifera and Nyah projects, incorporating the environmental water planning and delivery frameworks already in place in Victoria. The principles of adaptive management will allow project operations to respond to varying seasonal conditions and utilise knowledge gained from previous operation events to continuously improve the outcomes of watering programs. Consistent with the SIAC, I consider the effective implementation of this adaptive management approach to be critical to realise many of the key benefits the projects aim to achieve. My assessment also includes recommendations regarding the proposed monitoring program, to inform the adaptive management regime.

On 4 June 2020 and 26 June 2020, the Vinifera and Nyah projects (respectively) were each determined to be controlled actions requiring assessment and approval under the *Environment Protection and Biodiversity and Conservation Act 1999* (EPBC Act) because of likely significant impacts on matters of national environmental significance (MNES). My assessment concludes the accredited state assessment for each of the projects for the purposes of the EPBC Act and will inform the Commonwealth Government Minister for Environment and Water's decisions about whether and under what conditions to approve the projects under the EPBC Act.

It is my assessment that residual impacts on EPBC Act-listed species and communities of both the Vinifera and Nyah projects are unlikely to be significant with the implementation of the proposed EDSs, except for likely significant impacts on the Regent Parrot. I support amendments to EDSs and monitoring requirements as recommended by the SIAC and further strengthened by my assessment, to ensure appropriate avoidance and minimisation of adverse impacts on MNES as detailed in Appendix A. There is potential for cumulative impacts on MNES from the Vinifera and Nyah projects in conjunction with other VMFRP projects (assuming they proceed), in particular cumulative habitat loss for Regent Parrot from vegetation clearance during construction. However, there are also expected to be long term benefits for MNES from operations, including for the Regent Parrot, through improved ecosystem health in areas of the floodplains that provide habitat. It is my finding that the residual impact on Regent Parrot can be acceptably managed with the adoption of recommendations set out within this assessment.

My assessment includes specific recommendations to inform the proponent and statutory decision-makers responsible for approval decisions for these two projects under Victorian and Commonwealth law. When deciding whether and how the projects should be approved, decision-makers should consider this assessment and as a matter of good practice, I expect decision-makers to write to me to advise how my assessment was considered and applied through statutory decisions and conditions for these two projects.

1 Introduction

On 31 March 2020, Lower Murray Urban and Rural Water Corporation (Lower Murray Water, LMW), referred the Vinifera Floodplain Restoration Project and the Nyah Floodplain Restoration Project to the Minister for Planning under the *Environment Effects Act 1978*. The Vinifera and Nyah Floodplain Restoration Projects are part of the Victorian Murray Floodplain Restoration Project (VMFRP, refer to Section 2.1).

On 7 July and 11 June 2020, the Minister for Planning decided under the Environment Effects Act that an environment effects statement (EES) was not required for the Vinifera and Nyah Floodplain Restoration Projects (respectively), subject to conditions being met. Each of the decisions include conditions requiring appropriate environmental assessment through an environment report process (in lieu of an EES). This entails preparation of an environment report (ER) in consultation with the Department of Environment, Land, Water and Planning (DELWP), now Department of Transport and Planning (DTP), and relevant agencies and departments, completed to the satisfaction of the Minister for Planning. The conditions specified what the ER needed to examine and document for both the construction and proposed inundation areas:

a. the expected benefits and ecological objectives of the project, with measurable indicators for monitoring and thresholds for action;

b. assessment of project design alternatives to avoid and minimise adverse environmental effects, including options for the project layout and timing on inundations events;

c. assessment of predicted effects on biodiversity values particularly associated with: listed species and communities (under the *Flora and Fauna Guarantee Act 1988* and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)), native vegetation including large old trees, and threatening processes (under the *Flora and Fauna Guarantee Act 1988* and EPBC Act);

d. effects on hydrogeology and groundwater quality;

e. potential effects on Aboriginal cultural heritage;

f. potential cumulative effects of the project and other VMFRP projects and other existing or planned projects in the area, particularly in relation to downstream aquatic environments and beneficial water uses;

g. proposed native vegetation offset strategy accounting for the findings of items a to f; and

h. mapping that clearly illustrates the full extent of works and inundation areas, as well as key environmental assets to be avoided (e.g. no-go zones).

In July 2021, DELWP prepared a scoping document for the ER, which enabled a single ER to cover the Vinifera, Nyah and Burra Creek Floodplain Restoration Projects. The Burra Creek Floodplain Restoration Project is also part of the VMFRP, however, as explained below, is not covered by this assessment.

On 27 September 2022, with consent from the Governor in Council, the Minister for Planning appointed the Victorian Murray Floodplain Restoration Project Standing Inquiry and Advisory Committee (SIAC) to inquire into, and report on, the environmental effects of the VMFRP projects and corresponding draft PSAs, in accordance with terms of reference for the SIAC, approved 16 August 2022.

LMW prepared the ER and a draft planning scheme amendment (PSA), which were exhibited for public comment from 30 January 2023 to 10 March 2023. Planning Panels Victoria, on behalf of the SIAC, received 14 submissions on the exhibited ER and draft PSA for these three projects.

The SIAC held a directions hearing on 20 March 2023. On 3 April 2023, LMW requested the Burra Creek Floodplain Restoration Project to not be included in the roundtable process being held for the ER as they had identified that additional hydrological modelling work was required for the Burra Creek project to understand the implications of backwater effects that emerged during following significant Murray River floods in late 2022. On 6 April 2023, the SIAC provided notice that the roundtable would only consider the Vinifera and Nyah Floodplain Restoration Projects and that

the roundtable would likely be reconvened at some point in future to consider the Burra Creek Floodplain Restoration Project, with a separate SIAC report to be prepared for that project.

The SIAC held a roundtable on the Vinifera and Nyah Floodplain Restoration Projects for six days across three weeks from 13 April 2023 to 26 April 2023, in a hybrid format. Parties to the SIAC roundtable tabled a total of 108 documents. The SIAC provided its report on the Vinifera and Nyah Floodplain Restoration Projects to me on 5 July 2023. That report, along with the ER, its supporting specialist studies, public submissions, tabled documents and relevant legislation, policy and guidelines have informed my assessment of the environmental effects of both the Vinifera and Nyah Floodplain Restoration Projects. During the roundtable and in the SIAC report, the ER and supporting documents were also referred to as 'ER Central' in the context of the wider VMFRP[1].

I thank the SIAC for its considered report and advice. I also thank everyone who invested their time to make submissions and participate in the roundtable, to help understand the issues and perspectives of different parties. I have considered all of the matters relevant to the environmental assessment of the two projects.

1.1 Purpose of this document

This document constitutes my assessment of the environmental effects of each of the Vinifera and Nyah Floodplain Restoration Projects under the Environment Effects Act. This assessment represents the final step in the assessment process and provides authoritative statutory advice to decision-makers, the proponent and all other stakeholders on the likely environmental effects of each project, their acceptability and how the effects are to be addressed in relevant statutory decision and the delivery of the projects.

This assessment will inform the decisions required under Victorian law for the projects to proceed. In addition, because the ER has been undertaken as an accredited state assessment process for both projects, which are controlled actions under the Commonwealth EPBC Act, it will also be relied upon by the Commonwealth Minister for the Environment and Water for decisions under the EPBC Act, about whether and under what conditions each of the projects will be approved.

1.2 Structure of the assessment

The structure of my assessment is as follows:

- Section 2 provides a brief description of the projects;
- Section 3 outlines the assessment process and statutory approvals required for the projects;
- Section 4 assesses central matters that were the focus for some stakeholders and the SIAC;
- Section 5 examines the project's proposed planning controls and environmental management framework (EMF);
- Section 6 assesses the environmental effects of the projects by environmental discipline;
- Section 7 presents my conclusions, including responses to the recommendations of the SIAC;
- Appendix A contains the assessment of the Commonwealth matters of national environmental significance; and
- Appendix B contains my recommendations about the environmental delivery standards (EDSs) and monitoring requirements.

[1] Note that the 'ER Central' package, as part of the wider VMFRP, includes three of the nine floodplain restoration projects proposed: Vinifera, Nyah and Burra Creek.

2 Project description

2.1 Victorian Murray Floodplain Restoration Project

The Victorian Murray Floodplain Restoration Project (VMFRP) is being implemented as part of Victoria's obligations under the Murray Darling Basin Plan (Basin Plan). The Commonwealth Government amended the Basin Plan in 2018 to include 36 sustainable diversion limit adjustment projects to enable more effective and efficient use of environmental water. The VMFRP is an important component of the agreed package of 36 sustainable diversion limit adjustment projects that will combine to enable a 605 gigalitre (GL) reduction in the water recovery target for the Murray Darling Basin while achieving the same environmental watering objectives. The VMFRP consists of nine discreet projects that aim to return a more natural inundation regime across 14,000 hectares (ha) of high-ecological-value Murray River floodplain in Victoria (Figure 2-1). The Vinifera and Nyah Floodplain Restoration Projects are two of the nine projects under the VMFRP.

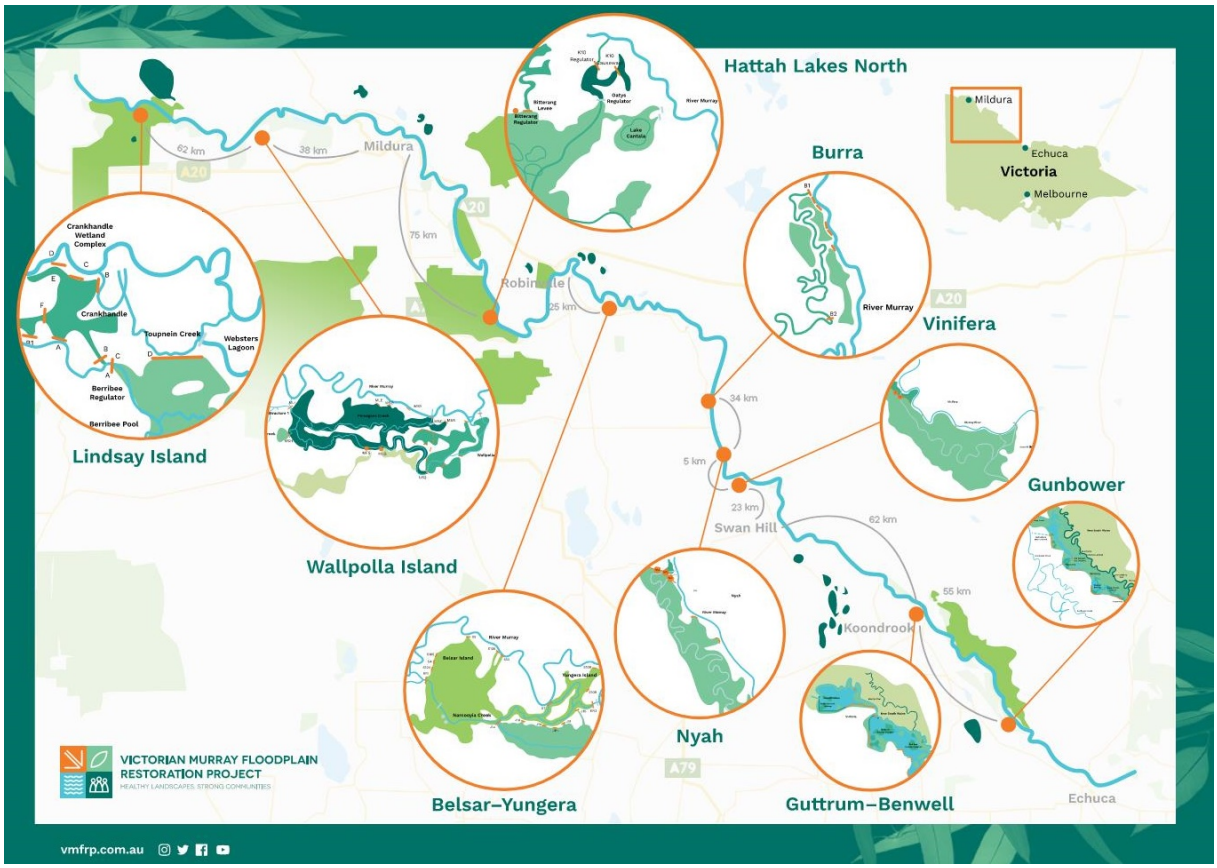

Figure 2-1 VMFRP project overview (Source: ER Chapter 1).

2.2 Vinifera

The Vinifera Floodplain Restoration Project (Vinifera) is located in north-west Victoria approximately 320 km north-west of Melbourne and 25 km north of Swan Hill, in the Nyah-Vinifera Park. The project proposes to return a more natural flood regime to 335 ha of significant floodplain at the northern and southern end of Vinifera Creek. The project is designed to facilitate managed inundation across the Vinifera water management area (Figure 2-2).

The ER described the project as comprising the following main components (Figure 2-2):

- one large regulator (V1);

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

The project will also establish a borrow site (shared for both the Vinifera and Nyah projects) to supply fill material to support construction. There are no permanent pumps proposed as part of the project.

The total construction footprint proposed for the project is 7 ha. The construction footprint is the maximum area required for the development of infrastructure necessary to facilitate the operation of the project to deliver and retain water on the floodplain. It also includes all infrastructure and associated activities required during construction such as laydown areas, site compounds, workforce facilities, site access, and borrow sites.

LMW would be the final asset owner of project infrastructure if the project proceeds. LMW would be responsible for wet commissioning, operation and maintenance of infrastructure, such as regulators, containment banks and spillways. Subject to approvals and project financing, works for the project are scheduled to commence in the second half of 2023, with construction taking between 9 to 12 months to complete.

Operation of the proposed structures within the Vinifera water management area would be coordinated to achieve environmental watering targets. Five potential operational scenarios were developed to deliver environmental water at different frequencies and durations to meet the hydrological requirements of the floodplain ecosystems. These operating scenarios aim to replicate inundation conditions within the water management area that would have occurred at various pre-regulation flow thresholds of the Murray River. Mallee Catchment Management Authority (Mallee CMA) would coordinate the environmental watering and the environmental monitoring, evaluation and reporting.

The project is described in further detail in Chapter 6 of the ER.

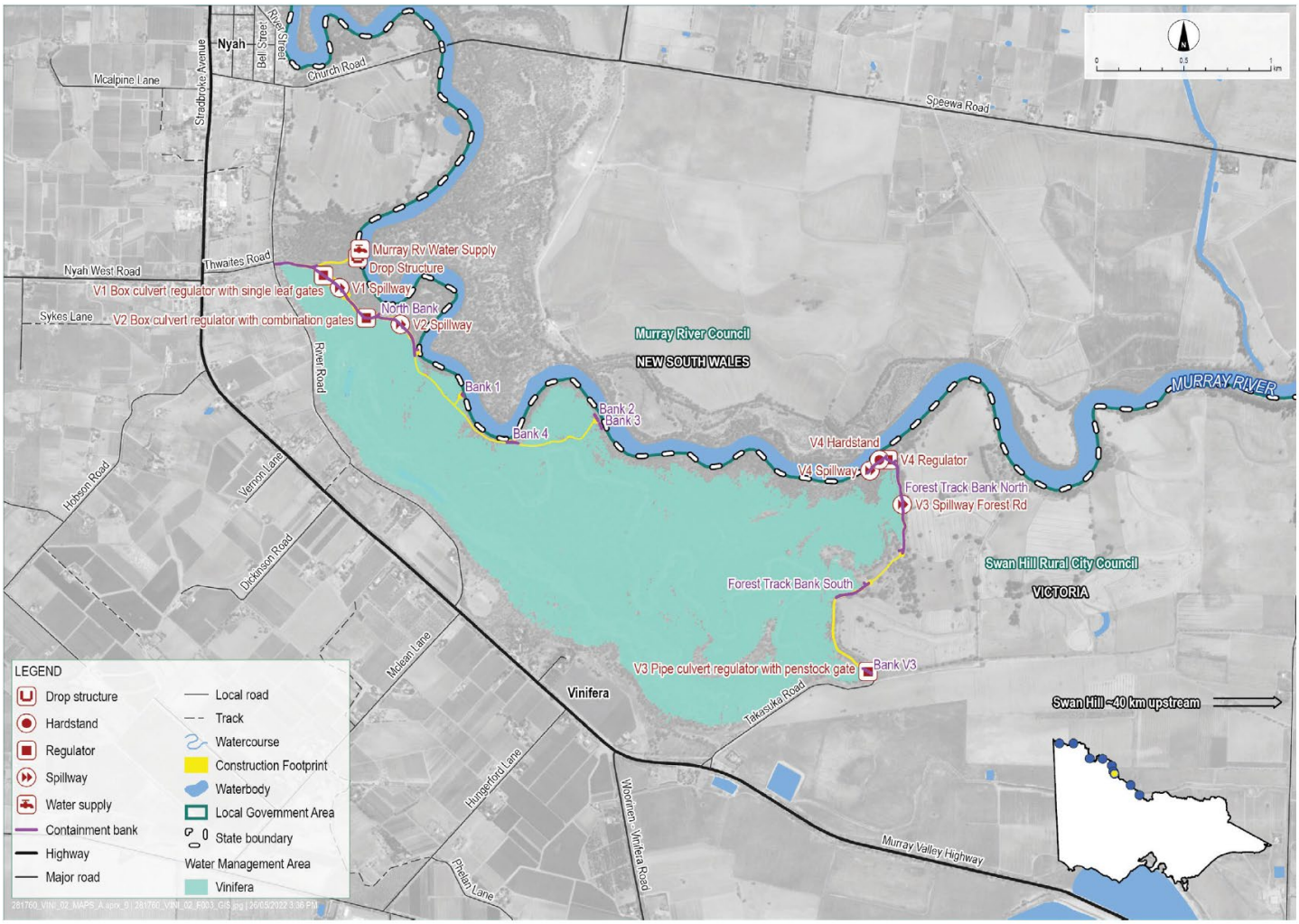

Figure 2-2 Project components map for the Vinifera Floodplain Restoration Project (Source: ER Chapter 6).

2.3 Nyah

The Nyah Floodplain Restoration Project (Nyah) is located in north-west Victoria approximately 325 km north-west of Melbourne and 30 km north of Swan Hill, in the Nyah-Vinifera Park. The project proposes to return a more natural flood regime to 475 ha of high ecological value Murray River floodplain. The project is designed to facilitate managed inundation across the Nyah water management area (Figure 2-3).

The ER described the project as comprising the following main components (Figure 2-3):

- one large regulator (N2);
- four small regulators (N1a, N1b, N5 and N7);
- containment banks (1.6 km);
- one drop structure to provide erosion control for flows returning from the floodplain to the Murray River;
- one permanent hardstand, for temporary pumps to transfer environmental water as required;
- upgrades to existing access tracks (approximately 0.3 km);
- creation of new access tracks (approximately 2.8 km);

- use of existing access tracks, including for maintenance activities during operation (approximately 4.3 km); and
- decommissioning and removal of two redundant structures (N4 bank and pipe) and a block bank (N6 regulator) in Parnee Malloo Creek.

The project will also establish a borrow site (shared for both the Vinifera and Nyah projects) to supply fill material to support construction. There are no permanent pumps proposed as part of the project.

The total construction footprint proposed for the project is 10 ha. The construction footprint is the maximum area required for the development of infrastructure necessary to facilitate the operation of the project to deliver and retain water on the floodplain. It also includes all infrastructure and associated activities required during construction such as laydown areas, site compounds, workforce facilities, site access, and borrow sites.

LMW would be the final asset owner of project infrastructure if the project proceeds. LMW would be responsible for wet commissioning, operation and maintenance of infrastructure, such as regulators, containment banks and spillways. Subject to approvals and project financing, works for the project are scheduled to commence in the second half of 2023, with construction taking between 9 to 12 months to complete.

Operation of the proposed structures within the Nyah water management area would be coordinated to achieve environmental watering targets. Five potential operational scenarios were developed to deliver environmental water at different frequencies and durations to meet the hydrological requirements of the floodplain ecosystems. These operating scenarios aim to replicate inundation conditions within the water management area that would have occurred at various pre-regulation flow thresholds of the Murray River. Mallee CMA would coordinate the environmental watering and the environmental monitoring, evaluation and reporting.

The project is described in more detail in Chapter 6 of the ER.

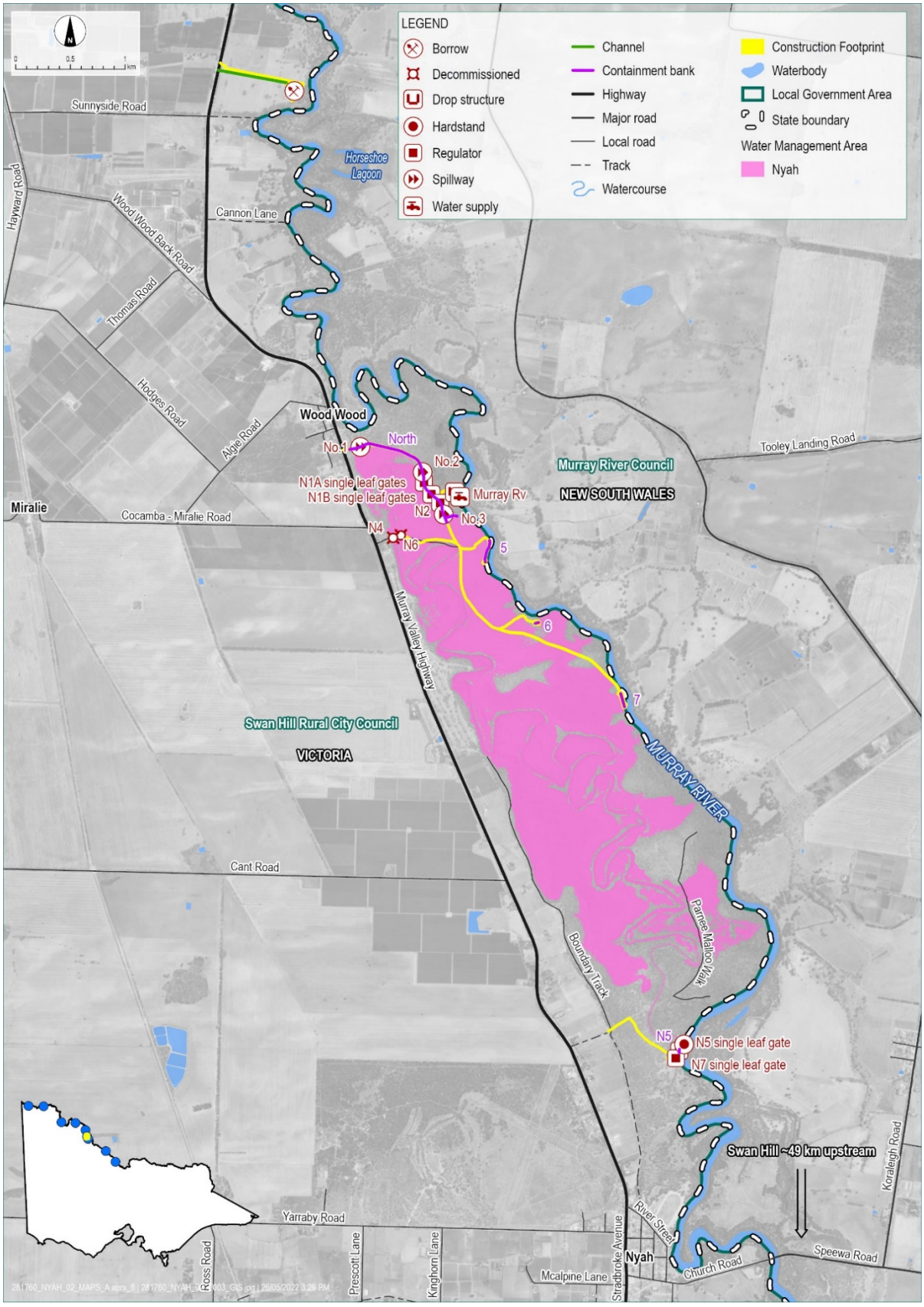

Figure 2-3 Project components map for the Nyah Floodplain Restoration Project (Source: ER Chapter 6).

3 Statutory processes

This section refers to key Acts that are relevant to my assessment and delivery of the projects. LMW require a variety of statutory approvals under Victorian and Commonwealth law for each project before they can proceed. My assessment under the Environment Effects Act will inform approval decisions, as well as a range of other permits, licences and consents.

Both the Vinifera and Nyah projects will require some New South Wales approvals due to the location of drop structures on the banks of the Murray River, which is within New South Wales. It is not the intent of this assessment to explicitly inform decisions beyond those required in Victoria and under the Commonwealth EPBC Act. The use of my assessment in other jurisdictions to inform their approval decisions is at the discretion of those authorities.

3.1 Environment Effects Act 1978

The Environment Effects Act provides for assessment regarding the acceptability and environment management of likely effects of proposed projects that are capable of significant effect on the environment, to inform decisions on such projects. The assessment can occur via an EES or an environment report (ER) process set out in conditions in lieu of an EES.

In July 2021, DELWP, now DTP, prepared a scoping document specifying the range of matters to be addressed in the environment report for the Vinifera, Nyah and Burra Creek projects. The core scope of the environment report was included within the conditions set by the Minister in his decision on the EES referrals for the projects. DELWP also convened a single technical reference group (TRG) covering all the nine VMFRP projects, to provide advice to the proponent and the department on the preparation and adequacy of the EESs and ERs, as well as coordination with related statutory approval and consent processes.

A single ER covering the Vinifera, Nyah and Burra projects was prepared by LMW and placed on public exhibition from 30 January 2023 to 10 March 2023. A single draft planning scheme amendment (PSA) for the projects was also exhibited with the environment report.

This assessment summarises the environmental effects of the proposed Vinifera and Nyah projects and provides an assessment of the acceptability of these effects and recommendations in relation to environmental management and mitigation. This assessment will inform statutory decision-making for key approvals and consents under the Victorian and Commonwealth legislation, as outlined below.

3.2 Planning and Environment Act 1987

The *Planning and Environment Act 1987* sets out land-use planning framework for the state, including processes for planning permit applications and the amendment of planning schemes. The proponent is seeking a single bespoke amendment of the Rural City of Swan Hill planning scheme, as the primary planning approval for the projects. The amendment would introduce planning control for the projects through an incorporated document and specific controls overlay to facilitate the construction and operation of the projects, rather than multiple planning permits that would be required under various provisions of the planning scheme.

The draft PSA and incorporated document relevant to these projects is discussed in Section 5.1.

3.3 Aboriginal Heritage Act 2006

The *Aboriginal Heritage Act 2006* provides a framework for the protection of Aboriginal cultural heritage in Victoria. As defined in the Aboriginal Heritage Regulations 2018, a CHMP is required when a 'high impact activity' is planned in an area of 'cultural heritage sensitivity'. Draft CHMPs are in preparation for construction of the Vinifera (No. 16901) and Nyah (No. 16900) projects. The proponent chose to prepare CHMPs which only relate to the works required to construct

the projects and did not encompass the operations phase (i.e. inundations areas). The proponent will need to consider their obligations under the Aboriginal Heritage Act, including whether effects and mitigations to minimise these effects in the maximum inundation area will require further CHMPs, or cultural heritage permits (another mechanism of the Aboriginal Heritage Act).

The projects are located on lands where Traditional Owners have not been appointed as a Registered Aboriginal Party (RAP) under the Aboriginal Heritage Act or formally recognised through a Recognition Settlement Agreement, therefore the CHMPs and permit applications will be evaluated by First Peoples-State Relations.

3.4 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (FFG Act) is a key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. The FFG Act places importance on prevention to ensure that more species do not become threatened in the future. The FFG Act was amended in 2019 through the *Flora and Fauna Guarantee Amendment Act 2019* (the Amendment Act), which came into effect on June 1, 2020. The Amendment Act provides a modern and strengthened framework for the protection of Victoria's biodiversity. Amongst other changes, the amended FFG Act includes an obligation under Section 4B on public authorities and ministers to consider potential biodiversity impacts when exercising their functions. This reflects the Victorian Government's commitment to embed biodiversity consideration in government decision making.

Project works on land owned by a public entity (including Crown land), which may affect protected native plants, will require a protected flora permit under the FFG Act. Works or other activities that involve taking or keeping of protected fish will require a permit to conduct activities under both the FFG Act and under the *Fisheries Act 1995*.

3.5 Water Act 1989

The *Water Act 1989* provides the legal framework for the management of Victoria's water resources, including the regulation and the protection of waterways. The Water Act also defines the rights to water of the Crown, individuals and water corporations as well as entitlements to water issued by the Minister for Water.

The Murray River is a declared water system under the Water Act. Therefore, a licence to take and use water from the Murray River (under Section 51 and Part 4B) for construction of these projects is not permitted. Instead, a water-use Registration (under Section 64AR) will be required to authorise use of water for purposes other than irrigation, and LMW will need to hold a water entitlement (temporary or permanent). While water use registration is also expected to be required for operation of both projects, it may be possible that operation could be undertaken in accordance with Mallee CMA and LMW's existing environmental water management processes and procedures established under the Water Act.

A works on waterways permit will be required for both projects to construct works in, on, under or above any designated waterway (Vinifera Creek/wetlands and un-named wetlands to the north of Vinifera Creek/wetland and Parnee Malloo Creek). LMW will also need a licence for works to construct, alter, operate, remove or decommission any works on a waterway.

A licence for construction of groundwater bores for monitoring, dewatering, or aquifer recharge, and for extraction of groundwater, or aquifer reinjection/recharge will also be required.

Further discussion on the governance framework of the projects and how it relates to water use and operations is provided in Section 5.2.

3.6 National Parks Act 1975

The *National Parks Act 1975* establishes a network of national parks and other protected areas that are representative of Victoria's diverse natural environments and sets out the legal framework for their protection, use and management.

Under the Act, consent is required for permanent works to be carried out in a designated park. The Vinifera and Nyah projects are located in the Nyah-Vinifera Park, a designated park under the Act, and will require consents for construction, operation and maintenance of project infrastructure. In executing consents, conditions need to be applied to protect the natural and cultural values of the park. The Red Gum Parks Management Plan is the relevant National Parks Management Plan for the Vinifera and Nyah projects; it provides important context for decisions on approvals sought for works/activities in the park.

3.7 Crown Land Reserves Act 1978

The *Crown Land Reserves Act 1978* provides for the reservation of land for a range of public purposes. Crown lands within the Vinifera and Nyah projects include the Nyah-Vinifera Park. These Crown lands are managed by Parks Victoria in accordance with the objectives of the National Parks Act and relevant management plans in place.

For the Vinifera and Nyah projects, LMW will need to obtain a licence or a lease from Parks Victoria for all proposed assets to be located on land managed by Parks Victoria.

The maximum inundation areas for both projects are also located predominantly within Crown lands. LMW will need to consult with licence-holders to ensure any existing rights of licences issued under the Crown Land Reserves Act are not adversely affected by the project. If changes to licences are required, approval will need to be sought from Parks Victoria.

3.8 Traditional Owner Settlement Act 2010

The Traditional Owner Settlement Act (TOS Act) is unique to Victoria and provides an alternative framework for the recognition of Traditional Owner rights, financial and land management packages and settlement of native title claims in Victoria. Under this Act, a recognition and settlement agreement is negotiated by Traditional Owners with the Victorian Government. There are currently no land use activity agreements (LUAA) for the lands on which the Vinifera and Nyah projects are located. Should there be a recognition and settlement agreement established under the TOS Act then the process for notification will be outlined in the LUAA. Section 3.12 provides discussion on notification requirements under the Commonwealth *Native Title Act 1993*.

3.9 Environment Protection Act 2017

The *Environment Protection Act 2017* came into effect on 1 July 2021. It is supported by the Environment Protection Regulations 2021, and other subordinate instruments and subsidiary documents. It changed the approach to environmental regulation in Victoria, establishing a proactive, duty-based legislative framework for the protection of human health and the environment. The Act imposes a number of duties, including an overarching 'general environmental duty', as well as duties in relation to pollution incidents, contaminated land and waste. The Act and regulations have also resulted in state environment protection policies being largely replaced by environmental reference standards.

The Environment Protection Authority (EPA) advised[2] that, based on the projects' material published to date, no permission under the Environment Protection Act is anticipated to be required. Irrespective of permission not being required, the Environment Protection Act is still of relevance to the assessment and implementation of the projects. The duties under the Act, including the general environmental duty, will apply to the projects independently of, and in addition to, the other proposed project controls. Furthermore, as noted by the EPA, any waste generated as part of the construction and operation of the project, including waste spoil and water must be managed in accordance with the Environment Protection Act and Environment Protection Regulations 2021.

[2] VMFRP SIAC submission no. 7, EPA, page 13.

My assessment of the projects provided in Sections 5 and 6 of this assessment takes account, as appropriate, the requirements of the Environment Protection Act and regulations.

3.10 Mineral Resources (Sustainable Development) Act 1990

The *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act) regulates mineral exploration and economically viable mining and extractive industries in a way that is compatible with the economic, social and environmental objectives of the state. The Vinifera and Nyah projects require extraction of material from nearby small quarry sites (referred to in the environment report and hereafter in this assessment as borrow sites). The location of the borrow sites are proposed to be on private land within the project areas, which were identified through a tendering process. On 31 August 2022, a Victorian Government Gazette was issued by the Minister for Resources providing an exemption pursuant to section 5AA(1) of the MRSD Act. The exemption from the provisions of the Act stipulated[3]:

1. the exemption only applies to the MRSD Act and does not remove any requirement associated with any other act;
2. the exemption is for any extraction or removal of raw materials from land undertaken by or on behalf of the VMFRP for the purpose of construction of landforms required to achieve the outcomes of the VMFRP;
3. extraction of raw materials from land is solely for the purpose of the VMFRP project, and cannot be applied to any other private, commercial or industrial purpose;
4. any excavation for the purpose of the VMFRP project will not exceed an area of 6 ha and more than 2.5 m below natural surface in any single location, and will not require blasting;
5. prior to commencement of extraction a formal agreement must be entered into with any landowner stating the required work, any compensation matters and an agreed final rehabilitation status (all areas are to be rehabilitated to a safe, stable and sustainable landform); and
6. the proponent is to adopt industry best practise in undertaking all operational and rehabilitation activities associated with the excavations, including managing hazards and risks to environment, any member of the public, or land, property or infrastructure in the vicinity of the work.

The borrow sites will need to comply with the requirements of the 5AA(1) exemption and the Earth Resources Regulation Code of Practice for Small Quarries.

3.11 Other Victorian statutory approvals

In addition to those discussed above, the projects are expected to require other Victorian statutory consents and approvals including:

- consent for the use or development of land within a declared under the *Road Management Act 2004;*
- authorisation to create obstructions to fish passage and/or a permit to take fish under the *Fisheries Act 1995*;
- consent for the use or development of land within council owned or managed roads under the *Local Government Act 2020;*
- authorisation to take or handle wildlife under the *Wildlife Act 1975* (e.g. if live capture or relocation of fauna is required); and
- a permit to disturb an item listed in the Victorian Heritage Inventory under the *Heritage Act 2017*, for unlisted or newly discovered sites.

[3] Victorian Government Gazette No. S 444, Wednesday 31 August 2022 (Dated 25 August 2022). Minister for Resources, Jaala Pulford.

3.12 Commonwealth statutory approval

Environment Protection and Biodiversity Conservation Act 1999

LMW referred the proposed Vinifera (May 2020) and Nyah (June 2020) projects to the Commonwealth Government (referrals 2020/8647 and 2020/8648, respectively) for a determination on whether each project was controlled action under the EPBC Act.

On 4 June 2020 and 26 June 2020, the Vinifera and Nyah projects were determined to be controlled actions requiring assessment and approval under the EPBC Act, due to likely significant impacts on matters of national environmental significance (MNES). The relevant controlling provisions for both the Vinifera and Nyah projects are listed threatened species and communities (Sections 18 and 18A).

The ER process is serving as the accredited state assessment for each of the controlled actions (i.e. projects), for the purposes of the EPBC Act, with the Commonwealth decisions about whether, and under what conditions, to approve each of the projects to be informed by this assessment. My consolidated assessment of the impacts on MNES is provided in Appendix A.

Water Act 2007

The *Water Act 2007* provides the legislative framework for regulation of water charge and water market rules across the Murray-Darling Basin. It provided for the establishment of the Murray-Darling Basin Authority (MDBA) with the functions and powers needed to ensure that the basin's water resources are managed in an integrated and sustainable way. VMFRP is being implemented as part of Victoria's obligations under the Basin Plan and would need to operate in accordance with the requirements for environmental watering under the *Water Act 2007* (Cth) and the *Water Act 1989* (Vic). The policy basis for the projects being pursued is beyond the scope of this assessment.

LMW will need to notify the MDBA of any proposal(s) that may affect the flow, use, control or quality of any water in the upper Murray River. LMW must also provide all necessary information and data to the MDBA in order to assess the potential impacts on the river before construction commences. The Act does not expressly provide that the approval of the MDBA is required, but states that the MDBA may approve such works subject to conditions.

Native Title Act 1993

The Native Title Act establishes a mechanism for the determination of Native Title claims through the Federal Court of Australia providing for the recognition and protection of Native Title in Australia. The construction footprint of the Vinifera and Nyah projects are not located on lands for which Native Title has been recognised. However, two Indigenous Land Use Agreements (ILUA) (VI2004/010, VI2011/001), made between the Traditional Owners and Minerals Council of Australia cover the majority of the Vinifera and Nyah inundation areas. Notification may need to be provided of a 'future act' for activities on Crown land that may affect Native Title rights and interests under these ILUAs.

3.13 New South Wales statutory approvals

The relevant New South Wales legislation under which statutory approvals for the Vinifera and Nyah projects would likely be required include:

- *Environment Planning and Assessment Act 1979*; and
- *Fisheries Management Act 1994*.

It is outside the scope of this assessment to provide recommendations on these approvals. The use of my assessment to inform approval decisions in NSW is at the discretion of relevant NSW statutory authorities.

4 Environmental assessment – key matters

This section examines and provides my assessment on some key and overarching matters listed below:

- project benefits;
- consideration of project alternatives;
- cumulative effects; and
- overall findings

4.1 Project benefits

The underlying rationale for all the VMFRP projects is to restore and enhance high value floodplain environments, their ecosystems, biodiversity values (particularly listed threatened species and communities), water quality, and cultural values, through the implementation of engineered environmental watering. However, construction of the watering infrastructure, itself, will cause significant impacts to the same values when native vegetation is cleared to construct the projects in these high value environments.

In the consideration of project approvals for the construction and operation, the expected project benefits and associated certainty of those being realised over time, should be weighed against the identified impacts (direct and indirect) of delivering the projects, particularly in the context of the Planning and Environment Act and native vegetation policy. To assist with this, the ER was required to assess and document the projects' intended ecological benefits including how they relate to the projects' predicted adverse effects on specific biodiversity values.

Overall improvement (benefits) to biodiversity

In its assessment of the projects' benefits and impacts, the proponent sought to examine whether each project meets the criteria[4] required for exemption from native vegetation offsets under the Victorian native vegetation policy. Formal application (and decision-making) on the exemption will be defined in the PSA's incorporated document. My assessment and recommendations regarding specific biodiversity effects is provided in Sections 6.2, 6.3 and Appendix A, and associated planning controls are discussed in Section 5.1.

The assessment of overall improvement to biodiversity (AOIB) reports for Vinifera and Nyah included in the ER (Attachments V and VI, respectively) both concluded that the projects would deliver an overall improvement to biodiversity in these floodplains by improving the current floodplain hydrology (frequency, duration and timing of inundation/watering) to something similar to the pre-regulated hydrology. The ER assessments concluded this would improve ecosystem function as well as threatened species' habitat within the native vegetation communities of the inundation areas. Notwithstanding the benefits, the assessments noted that one species - Murray Hardyhead (*Craterocephalus fluviatilis*) - was predicted, by the EnSym NVR tool for the Vinifera site, to have a greater impact than benefit. However, the ERs concluded that the species is highly unlikely to be present, and therefore unlikely to be adversely impacted by the Vinifera project.

The proponent commissioned an independent 'expert elicitation' by Arthur Rylah Institute (ARI) to assist in predicting likely responses of the floodplain vegetation communities (ecological vegetation classes, EVCs) under various watering regimes. The expert elicitation panel was comprised of public and private sector botanists and floodplain ecologists experienced with the vegetation and hydrology of the Murray River floodplain. The panel considered the optimal and tolerable ranges (based on frequency and duration of inundation) of the 24 identified EVCs associated with the broader VMFRP. Their report concluded that four of the EVCs would not receive benefit from the projects' proposed watering regime. As the expert elicitation report was prepared after the main ER documents were finalised, this report was exhibited with the ER as an 'accompanying document' (Accompanying Document 2). The findings of the ER main report and technical studies were not updated to incorporate the outcomes of the expert elicitation.

[4] See DELWP (2017) Guidelines for the Removal, Destruction or Lopping of Native Vegetation. Department of Environment, Land, Water and Planning.

To contextualise the expert elicitation results for the Vinifera and Nyah environments, the proponent published a technical note (TN01, Tabled Document 22) which presented further site-specific work for the Vinifera[5] and Nyah[6] floodplains, carried out by Ecological Associates. The Ecological Associates reports apply the results of hydraulic modelling of the Vinifera and Nyah floodplains to evaluate the frequency and duration of inundation of the various EVCs under different scenarios. The scenarios were pre-regulation (i.e. the target scenario), regulated (i.e. existing scenario) and Basin Plan (i.e. accepted baseline scenario). However, I note that the Basin Plan plus VMFRP scenario was not addressed in the Ecological Associates report. As noted in the ER, this scenario represents the most likely post-VMFRP regime, which is what the projects would seek to implement. I recommend this scenario is included in the additional hydraulic modelling and analysis work to be conducted, and then used to inform the updated AOIB reports (as recommended under EDS SW4).

The Ecological Associates reports said the expert elicitation report had limited usefulness when applied to specific sites, due to the generalised nature of the expert elicitation advice on the optimal and tolerable ranges of each EVC. In the covering technical note (TN01), the proponent noted that neither the expert elicitation report nor the Ecological Associates reports considered the full range of factors, such as site specific hydrology, topography, drying phases required for some EVCs and intervals between watering events, which will be relevant to achieve the intended ecological and biodiversity benefits of the projects through future environmental watering.

For Vinifera and Nyah, the SIAC agreed with the findings set out in the EES Central SIAC report and concluded that with the increased frequency and duration of inundation achieved through the implementation of the Vinifera and Nyah projects, it is reasonable to expect the health of most of the floodplain vegetation in the proposed inundation areas to benefit. The SIAC therefore concluded the two projects can result in an overall improvement to the biodiversity values of these floodplains. However, the SIAC highlighted the uncertainty in both the extent and timeframes of beneficial outcomes that may be realised for each project, and that outcomes will depend on the responses of key vegetation communities of the Nyah-Vinifera Park to the changed watering regimes. The SIAC recommended additional hydraulic modelling and analysis work is conducted to further understand and inform the operational management of impacts and realisation of benefits.

As detailed in Sections 6.2 and 6.3 of this assessment, I support SIAC's recommendation for further hydraulic modelling and analysis. I note the SIAC did not include in their recommendations that the outcomes of this additional hydraulic modelling and analysis should be used to refine the assessment of the extent of benefits to be realised through update of the AOIB reports, as per the recommendations for EES Central. I consider it important this work is undertaken to provide greater certainty regarding the expected improvements to biodiversity values and to specific EVCs, prior to native vegetation related decision-making. I recommend that the planning scheme amendment for the projects include a requirement to update the AOIB reports to be provided to the Secretary of DEECA under Clause 4.5.1 of the incorporated document. Sections 6.2 and 6.3 examine the projects' effects (and benefits) on biodiversity values and sets out all of my associated recommendations in further detail.

While the predicted ecological and biodiversity benefits of each project are likely to occur, they will take some time to realise. On this basis, the SIAC recommended an offset regime for these projects that requires a determination on necessary offsets to be deferred until there is clear evidence the benefits have been delivered. As detailed in Section 6.2 of my assessment, I do not support this recommendation. This is not consistent with state planning policy and does not allow sufficient clarity on offset requirements (to meet relevant policy), prior to vegetation clearance occurring. Consistent with my assessment for the EES Central projects I maintain that the incorporated document should include conditions consistent with state policy, requiring offsets (should they be deemed necessary) to be secured prior to construction. My findings and recommendations on this matter are further discussed in Section 5.1.

[5] Ecological Associates (2023). Hydrological analysis of Ecological Vegetation Classes in relation to expert elicitation report – Vinifera Floodplain (Tabled Document 24)

[6] Ecological Associates (2023). Hydrological analysis of Ecological Vegetation Classes in relation to expert elicitation report – Nyah Floodplain (Tabled Document 23)

Other project benefits

While the key objective of the projects is to protect and restore floodplain ecosystems, other project objectives outlined in the ER include the facilitation of Traditional Owner aspirations for restoration of floodplain ecosystems as well as provision of social and economic benefits through enhancing tourism and recreational opportunities associated with healthy riverine landscapes.

The ER concluded that the projects' delivery of environmental water is expected to increase vegetation cover and, in turn, reduce erosion that would otherwise expose and disturb archaeological sites (and associated Aboriginal cultural heritage) across the landscape. The ER also concluded that the projects are likely to improve the health of living scarred trees and therefore prolong their lifespan. These likely benefits need to be considered alongside potential impacts to Aboriginal cultural heritage values. However, I support the findings of the SIAC that these potential effects can be managed to an acceptable level and that there will be benefits. Detailed assessment and my recommendations regarding effects on Aboriginal cultural heritage values are provided in Section 6.4.

In the case of social and economic considerations, I am similarly confident the projects' benefits will outweigh their disbenefits. The Vinifera and Nyah project areas are highly valued for activities including camping, bushwalking, bird watching, canoeing, trail-bike riding and horse riding. The ER estimated approximately 1,500 additional recreational visitors to the Vinifera area, which would bring an estimated economic value of $240,000 per year, and approximately 1,700 recreational visitors to Nyah each year, which would bring an estimated economic value of $270,000 per year. Further regional economic benefits are outlined within the ER, including the generation of economic activity during construction of approximately $18.9 million for each of the Vinifera and Nyah projects. Other likely benefits for the community include overall positive effects for apiarists through improved vegetation health resulting in healthier hives, improving bushfire resilience of vegetation, improving vegetation growth and improving visual quality of views, improved access through track upgrade and maintenance.

The SIAC concluded that the assessment of social and economic effects in the ER was satisfactory, and the EMF provides a suitable basis for managing the social and economic effects of the project. I note that the SIAC acknowledged the net community benefit likely to result from each project. These are matters that need to be considered for the subsequent planning approval decision under the Planning and Environment Act (see Section 5.1). My assessment of effects and specific recommendations for land use, social and economic aspects are provided in Section 6.6.

Residual uncertainties and adaptive environmental management

The additional work recommended by the SIAC, and further refined in this assessment, will assist in confirming aspects of the predicted benefits. Notwithstanding that, the ability of the projects to fully realise the extent of predicted benefits also relies on some other factors that are essential to achieving short, medium, and most importantly, long-term environmental objectives. These essential success factors are:

- that the operations and projected inundations can continue to be implemented over the long term as proposed;
- the monitoring and adaptive management program can be implemented effectively, with timely understanding of ecological conditions and responses to the planned watering, to inform appropriate interventions/management actions; and
- practical options for adaptive management exist well into the future, as the understanding of the ecology and floodplain environment evolves, in the context of its responses to watering and other uncontrollable factors such as climate change.

The SIAC's findings and this assessment is predicated on sufficient water being available to the projects through the management of entitlements under the Water Act (Vic) as presented to the SIAC by the Victorian Environmental Water Holder (VEWH). The realisation of benefits is also dependent on the sustained and effective implementation of operations, which is conditional on primary and secondary approvals and interactions between these approvals, as discussed in Sections 3 and 5.1. Therefore, there needs to be sufficient certainty regarding these aspects to underpin the implementation of operations before vegetation clearance and/or construction begins.

The proposed EMF in the exhibited ER includes an adaptive management regime for both the Vinifera and Nyah projects, incorporating the environmental water planning and delivery frameworks already in place in Victoria. The adaptive

management process would include monitoring, evaluation and reporting to continuously review project performance relative to objectives and targets and allow for the watering program to be updated in response. The SIAC's assessment was made on the basis that the EMF, EDSs and associated management plans and processes will be adequately resourced and implemented consistent with what is approved. I agree with the SIAC that it is paramount there is sustained commitment of project partners and that adequate, sustainable funding and resourcing is provided for environmental monitoring and adaptive management. This is essential to facilitate the realisation of expected benefits and effective management of adverse residual environmental effects and risks.

4.2 Consideration of project alternatives

As set out in the ER scope, the ER was required to describe and assess effects of relevant alternatives for each project. This included requirements to explain how and why specific alternatives were selected for detailed evaluation within the ER and to document the likely environmental effects of feasible alternatives, particularly where these offered a potential to minimise and/or avoid significant environmental effects whilst meeting the objectives of the project.

Chapter 4 of the ER outlined project alternatives considered in the early stages of project development (pre-EES referral) and summarises further project refinements conducted during the ER process. The early stages of project development, which the ER indicates have been ongoing since 2010, included investigations of potential options to provide water to restore the function and habitat components of floodplain ecosystems along the Murray River. The ER reports that individual business cases for each VMFRP project were completed in 2015 for consideration under the Murray-Darling Basin Plan Sustainable Diversion Limit Adjustment Mechanism. Early project development had a focus on finding a feasible infrastructure solution that suited the conditions of each site and identify preferred watering regimes. This work informed the development of concept designs used to commence the assessment and approvals processes.

A brief outline of policy context and interventions considered as part of the early development of VMFRP are provided in ER Chapter 2, which includes consideration of options such as additional Commonwealth water recovery from consumptive users, alternative approaches for environmental watering within sites and use of alternative sites for watering. The 'no intervention' scenario is also discussed.

The SIAC report indicated in Section 1.3 that the extent to which project alternatives have been investigated was ventilated in the SIAC process for EES Central, and the SIAC generally adopted the views reported by the SIAC for EES Central in relation to these matters. I note that, as was the case for EES Central, some submitters were of the view that the SIAC should consider alternative projects that would achieve the same environmental outcomes sought by the VMFRP, such as constraints relaxation. As raised by the submitters, this was pertinent to the Vinifera and Nyah projects as there is some overlap in the proposed inundation areas as a result of VMFRP and constraints relaxation. Consistent with the *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978*, the ER did not assess alternatives to the projects but did consider the implications of the 'do nothing' scenario. The proponent gave evidence that currently there is no publicly available modelling that could reasonably represent the likely or actual outcomes of constraints relaxation, given the associated degree of uncertainty. The proponent also pointed to its Part C submission to the EES Central hearing (Tabled Document 98) that states the constraints measures themselves would not guarantee flow levels to deliver inundation to the extent or required frequency and duration that the Vinifera and Nyah projects are designed to achieve. The SIAC noted that while outside the scope of the ER, consideration of constraints relaxation in flow scenarios, or examination in the context of cumulative effects and benefits would have been helpful. Consistent with my assessment for EES Central, I agree with the SIAC that the approach taken in the ER, with the focus on alternatives for the projects (such as project footprint alternatives), was appropriate. Consideration of constraints relaxation in relation to surface water modelling is discussed further in Section 6.1.

Information on specific alternatives considered during the ER process for siting and layout of project infrastructure was provided in Chapter 4 and Attachment VIII of the ER. The process of assessment of alternatives for the project layouts during the ER process initially included a design and constructability review, which allowed the construction and operational requirements of the projects to be better understood including a review of required construction footprints for infrastructure and requirements for access tracks and borrow sites. Based on the outcomes of specialist assessments conducted for the ER, 'significant values' were identified for consideration during further examination of alternatives. Multidisciplinary workshops were held where refinements to the construction footprint were considered to avoid and

minimise environmental impacts where possible – there was a particular focus on reducing impacts to biodiversity and cultural heritage values. The selection of design refinements was also informed by stakeholder consultations, including with Traditional Owners. Alternatives associated with project staging and timing and/or extent of inundation events were also considered in the ER.

The process of consideration of alternatives to avoid and minimise impacts on native vegetation for the projects was further discussed in Section 5.2 of the SIAC report. The implications of design alternatives for avoiding and minimising impacts on threatened flora communities and species listed under the FFG Act or EPBC Act were also considered in Section 5.3. The SIAC highlighted that while a few submissions raised broad concerns about the extent of native vegetation and tree loss associated with the projects' construction footprints, no submissions called for consideration of site-specific design alternatives. In relation to the assessment of project alternatives presented in Attachment VIII of the ER, the SIAC considered the broad logic of decisions on the relative merit of previous design proposals and specific alternatives is reasonably clear. I support this finding, noting my recommendations below for additional consideration of project alternatives and refinements.

The SIAC highlighted that, while EDS E1 would require the project contractor to implement further measures to avoid and minimise native vegetation removal, the likely effectiveness of such measures is uncertain as the only definitive requirements are the caps on total vegetation removal and the implementation of no-go zones. To assist in ensuring appropriate consideration of further opportunities to reduce impacts on biodiversity, the SIAC recommended EDS E1 be amended to require further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species. The SIAC also recommended further consideration of the need for siting of any works within 30m of the banks of the Murray River having regard to relevant alternatives, due to the sensitivity of the riparian environments. I support these recommendations to assist in further reducing the impacts on native vegetation in these sensitive environments. These recommendations are discussed further in Section 6.2 of this assessment.

I note that a proposed process for further assessment of alternatives during the contractor procurement, detailed design and construction phase was outlined in Chapter 4 of the ER but was not reflected in the EMF. The process outlined in ER Chapter 4 includes the following activities:

- shortlisted contractors would be required to refine and recommend alternatives and refinements before the contract is awarded (including consideration of alternatives identified in the environment report that require further assessment post-approval);
- workshops will be held with shortlisted contractors to discuss design alternatives (previously identified and new alternatives) and constructability within the construction footprint for each project;
- agreed alternatives will then be embedded into the contract specification as scope items and monitored post contract award (these changes would be implemented via the change management approach outlined in the ER Chapter 20 EMF); and
- VMFRP staff will continue to work closely with the contractor throughout the construction phase to ensure all relevant project knowledge and background assessments are shared as relevant.

Further to the SIAC recommendation to amend EDS E1, I recommend the final EMF includes a process for further assessment of alternatives/refinements to the construction footprint to be implemented during the contractor procurement, detailed design and construction phase (generally consistent with the process proposed in ER Chapter 4 as summarised above). This will further strengthen the measures to avoid and minimise adverse environmental effects in the later stages of the project. As per the recommendations of the SIAC for EDS E1, this process should consider opportunities to avoid and minimise impacts on native vegetation, large trees and habitat of threatened species. Trade-offs with other key values in the landscape such as avoiding impacts on cultural heritage sites will need to be carefully considered in that process, in consultation with relevant stakeholders.

4.3 Cumulative effects

The consideration of cumulative impacts and benefits has formed an important part in the development of each of the nine VMFRP projects. It should be noted that there is uncertainty around the respective timing and implementation of

each of the nine VMFRP projects. The scenario considered in this assessment assumes that all nine projects will proceed, and that the Vinifera and Nyah projects are constructed at the same time.

The projects will result in some adverse cumulative effects namely in relation to:

- salt load and dissolved oxygen;
- increased Carp abundance;
- impacts to biodiversity and habitats through native vegetation clearance; and
- Aboriginal cultural heritage.

The Vinifera and Nyah projects also have the potential to achieve cumulative beneficial effects to biodiversity and habitats in conjunction with the other VMFRP projects through improvement to floodplain vegetation (as discussed above). The ER estimated that there is potential, across the nine VMFRP projects, for cumulative benefit to a total of 14,477 ha of floodplain vegetation, within which an estimated 79,862 large trees could benefit.

The SIAC concluded the projects are unlikely to result in significant adverse cumulative impacts with implementation of the proposed mitigation measures. I support the conclusion of the SIAC and have provided recommendations to address the management of potential adverse cumulative effects, including in relation to some specific risks for threatened fauna, as discussed in Section 6.2 and Appendix A.

Detailed information on the cumulative effects of different aspects of the projects have been considered in later sections of this assessment including in relation to salt load and dissolved oxygen (Section 6.1), Carp (Section 6.3), and potential impacts to biodiversity and habitats (Section 6.2 and Appendix A). The ER states that the accurate assessment of cumulative effects for Aboriginal cultural heritage relies on knowledge of Aboriginal places within the project areas. Therefore, sufficient cumulative assessment of the impacts to Aboriginal cultural heritage will be encompassed in the proposed CHMPs, as required under Regulation 68 of the Aboriginal Heritage Act.

4.4 Overall findings

Considering both the potential benefits and expected residual impacts of the projects, it is my assessment that the Vinifera and Nyah projects can proceed with acceptable environmental effects. The acceptability of some significant adverse effects is subject, however, to the completion of further detailed analysis and implementation of an environmental management regime consistent with that endorsed by the SIAC and refined through the findings and recommendations of this assessment. The successful implementation of adaptive environmental management during the operation of the projects will be vital to support the realisation of the likely project benefits. My assessment also includes recommendations regarding the proposed monitoring program, to inform the adaptive management process. I consider the proposed EDSs (with amendments recommended by the SIAC and this assessment) will provide appropriate measures to ensure that the adverse effects of both construction and operations are managed to acceptable levels.

Along with the SIAC, I consider the proponent has demonstrated during the ER process that the avoid and minimise principles have been applied in the development of the project layouts and designs (see Section 4.2). However, I have made recommendations to support further avoidance and minimisation during the detailed design and construction phases, as there is an imperative to continue to improve environmental outcomes (short and long term) for both projects. Further avoidance and minimisation of vegetation clearance and other impacts is considered possible when the projects are designed, constructed and operated, and therefore should be undertaken, consistent with state policy.

While I consider that both the Vinifera and Nyah projects can result in an overall improvement to biodiversity values within these floodplains over the long-term, I also note the issues and gaps raised by the SIAC regarding the understanding of some aspects of the extent and timeframes of some expected benefits. Along with the SIAC, I recommend additional analysis occurs to provide greater certainty regarding effects and benefits for floodplain vegetation communities as well as soil erosion risks, to inform the detailed design and operational parameters. This additional work will be important to satisfactorily demonstrate and provide greater certainty that the full extent of predicted net benefits to floodplain vegetation communities will be achieved for each project, prior to native vegetation related decision-making.

I consider it unlikely that this additional analysis will identify adverse effects not already considered through this assessment and addressed by the EDSs (taking account of recommendations of the SIAC and this assessment). However, this work is expected to result in refinement of the extent of native vegetation to benefit from watering within each of the maximum inundation areas and refined understanding to help realise those benefits. As recommended by the SIAC, the outputs of the additional hydraulic modelling and analysis should also be fed into the detailed design of the projects and operational scenarios to provide the opportunity for any issues identified to be addressed through design modifications and any necessary refinement of the approach to adaptive environmental management. Consistent with my assessment for EES Central, I have also recommended further analysis to inform an update of the AOIB reports for each project. The outcomes of this work (along with other recommendations of this assessment) will need to be considered in relevant project approval decisions and secondary consent matters. My assessment of planning controls for the projects is provided in Section 5.1 and other approvals are discussed in Section 3.

It is my assessment that residual impacts on EPBC Act-listed species and communities of both the Vinifera and Nyah projects are unlikely to be significant with the implementation of the proposed EDSs, except for likely significant impacts on the Regent Parrot due to loss of potential habitat. I support amendments to EDSs as recommended by the SIAC and further strengthened by my assessment, to ensure appropriate avoidance and minimisation of adverse impacts on MNES as detailed in Appendix A. There is potential for cumulative impacts on MNES from the Vinifera and Nyah projects in conjunction with other VMFRP projects (assuming they proceed), in particular cumulative habitat loss for Regent Parrot from vegetation clearance during construction. However, there are also expected to be long term benefits for MNES from operations, including for the Regent Parrot, through improved ecosystem health in areas of the floodplains that provide habitat. It is my finding that the residual impact on Regent Parrot can be acceptably managed with the adoption of recommendations set out within this assessment.

The projects will have a complex governance framework and their implementation will require sound coordination and collaboration between numerous government agencies, Traditional Owners and other stakeholders. The proposed EMF and management plans will provide an appropriate framework for the ongoing management of potential adverse effects of the project. The implementation of the proposed monitoring and adaptive management approach during construction and operations will also be vital to successfully mitigating risks and helping ensure the realisation of the positive outcomes that the projects aim to achieve, in both the short and long-term.

Furthermore, continued implementation of consultation and engagement activities will also be critical to ensuring the further development and implementation of the projects consider local community interests and needs, and are able to help facilitate Traditional Owner aspirations for restoration of the floodplain. My recommendations regarding the proposed approach to further consultation and engagement are provided in Sections 5 and 6.

5 Planning framework and environmental management

This part of my assessment explains relevant aspects of the regulatory framework and proposed environmental control regime that have informed my assessment. It also sets out my analysis and findings in relation to the proposed planning controls and environmental management framework for the projects.

5.1 Planning controls

The primary approval for both projects under Victorian legislation is proposed to be a planning scheme amendment (PSA) to introduce bespoke controls to facilitate the construction and operation of the projects. A single draft PSA (Amendment C78 to the Swan Hill planning scheme) covering the Vinifera, Nyah and Burra Creek projects was prepared by the proponent in consultation with relevant agencies and was included in the exhibited ER in Attachment 4. The draft PSA seeks to:

- facilitate approval and delivery of the projects in a timely, coordinated and consistent manner;
- establish a framework to manage environmental effects during construction and operation; and
- ensure the projects can be planned with certainty and commence without delay.

In broad terms, the proponent's draft PSA:

- inserts an incorporated document into the Swan Hill Planning Scheme to allow the use and development of the land for the projects in accordance with the specific control in the incorporated document;
- applies the specific controls overlay (SCO) to land required for the projects; and
- makes the Minister for Planning the Responsible Authority for the projects on land subject to the SCO in the Swan Hill Planning Scheme.

Amending the planning scheme to insert an SCO and an incorporated document would allow the proponent to progress the projects consistently, without the need for a series of individual planning permits required under a range of planning provisions in the local planning scheme, provided conditions in the incorporated document are met.

The SIAC was appointed both as an inquiry under the Environment Effects Act to assess the environmental effects of the projects and as an advisory committee under the Planning and Environment Act to provide the Minister for Planning with advice as to the merit, strategic justification, content and structure of the PSA. In this assessment I have considered the SIAC's recommendations on the proposed PSA in the context of the environmental effects of the proposed works, their acceptability and how those environmental effects might be mitigated. Subsequent consideration of a decision on whether, and on what terms, the planning approval of the projects should proceed, is still required under the Planning and Environment Act. This assessment will inform those considerations.

As described in Section 1 of this assessment, since exhibition of the draft PSA, the proponent has deferred the public hearing process for the Burra Creek project to allow time for the proponent to undertake further hydraulic analysis. The SIAC therefore addressed only the Vinifera and Nyah projects in the roundtable hearing and its report. My recommendations on the draft PSA included in this assessment are consequently only relevant to the Vinifera and Nyah projects. A decision on whether to include Burra Creek in Amendment C78 to the Swan Hill Planning Scheme must be adequately informed by further analysis undertaken for the Burra Creek project and any public hearing process relating to this component of the project or deferred to a separate planning scheme amendment process.

Strategic assessment of the draft PSA

The SIAC reviewed the VMFRP Planning Scheme Amendment C78 Strategic Assessment Report (ER Attachment 4) and concluded that the draft PSA is strategically justified for the Vinifera and Nyah projects because:

- the draft PSA will facilitate the projects implementation;

- the draft PSA appropriately responds to the objectives of planning as well as relevant State, regional and local policies, strategies and plans including the Loddon Mallee Regional Growth Plan;
- the draft PSA appropriately responds to Ministerial Directions, Planning Practice Notes, bushfire risk and the *Transport Integration Act 2010*;
- the preparation of the PSA included appropriate consultation with relevant agencies and stakeholders; and
- the administrative costs associated with implementing the incorporated document will potentially be significant but are balanced by the broader project benefits.

The SIAC recommended that draft PSA C78 to the Swan Hill Planning Scheme be approved subject to their revisions to the incorporated document and the EMF.

I consider the draft PSA provides for an appropriate set of planning controls for facilitating the sound implementation of the construction and operation of the projects. However, the final form and content of the draft PSA, when submitted to me for a decision under the Planning and Environment Act, will need to address the findings and recommendations of this assessment (including the SIAC recommendations as appropriate), as well as adequately respond to whether the PSA results in a net community benefit. This should be considered in the context of this assessment and the SIAC report, and include an assessment of the environmental, social and economic effects of the PSA, using the ER documentation as appropriate. It should also include an evaluation of the costs and benefits to businesses and the community informed by the ER, arising from any requirement that is proposed to be implemented via the PSA during construction and operation.

Specific controls overlay

The SCO is one of the tools available in the Victoria Planning Provisions. It allows land to be used or developed in accordance with a specific control in an incorporated document corresponding to that land.

No issues were raised in submissions about the use or extent of the SCO and associated planning scheme provisions. The SIAC concluded that the use of the SCO and an incorporated document is an appropriate use of the Victoria Planning Provisions for these projects, which I support.

I note it is possible that the extent of the land to be included in the SCO will require confirmation before a request to approve the proposed PSA is submitted. This relates to the outcomes of further technical analyses (including the hydraulic analysis to refine the floodplain vegetation assessment) and any associated design or operational changes informed by that refined understanding. My recommendations regarding the further analyses required are provided in Section 6.2.

Further consideration will be given to the aspects discussed above when I am asked to decide on the final form of the PSA.

Incorporated document

The proponent's final day draft incorporated document includes specific conditions, some of which require plans and documents to be prepared and approved (by the Minister for Planning or other authorities) at specified times, but predominantly before construction commences. These are as follows:

- development plans including the construction footprint and infrastructure (for approval by the Minister for Planning);
- EMF containing associated EDSs (for approval by Secretary of DEECA[7]);
- construction environmental management plan (CEMP, for approval by the Secretary of DEECA);

[7] Note in all cases in the incorporated document where approval by the Secretary of DEECA is required, it should be clarified that this refers to the Secretary of DEECA 'as constituted under Part 2 of the *Conservation, Forests and Lands Act 1987*'

- operational environmental management plan (OEMP, for approval by the Secretary of DEECA);
- AOIB and native vegetation requirements (for approval by the Secretary of DEECA);
- submission of ongoing monitoring results to evaluate biodiversity response (for approval by the Secretary of DEECA);
- heritage management plans for local heritage values (for approval by the Minister for Planning);
- plans of alteration or creation of road access (for approval by the Head, Transport for Victoria);
- floodplain management plans (for approval by the relevant floodplain management authority);
- bushfire emergency response plan for construction (for approval by the relevant fire authority); and
- fire access road plan (for approval by the relevant fire authority).

The draft incorporated document also defines preparatory buildings and works that may be undertaken before these plans are approved.

The draft incorporated document was updated by the proponent through the SIAC roundtable in response to submissions and evidence presented for the ER as well as elements adopted through the EES Central process. The proponent also updated the draft incorporated document to reflect the machinery of government changes (e.g. updating references to DELWP to DEECA). The proponent tabled a final day draft version of the incorporated document (Tabled Document 85). The SIAC then provided their recommended version of the incorporated document as Appendix E of the SIAC report.

Several key changes to the exhibited incorporated document relate to the EMF and OEMP. The proponent's final day version of the incorporated document included a new condition under the 'Environmental Management Framework' to explicitly require the inclusion of a list of environmental aspects to be addressed in the EDSs for the design, construction and operation of the projects. This was in response to the submission from DEECA, to ensure that residual risks are identified and mitigated (Submission 12). I support this clarification and amendment.

The SIAC recommended that the Minister for Planning should be responsible for approval of the EMF (under conditions of the incorporated document) rather than the Secretary of DEECA, as proposed by the proponent. In the former Minister for Planning's No EES with conditions decisions for each project[8] an EMF was required to be prepared to the satisfaction of the Secretary of DELWP[9]. The SIAC noted that the Minister for Planning is to be responsible for approval of the EMF for EES Central and did not consider it appropriate for this to be different for the EMF for Vinifera and Nyah. The SIAC considered that the risks and uncertainties inherent in the Vinifera and Nyah projects are similar to those of EES Central and therefore the EMF, as 'arguably the most critical element of delivery, should be signed off at the highest level'. I agree with the SIAC that given the nature of the environmental effects of the Vinifera and Nyah projects and critical role the EMF plays in ensuring acceptable environmental outcomes are achieved, it is appropriate for the EMF to be approved by the Minister for Planning[10]. Further discussion on the EMF as a core approval for the projects is included in Section 5.2 of my assessment.

In the final day version of the incorporated document, the proponent corrected condition 4.5.8 to refer to the OEMP rather than Operating Plan. I agree with this correction. The relationship between the OEMP and the operating plans are discussed further in Section 5.2.

In accordance with the DEECA submission (Submission 12) and the question on notice response from DEECA (Tabled Document 3), the proponent added a new condition for the OEMP into the draft the incorporated document (condition 4.5.8(d) in the final day version). The condition specifies a requirement for the OEMP to include objectives, targets and indicators to be used for monitoring and evaluation of biodiversity response to environmental watering, as well as the

[8] https://www.planning.vic.gov.au/__data/assets/pdf_file/0024/642390/Nyah-Floodplain-Restoration-Project-Ministers-Reason-for-Decision.pdf and https://www.planning.vic.gov.au/__data/assets/pdf_file/0032/642389/Vinifera-Floodplain-Restoration-Project-Ministers-Reason-for-Decision-.pdf

[9] Note when the decisions were made on the EES referrals, the Secretary of DELWP was the relevant Secretary for the Planning portfolio, however following the machinery of government changes, the relevant Secretary for the Planning portfolio is now the Secretary of DTP.

[10] Note the condition set by the Minister for Planning in the decision on the EES referral for each of the projects requiring the EMF to be prepared to the satisfaction of the Secretary can be addressed, despite the Minister needing to approve under the proposed incorporated document.

process for preparation, approval and implementation of a Monitoring, Evaluation and Reporting Plan. The SIAC has also recommended a condition that the OEMP include the conceptual frameworks of environmental system interactions that will guide adaptive management of inundation and associated land management actions. I generally support these amendments. Consistent with the approach for the EES Central projects, this aspect may be able to be covered by the description of the OEMP in the final EMF (see further discussion of the OEMP in Section 5.2).

The SIAC noted the potential impacts to the riparian zone identified for Vinifera and Nyah are significantly higher in comparison to those identified for the EES Central projects, which was a cause for concern. The SIAC highlighted the importance of this vegetation, much of which is very large old trees, and the need to avoid the impacts of the project on native vegetation adjacent to and fringing the Murray River. In doing so, the SIAC noted that protecting riparian vegetation is reflected in government policy including the Victorian Waterway Management Strategy, Northern Sustainable Water Strategy and Cl 12-03-1S and Cl 14.02-1S of the Swan Hill Planning Scheme. The SIAC acknowledged that, although the location of some structures (such as drop structures at the infill point to the Murray River) must be close to the river, there may be opportunity to increase setbacks for infrastructure such as containment banks, vehicle turnaround and laydown areas. The SIAC considered the relocation of such works away from the riparian zone and riverbanks may minimise losses of native vegetation and large trees as well as erosion risks. The SIAC has recommended a new condition on development plans (4.4.2) for detailed design to examine project modifications to minimise impacts within 30m of the Murray River. I support this recommendation, which is discussed further in Section 6.2.

The SIAC considered it likely that each project will generate benefits sufficient to result in no biodiversity offsets being needed to compensate for vegetation loss. However, some uncertainty remains, as discussed in sections 4 and 6.2. On this basis the SIAC proposed an offset regime that requires the final assessment of offset determination to be deferred until there is clear evidence the benefits have been delivered. Accordingly, the SIAC recommended changes to the native vegetation conditions (condition 4.6 of the SIAC's recommended version of the incorporated document) to support the deferral of an offset determination and associated monitoring of biodiversity response during construction and operation. As outlined in Section 4 and detailed in Section 6.2 of my report, I do not support the approach of deferring decisions regarding the need for biodiversity offsets until the operational phase of the projects has showed benefits are accruing. In accordance with state planning policy designed to protect and enhance Victoria's biodiversity (clause 12.01-1S) and ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation (clause 12.01-2S), I maintain that the incorporated document should include conditions that retain an appropriate safeguard to require offsets (or an alternative offset arrangement) prior to construction and vegetation clearance commencing. This recommendation is consistent with my previous assessment for EES Central and DEECA's submission (Submission 12). I recommend the findings of the further hydraulic assessment of the operational impacts on floodplain vegetation should be used to update the AOIB, prior to final decision-making on the alternative arrangement to offsets as set out in the exhibited incorporated document.

The SIAC's proposal to defer the offset determination and alter the native vegetation conditions in the exhibited incorporated document also saw the SIAC proposing other related changes to the conditions in the exhibited document. This included changing and moving requirements included within Condition 4.6.1 of the proponent's final day incorporated document into the SIAC's proposed native vegetation conditions. However, the proposed Condition 4.6.1 was drafted to be a stand-alone condition related to monitoring and evaluation of biodiversity improvement and adaptive management in the medium and longer term, to help ensure transparency and accountability for outcomes. It requires monitoring and evaluation of biodiversity improvement during operation of the projects and the preparation and submission of a report of monitoring results to the satisfaction of the Secretary of DELWP (now DEECA) 5 years after the first environmental watering and thereafter every 10 years. Condition 4.6.1 also required the monitoring report to identify any unintentional impacts on biodiversity values and any adaptive management proposed to be undertaken to provide an increase in overall biodiversity.

I do not support the SIAC's recommendation to incorporate these reporting requirements within their proposed native vegetation conditions (SIAC recommended condition 4.6.2 b and c) of the draft incorporated document. Nor do I support amending the conditions to alter the timeframe for an evaluation of biodiversity change attributable to the projects to be provided to the Secretary within five years of the completion of project construction or such other time that the Secretary may approve. The differences in the detail of these proposed conditions for monitoring and evaluation of biodiversity

change are subtle and are not appropriate in the context of me not supporting the deferral of the offset determination. Reporting on the monitoring results and outcomes of proposed adaptive management (5 years after the first watering and thereafter every 10 years) will provide a transparent and important means of understanding how adaptive management of inundation is achieving desired environmental outcomes. Further refinement of the monitoring conditions in the incorporated document to this effect will be considered when I am asked to decide on the final form of the PSA.

The SIAC report does not discuss the approach to addressing bushfire risks for the projects in detail, indicating that this issue can be addressed through the incorporated document, EMF and secondary approvals. The proponent's final day incorporated document indicates that the Bushfire Emergency Response Plan (BERP) for construction is required to be submitted to the relevant fire authority for approval. The DEECA submission (Submission 12) also supports approval of the BERP by the relevant fire authority. While most of the area covered by the projects is Crown land for which DEECA is the 'relevant fire authority', there is also freehold land for which the Country Fire Authority (CFA) is the 'relevant fire authority'. I consider having two agencies responsible for approval of the BERP may create inconsistencies and confusion. Therefore, consistent with my previous assessment for EES Central projects, I recommend that the proponent be required to prepare a BERP in consultation with and to the satisfaction of the different land managers, emergency management and fire authorities, to ensure a consistent, workable and valid framework. Further, I recommend the BERP for construction be submitted to the Minister for Planning for approval.

The proponent's final day version of the incorporated document proposed minor changes to the fire access road plan to enable road maintenance works to be carried out within the existing horizontal or vertical footprint of any road or access track on land used for the projects. I support this recommendation and I note that the fire access road plan should also be included in the management plans described in the final EMF.

The draft incorporated document defines preparatory buildings and works that may be undertaken before the plans and requirements set out in its conditions are approved. Preparatory works specified in the exhibited incorporated document included investigation and testing to determine the suitability of land, land surveying and salvage and relocation of Aboriginal cultural heritage. The proponent's final day version of the incorporated document proposed changes for preparatory and other works (Condition 4.12) to clarify that preparatory works includes vegetation removal where a planning permit would not be required under the provisions of the planning scheme. Given the conservation values and sensitive nature of these floodplain environments, I recommend seeking specific advice from the relevant agencies and the land manager as to what preparatory works are likely to be appropriate. Consultation in this regard will be required to support any future request to prepare the PSA and advice from the relevant agencies and land manager will be reflected in the conditions of the incorporated document. It is likely that any potential native vegetation clearance for preparatory works would require a planning permit given the sensitivities and associated controls within this crown land setting.

Regarding historic heritage, the SIAC recommended that the draft incorporated document be revised to include photographic recording of any heritage 'structures' as well as buildings to include the Takasuka Levee Bank which is under a Heritage Overlay (HO186) in the Swan Hill Planning Scheme. This will ensure any original areas of the levee bank that are disturbed are recorded. I agree with this revision.

Further consideration will be given to the various aspects discussed above when I am asked to decide on the final form of the PSA.

Consultation on the draft PSA

The draft PSA was exhibited with the ER, and 14 submissions were received. Issues relating to the incorporated document were raised in submissions, however most issues related to the ER. I note the SIAC concluded that for the Vinifera and Nyah projects, consultation on draft PSA C78 to the Swan Hill Planning Scheme was adequate and that no additional consultation need occur. The VMFRP Planning Scheme Amendment C78 Strategic Assessment Report (ER Attachment 4) indicates that consultation on the preparation of the draft PSA was undertaken with relevant agencies and stakeholders including Traditional Owners through the TRG, targeted briefings and meetings. I would expect that the final form and content of the draft PSA, when submitted to me for a decision under the Planning and Environment Act, includes sufficient evidence in the form of a separate consultation report which summarises the key stakeholders, landholders and community engagement processes on the draft PSA referencing the ER documentation as appropriate.

The SIAC did not believe the concerns from submitters about Traditional Owner engagement were substantiated and concluded that the proponent has undertaken a comprehensive program of engagement with Traditional Owners and proposes to continue to do so. It would be appropriate to prepare a consolidated summary addressing Traditional Owner consultation to support any future request to prepare the PSA. Traditional Owner consultation is discussed further in Section 6.4 of this assessment.

Additionally, the SIAC recommended that the proponent update the Explanatory Report included as part of the draft PSA to address the EPA's submission in relation to contaminated land. The EPA recommended that the reference to Ministerial Direction No. 1 – Potentially Contaminated Land in the Explanatory Report is amended to confirm that where the project intersects with potentially contaminated land (Acid Sulfate Soils) and the use of the land is as a sensitive use, that the appropriate steps will be taken to ensure that the risks of harm are appropriately assessed and managed. I agree with this change recommended by the SIAC.

5.2 Environmental management framework

I acknowledge that each of the Vinifera and Nyah projects will generate both positive and negative significant environmental effects, as outlined in Section 4 of this assessment. A sound regulatory framework and environmental control regime is needed, to ensure appropriate mitigation of adverse effects that were examined through the ER, and to support effective management of key risks and uncertainties that could impinge upon on environmental outcomes. I have considered key elements of the proposed environmental management regime described below when assessing the project's environmental effects. Core to the proposed approach is adaptive environmental management, to enable the environmental watering programs to respond to outcomes of ongoing monitoring and support realisation of the predicted benefits to the floodplains over the medium and long term.

The proponent's final day version of the draft incorporated document states that prior to the commencement of development (excluding preparatory buildings and works), an EMF must be prepared, and then submitted to and approved by the Secretary of DEECA. It then sets out what the EMF is to include. As discussed in Section 5.1, the SIAC recommended that the EMF be approved by the Minister for Planning, consistent with the approach proposed for the EES Central projects. As per the reasons outlined in Section 5.1, I support the SIACs view that approval of the EMF by the Minister for Planning is also appropriate for Vinifera and Nyah.

It is expected that the 'final' EMF would be based on the EMF exhibited as Chapter 20 of the ER, incorporating recommendations from the SIAC and this assessment. The proposed EMF, as presented in Chapter 20 of the ER, provides details on the proposed governance framework for the projects including roles and responsibilities, and describes the proposed environmental management documentation to be prepared (Figure 5-1) including review and approval requirements. The proposed approach to performance management and change management is described, including requirements for evaluation and reporting. The EMF also provides a consolidated list of the proposed environmental delivery standards (EDS) which set out the environmental management measures and standards that will apply to the project. Additionally, the EMF outlines a proposed monitoring program for each environmental aspect associated with the project. The EDS and monitoring measures were the subject of submissions and focussed consideration through the SIAC hearing. This led to the proponent tabling an updated ('final day') version of the EDS and monitoring requirements (Tabled Document 84), including refinements resulting from further consideration of issues raised by submitters, the SIAC and advice from relevant experts.

The proposed EMF outlines an adaptive management regime for both the Vinifera and Nyah projects, incorporating the environmental water planning and delivery frameworks already in place in Victoria. The adaptive management process would include monitoring, evaluation and reporting to continuously review project performance relative to objectives and targets and allow for the future seasonal watering programs to be updated in response. The EMF explains that objectives and targets for each project site would be prescribed in the environmental water management plans, and the monitoring programs outlined in the monitoring, evaluation and reporting plans would be specifically designed to support collection of data to analyse whether these objectives and targets are being met (Figure 5-1).

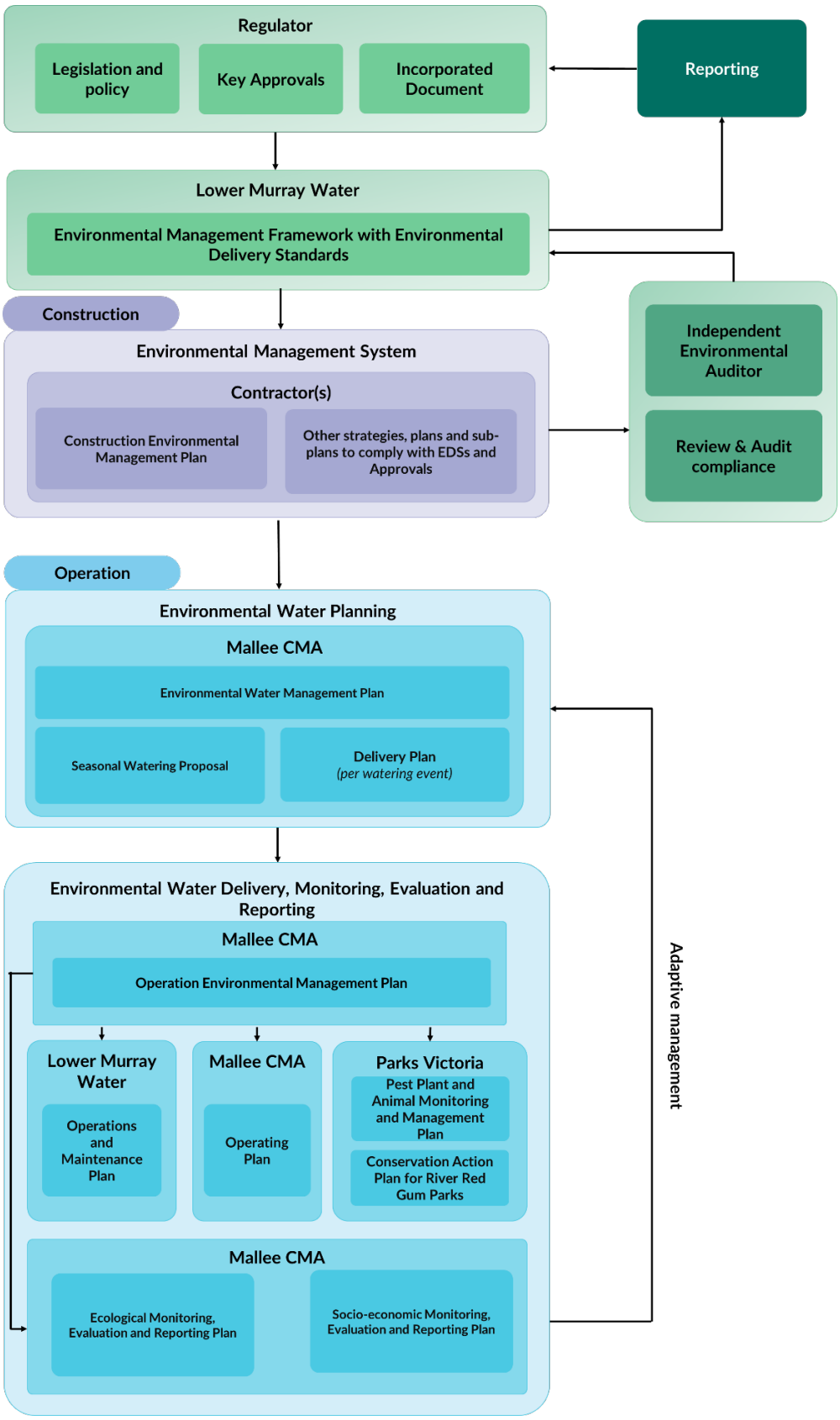

Figure 5-1 Overview of the governance framework of key environmental management documentation (Source: ER Chapter 20).

The use of adaptive management principles will allow project operations to respond to varying seasonal conditions and utilise knowledge gained from previous operation (watering events) to continuously improve the watering programs and the ecological outcomes for biodiversity values. Along with the SIAC, I consider the effective implementation of this adaptive management approach is critical to realise many of the key benefits the projects aim to achieve.

The proposed governance framework for the projects is complex. The VMFRP is a Victorian Government project being delivered by Lower Murray Water (LMW) in collaboration with organisations that have statutory responsibilities for environmental protection, public land management and waterway management which are: LMW, Goulburn-Murray Water (GMW), Mallee CMA, North Central CMA, Parks Victoria and the DEECA Water and Catchments Group (DEECA WCG). There are several other roles for statutory authorities and government agencies set out in the EMF as well.

LMW is the proposed proponent for the construction of the projects, but the construction works are proposed to be completed by construction contractor(s). The EMF includes a commitment to implement a construction phase environmental management system and to enforce contracts that would require contractors to implement this environmental management system, including implementation of the approved CEMP.

At the completion of the construction phase, Mallee CMA is proposed to become the primary agency responsible for the operation of the two projects, including implementation of the EMF and the operation-related EDSs. Mallee CMA would also be the agency responsible for the preparation and implementation of the approved OEMP (Figure 5-1).

The SIAC discussed the EMF in Section 10.1 of the SIAC report and provided numerous recommendations regarding the EDS and monitoring requirements in Appendix F of their report. These include recommendations in relation to the proponent's proposed changes to the EDSs and monitoring requirements in the 'final day' versions, as well as additional SIAC recommendations.

Overall, the SIAC considered the proposed EMF to be acceptable, subject to their recommended changes to the EDSs and monitoring requirements, noting that the final EMF still needs to be to be approved.

As discussed in Section 5.1, in the final day incorporated document the proposed requirements for approval of the OEMP were changed from requiring approval by the Minister for Planning (as per the exhibited version) to requiring approval by the Secretary of DEECA. I note this change should also be reflected in the final EMF where approval requirements of the OEMP are discussed (e.g. Table 20.8). In addition to this update, I note that a detailed description of the OEMP is not provided in Section 20.8.3 of the exhibited EMF. While section 20.8.3.1 is titled Operation Environmental Management Plan the text details the process and requirements for the Environmental Water Management Plan. Based on the plans and frameworks presented in Table 20.8 it would appear that this is an editorial error and I recommend the EMF is updated to include separate descriptions of the scope of both the OEMP and Environmental Water Management Plan, including a description of associated consultation requirements for each. I note the EMF exhibited for the EES Central projects has separate subsections providing descriptions of each of these plans.

While there were several public submissions recommending changes to the EDSs which are discussed throughout this assessment, there were no submissions related to the general structure or proposed governance approach set out in the proposed EMF. The EPA did submit that the EMF and EDSs should specify that allowance of sufficient review time, in agreement with relevant stakeholders, be included for the CEMP and operating plans. As a result, the proponent accepted this recommendation for the CEMP and included changes to EDS EMF2 in its 'final day' version of the EDSs. The SIAC removed this requirement from their recommended wording of EDS EMF2. I note that Table 18.10 of the EMF and clause 4.5.7 of the incorporated document both specify that consultation with the EPA is required on the CEMP. The incorporated document also specifies the need to consult with EPA on the operating plans. I agree with the SIAC that the EDSs do not need to be edited in this regard as the requirement to consult with the EPA in the preparation of management plans is covered adequately in the proposed EMF and incorporated document.

The EMF and EDSs will require updating prior to submitting for approval, with any consequential changes resulting from the SIAC's recommendations and this assessment to be clearly identified. It will also be necessary to reflect/address the Victorian machinery of government changes that occurred in late 2022 within the EMF and EDSs.

The EMF proposes that LMW would appoint an independent environmental auditor, which would be responsible for auditing the compliance of the construction contractor during the construction phase, which I support. I note that the EMF does not propose a role for the independent environmental auditor during the operational phase of the projects but does propose that an operational environmental performance report would be prepared annually by Mallee CMA, submitted to the Minister for Planning[11] and published on the DELWP website. Following the machinery of government changes, I recommend the report is published on the DEECA website. I also recommend the full operational environmental performance reports are provided to the Victorian Minister for Environment given the relevance of the projects to the environmental and crown land portfolios. This includes reporting against the EDSs for operations and updates on any corrective actions implemented. To further support the project's evaluation and success during operations, in particular the sustained effectiveness of the adaptive management process, I recommend that the independent environmental auditor is retained or a new one engaged to conduct periodic audits of both projects during operations, consistent with the approach I recommended for the EES Central projects. Independent auditing of operations will be valuable particularly given the complex governance framework proposed for the projects, with responsibilities for environmental management spread across numerous government agencies and authorities. The auditor could also review the CMA's annual reports in the process of reporting to the relevant Minister or government department. The audit reports should also be published, consistent with the recent approach to other government infrastructure projects implemented with an approved EMF in place.

Independent auditing for operations should entail an audit at the commencement of the operations phase, to verify all environmental management and monitoring documentation for operations is appropriately prepared/approved and fit for purpose. Auditing should be at least five-yearly thereafter during operations. I note that, as per condition 4.6 of the exhibited draft incorporated document[12], a report of monitoring results in relation to the extent to which an overall improvement for biodiversity has been achieved must be submitted to the Secretary five years after the first environmental watering and thereafter every ten years. The outcomes of the five-yearly audits can also be used to inform those reporting activities, including identification of any corrective actions to further support achievement of environmental outcomes, including for biodiversity.

Similar to the audits proposed in the EMF for the construction phase, I recommend the operations audits should cover:

- compliance with the EMF, EDSs, mitigation measures, environmental management plans and documents;
- responses to non-conformances, incidents and complaints received;
- the environmental effects caused by any non-conformances;
- application of the change management process where relevant;
- effective implementation of monitoring programs;
- previous audit outcomes;
- changes to regulations and environmental standards; and
- compliance with approval conditions.

Consistent with my recommendations for the EES Central projects, I recommend the scope and timing of these audits for operations is outlined in further detail in the final EMF. I recommend the selection criteria for the operations independent environmental auditor be the same as set out for construction independent environmental auditor in the EMF, and to help strengthen the transparency and independence of the auditing for operations, the selection and reporting of the auditor should be done in consultation with the Secretary of DEECA[13] or delegate.

One of the requirements outlined in the ER scope prepared by DELWP is for the ER to include information on "proposed ongoing consultation for the project". I note that ER Chapter 7 states that a 'communication and engagement plan' will be prepared for both the construction and operations phases of the projects. The EMF includes a requirement for the

[11] "Except where the Minister for Planning agrees that compliance reports are no longer necessary or less frequent reports are required."

[12] This is now Condition 4.7 in SIAC recommended incorporated document; no changes to this condition were proposed by the SIAC.

[13] Secretary of DEECA as constituted under Part 2 of the *Conservation, Forests and Lands Act 1987*

proponent to prepare a Communications and Stakeholder Engagement Plan – Construction. Some specific engagement activities are also outlined in EDS SB3. However, there is no commitment in the EMF to prepare a similar overarching plan for the operations phase, although I do note that communication and engagement plans are proposed to be prepared for each watering event as part of delivery plans (EMF Section 20.8.3.3). I consider development of an overarching communication and engagement plan (or similar) for operations will be important for ensuring project-specific consultation and engagement activities are appropriately planned for project commissioning and ongoing implementation of the two projects' environmental watering activities. There is also scope for this plan to cover both ER Central projects and EES Central projects. I therefore recommend that the final EMF is amended to include a commitment to prepare a communication and engagement plan (or similar) for operations. The scope and requirements for review and approval of the plan should also be specified in the EMF, as per the other environmental management documentation. The scope should include the aspects identified for the plan outlined in Section 7.6.6 of the ER:

- opportunities for community involvement;
- mechanisms to respond promptly to concerns raised by community members; and
- provisions for timely and accurate information about flooding events.

The plan should also cover the approach to the specific engagement activities proposed for the operations phase in EDS SB3.

Without prejudice to any decisions that may follow with respect to the proposed PSA and secondary consents, I am satisfied that the proposed EMF is generally sound, subject to the recommendations of the SIAC and this assessment, including those set out above. With the recommended changes, it incorporates a clear governance framework and covers the key elements required for environmental management and monitoring for both the construction and operation phases. Along with the SIAC, I support the proposed changes to the EDSs and monitoring measures included in the final day versions unless otherwise recommended in Section 6 and/or Appendices A and B of this assessment.

6 Assessment of environmental effects

This section details my examination of each project's potential effects on each aspect of the environment.

6.1 Surface water and groundwater

Assessment context

Surface water and groundwater effects are addressed within Chapters 10 (Vinifera) and 14 (Nyah) of the main ER report, as well as in Specialist Study C (surface water) and Specialist Study D (groundwater) appended to the ER, and in Section 3 of the SIAC report.

The Vinifera floodplain complex covers an area of 638 ha and comprises a network of waterways, wetlands and inundation-dependent woodlands that receive water from the Murray River via Vinifera Creek. The Vinifera Creek is a collection of watercourses and wetlands in the Vinifera floodplain. It is approximately 5 km in length flowing from east to west and was historically an anabranch of the Murray River. Due to historical modifications to the upstream end of the creek and a levee at the eastern edge to reduce inundation of private land, it now functions as a separate wetland. The Vinifera project area contains five wetlands mapped on the Victorian Wetland Inventory; two are within the construction footprint and maximum inundation area.

The Nyah floodplain complex covers an area of 913 ha, and its hydrology is influenced by the Murray River and upstream tributaries. The main waterway associated with the Nyah project is Parnee Malloo Creek, an intermittently flowing anabranch of the Murray River, which runs for approximately 15 km and is generally less than 30 m wide. The Nyah project area contains three wetlands mapped on the Victorian Wetland Inventory; two intersected by the construction footprint and are within the maximum inundation area.

The ER noted that the environmental values of surface water in the region are water dependent ecosystems[14] and species, irrigation, water-based recreation, livestock drinking water, human consumption of aquatic foods, Traditional Owner cultural values, human consumption after appropriate treatment, and industrial and commercial uses.

The ER stated that flow regulation of the Murray River has resulted in a decline in the condition of the floodplains' health due to reduced flooding frequency and duration, and that the condition is likely to decline further due to the decreases in frequency and duration of natural inundation expected with climate change. The ER noted that, along with seasonal factors (e.g. temperature, dissolved oxygen), inundation frequency influences water quality in surface waters within the floodplains.

The ER detailed that groundwater is present across both projects' areas in a shallow aquifer, typically less than 5 m below ground, connected to the Murray River and anabranches. Groundwater is also present in deeper aquifers, but the projects do not affect these due to a clay aquitard layer beneath the shallow aquifer. The ER also noted that groundwater salinity in the aquifer across both projects' areas ranges widely, from fresh water (less than 1,200 mg/L total dissolved solids) to very saline (over 35,000 mg/L total dissolved solids). Fresh water occurs adjacent to the Murray River due to the higher recharge amount, while more saline water is found further inland.

The ER identified environmental values associated with groundwater for both projects, including water dependent vegetation, which occurs across parts of the projects' areas where groundwater is fresh and shallow enough for vegetation use. The ER noted that there are currently no licenced groundwater users that would have their groundwater resources affected by either of the projects. There are 93 bores that access or intersect the shallow aquifer within 10 km and 15 km of the Vinifera and Nyah maximum inundation areas, respectively. Of these, eight are used for extractive purposes (i.e. stock and/or domestic use), 82 for groundwater investigation or observation, or non-groundwater related

[14] As defined in the EPA environment reference standard as "any water environment from small to large, from pond to ocean, in which plants and animals interact with the chemical and physical features of the environment".

purposes, and 3 with unknown usage. The extractive use bores are located on the NSW (eastern) side of the Murray River and south of the Vinifera and Nyah projects, hydraulically up-gradient of the project areas.

The ER stated that each project is expected to result in increased groundwater recharge, with associated rising groundwater levels around the maximum inundation areas, which would benefit water dependent, deep-rooted vegetation through increased water availability. The ER noted that no change in groundwater quality (not already occurring or possible due to natural inundation events) is expected as a result of either of the projects.

The ER examined the potential adverse effects of the projects on surface water quality. These were consistent between the two projects. For construction, the ER identified the following potential effects:

- erosion and runoff from disturbed areas creating increased turbidity and sedimentation of waterways;
- exposure of contamination or acid sulfate soils during excavation;
- contamination as a result of construction activities and accidental spills; and
- discharge of saline groundwater to waterways if dewatering of construction sites is required; and
- clearing of riparian vegetation at construction sites causing localised increases in temperature.

For operation, the ER identified the following potential effects:

- erosion around regulating structures;
- discharge of saline groundwater into the Murray River;
- return flows contributing to nutrient load and algal growth; and
- low dissolved oxygen events.

The ER also found potential for cumulative adverse effects on downstream water quality during construction if multiple sites are constructed at the same time. This would be due to dewatering and disposal of saline groundwater to waterways or soil disturbance and runoff with high turbidity and/or other contaminants. There are also potential adverse cumulative effects on downstream water quality during operation if managed inundations occur in multiple sites at the same time and return flows low in dissolved oxygen and/or high in salinity occurs. In relation to low dissolved oxygen, the ER found that there are sufficient Murray River passing flows (even during low river flow conditions) to provide mixing and dilution to the extent that any effect of low dissolved oxygen would be rapidly mitigated and not extend downstream. The ER also identified potential cumulative adverse effects on water quality in the Murray River due to return flows high in salinity.

The ER also examined potential adverse effect of the projects on groundwater values. These were also consistent between the two projects. For construction, the ER identified the potential for localised groundwater drawdown during construction of drop structures affecting water dependent vegetation. For operation, the ER identified the potential for a small increase in groundwater return flow to the Murray River with associated modest increase in salt load and the potential for intermittent shallow groundwater levels causing land and soil salinisation in localised areas.

For both Vinifera and Nyah, the ER proposed three specific EDSs to manage the adverse effects related to surface water (SW1 to SW3) and two specific EDSs to manage groundwater-related adverse effects (GW1 and GW2). In summary:

- SW1 requires processes and measures to manage adverse effects on surface water during construction to be included in the CEMP;
- SW2 requires consideration of measures to avoid, minimise or manage adverse surface water effects during operation;
- SW3 requires monitoring volume, duration, frequency and surface water quality during operation;
- GW1 requires measures to manage adverse effects on groundwater during construction to be included in the CEMP; and

- GW2 requires the OEMP to include monitoring groundwater and surface water levels, flow and salinity during operation.

Two monitoring requirements for surface water (M SW1 and M SW2) and three for groundwater (M GW1 to M GW3) were also proposed in the EMF.

The ER concluded that with the implementation of the proposed EDSs and monitoring requirements, the significance of the residual adverse effects related to surface water and groundwater is insignificant to low for each project.

Discussion

The SIAC considered that the key issues associated with surface water and groundwater relate to (i) hydrological assessment of Murray River flows (the Source Murray Model), (ii) modelling of floodplain hydraulics, (iii) blackwater and algal bloom events, and (iv) groundwater and salinity. Each of these issues are discussed below.

Hydrological analysis of Murray River flows (the Source Murray Model)

To support the examination of surface water effects, the ER included an analysis of changes in river flow patterns and floodplain inundation. The hydrological analysis underpins the analysis of each project's hydraulic, water quality and ecological effects. It includes comparisons of flow scenarios in relation to floodplain inundation thresholds, blackwater modelling, and assessment of climate change effects on the frequency of flow events for comparison with the various operating strategies for each project.

Amongst other inputs, the ER used MDBA's Source Murray Model (SMM) flow data as input to the hydrological analysis. Key assumptions underlying the SMM for different flow scenarios related to the level of river regulation and the amount of water allocated to consumptive uses. The SIAC noted that the ER did not provide flow scenarios that factored in the implementation of VMFRP projects specifically. Only one flow scenario considered the full operation of all sustainable diversion limit adjustment projects and their supply contributions of 605 GL. The ER noted that the model was to be updated to include explicit representation of sustainable diversion limit adjustment projects, which would provide further insights into climate change effects, but that the modelling would not be completed until the end of 2022, after the surface water specialist study was completed (September 2022). The ER stated that the SMM was considered the best available and suitable for the analysis.

Environment Victoria and the Fenner School of Environment and Society raised issues with the hydrological modelling, including whether it had considered an appropriate range of scenarios. The submissions questioned the absence of a scenario that considered the implementation of constraints management projects[15]. The proponent noted that consideration of constraints management was outside the scope of the SIAC and that constraints management alone would not deliver inundation to the required frequency or duration that VMFRP offers. Dr Treadwell, a surface water expert witness for the proponent, gave evidence that constraints management, if implemented, may provide additional benefit to VMFRP project areas through optimised environmental water delivery. He also noted that if constraints management is not implemented, the VMFRP projects can stand alone as mechanisms for enabling managed inundation. Neither Environment Victoria nor Fenner School identified an alternative to SMM for modelling the Murray River Flows.

The SIAC was satisfied that the use of the SMM for the ER was appropriate. However, the SIAC considered that in the absence of a more refined model, the ER should have explained the implications for impact assessments of using the benchmark flow scenarios, in terms of interpreting the scenarios and associated uncertainties. The SIAC also considered that even though constraints management was outside the scope of the SIAC, it would have been helpful to consider flow scenarios that took explicit account of the potential contribution of the constraints management projects. The SIAC noted it would have been appropriate for the ER to examine constraints management projects in the context of cumulative effects and benefits in the same way that other related and unrelated projects were considered in the cumulative effects assessment. Similar to the EES Central committee's findings (for Belsar-Yungera and Hattah Lakes North), the SIAC noted the implications of climate change on future water availability, and proceeded on the basis that Vinifera and Nyah

[15] Refer to Tabled Document 72d: Murray-Darling Basin Authority – Constraints Management Strategy, 2013 to 2024.

will increase resilience to climate change. However, the SIAC also noted that the implications of climate change for passing flows and project operation would require further and ongoing attention during project design and operation (adaptive management) for all VMFRP projects.

In summary, the SIAC found that (i) the SMM was fit for the purpose of modelling passing flows in the Murray River to underpin the assessment of environmental effects for Vinifera and Nyah, (ii) there was a sufficient hydrologic context for assessing the effects of the projects, and (iii) future assessment, implementation and communication of VMFRP projects should make use of updated SMM modelling when available (particularly in relation to the implementation of other sustainable diversion limit adjustment projects and climate change), and consider the likely implications of implementation of constraints management for available flows. I support these findings.

Modelling of floodplain hydraulics

Managed inundation can result in changes in hydraulic characteristics compared to an unregulated flood as water is held on the floodplain for some time at a particular level and duration. The ER explained that this could cause: (i) changes in flow velocity and shear stress leading to excessive erosion within the inundation areas (refer to Section 6.5); (ii) physical degradation of habitat and suspended sediments entering the water column and impacting aquatic values (refer to Section 6.3); and (iii) ponding, which can result in differences in inundation depth relative to an unregulated event and which exceeds vegetation tolerances (refer to Section 6.2).

The ER analysed the hydraulic effects (change in depth of inundation, change in flow velocity and bed shear stress) at key locations in each project area for existing conditions, holding (regulators closed) and during release/drawdown (regulators open). This was done using floodplain hydraulic modelling completed in 2014 and 2016 as part of the business case for the projects to inform project development. The model results indicated minimal potential for erosion during the filling and holding phases, given that flow velocities would be close to zero across the maximum inundation areas. As discussed in Section 6.5, the ER stated that potential for erosion is expected to be similar at most of the modelled locations, except downstream the V2 regulator (Vinifera) and N2 and N5 regulators (Nyah), where unmitigated release of water from the floodplains back to the Murray River following a managed inundation event would increase the potential for erosion. Peer review of the hydraulic modelling determined it was adequate for developing business cases for the projects but advised that a higher level of certainty was required for detailed design. Surface Water specialist study C appended to the ER noted that “additional Hec-Ras modelling will be used to inform detail designs”.

Several submissions raised concerns regarding the hydraulic effects of managed inundation. Submitters Ms McKay and Friends of Nyah Vinifera Park (FoNVP) were concerned the projects would alter floodplain topography and water movement. In his expert witness statement, Dr Treadwell stated that modelling was used to identify the locations for infrastructure “at key points of flow to ensure that water flow is maintained in a natural pattern across the floodplain to areas outside the managed inundation extent during an unregulated flood event”. He added that “those parts of the floodplain outside the managed inundation extent would continue to experience inundation during unregulated floods in a way that is similar to current”.

The SIAC noted that the analysis of hydraulic effects presented in the ER relied largely on graphical analyses of the modelled pattern of depth distributions, flow velocities and bed shear stresses. These analyses were presented in the form of box plots that capture the statistical variation of the parameters across grid cells within segments of the respective floodplains. The SIAC asked the proponent to clarify aspects of some plots in the ER regarding variations of depth, velocity and shear stresses during the release of managed inundation via regulators. The proponent noted that modelling assumed steady state flows and maximum regulator opening during the release phase and that the proposed EDS SW2 requires release rates to be managed to avoid high downstream velocities and shear stresses.

Upon request from the SIAC, the proponent tabled further information about the hydraulic analysis of the projects, including mapping of modelled inundation depths, hydraulic modelling reports that informed the ER, and responses to questions from the SIAC about the interpretation of hydraulic information. The SIAC noted that the project infrastructure for Nyah is expected to increase flood depths in the Nyah maximum inundation area, inundating a larger extent than under existing conditions. In contrast, the Vinifera project infrastructure is not expected to increase flood depths due to the flat topography of the Vinifera floodplain. The SIAC also noted that hydraulic mapping for the projects was limited to

depth and extent of inundation and that no maps were provided for velocity or shear stress. The SIAC also detected differences between the ER and the modelling reports regarding the specifications of the projects' infrastructure and noted that this might have implications in relation to the hydraulic effects of various proposed structures.

The SIAC referred to findings from the EES Central committee that (i) the hydraulic modelling of Belsar-Yungera and Hattah Lakes North did not adequately define the specific effects of those projects on floodplain hydraulics within their project areas and that (ii) a new EDS (SW4) was required to determine the hydraulic effects in more detail, to confirm the effects of the projects on floodplain vegetation and to inform detailed design and operation of the projects. The SIAC reached the same conclusion regarding the adequacy of the hydraulic modelling undertaken for the Vinifera and Nyah projects and the need to include the additional EDS SW4 in the EMF.

The SIAC specified that the further detailed modelling of hydraulic effects for the projects under EDS SW4 should include:

- a finer-grained analysis of the extent and depth of inundation to better understand the implications for EVCs for both projects;
- mapping of the depth, velocity and bed shear stress outputs of the hydraulic modelling to supplement box plots, including difference maps of relevant parameters at their maximum levels for different 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; and
- appropriate calibration of hydraulic modelling to support more accurate modelling, which should include roughness and flow velocities.

The SIAC noted that the recommended detailed modelling would enable a more accurate prediction of the ecological effects of both projects at a finer scale, which can then inform a refined assessment of the predicted benefits for biodiversity values. The modelling will also provide an appropriate foundation for detailed design of the projects and use in adaptive management.

I support the SIAC's findings and recommendation that further work needs to be undertaken to refine the understanding of floodplain hydraulics under proposed operating scenarios and, in turn, consequences for some native vegetation in the floodplains. I endorse the addition of EDS SW4 to the EMF, with some refinement. To further clarify the purposes and expected outcomes of the analysis required under EDS SW4, I recommend EDS SW4 should also specify that the hydraulic analysis:

- be undertaken prior to detailed design;
- inform the minimisation of erosion and sedimentation through design (EDS GS1) and operation (EDS GS3 and EDS SW2);
- include mapping of key hydraulic parameters (depth, velocity and shear stress) for each operating scenario (including managed inundation events and comparable natural and existing flooding events) at key stages of managed inundation events (including filling, holding and releasing with regulators closed and open); and
- include using 'difference maps' 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.

Blackwater and algal bloom events

The ER explained that blackwater can occur in wetlands and floodplains when large amounts of organic material, high in dissolved organic carbon and nutrients, decompose rapidly, consuming dissolved oxygen in the water more quickly than it can be replenished. This can result in water taking on a black appearance and cause hypoxic or anoxic conditions, leading to the death of aquatic organisms. The ER noted that blackwater is a natural occurrence and that not all blackwater events result in fish kills.

The ER modelled the potential for extreme cases of low dissolved oxygen blackwater to develop as a result of each project. It determined that there is potential for low dissolved oxygen conditions to occur during managed inundations of both project areas and that maintaining throughflow is important to minimise the potential for and duration of low dissolved oxygen. The modelling also showed that during a widescale natural blackwater event where the Murray River has low background dissolved oxygen, the operation of the projects would not increase the occurrence of low dissolved oxygen in the river. The ER proposed the preparation of operating plans under EDS SW2 to consider measures to avoid, minimise or manage potential adverse effects when planning environmental watering actions, such as maintaining throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions, as well as factoring seasonal implications in the timing of filling and drawdown. Monitoring in relation to blackwater events was also proposed under monitoring requirement M SW2 as part of the EMF's monitoring program. The ER concluded that with the implementation of EDS SW2, the significance of the residual adverse effect on surface water environmental values for each project is low.

The ER identified increased algal blooms as another risk in both projects. This risk is increased with extension of managed inundation events into early summer and associated higher temperatures and light levels. The proposed EDS SW2 also seeks to minimise risks associated with algal bloom development by considering the seasonal implications in the timing of managed inundation events.

Submitter Ms McKay identified blackwater events as a recent issue in the local reach of the Murray River and was concerned with pumped inundation events leading to stagnant conditions in the floodplain. Dr Treadwell submitted that dissolved oxygen decline leading to hypoxic and anoxic conditions is more likely to occur following very large flood events when large areas of the floodplain are inundated and following a long duration of no floods. He noted that the ER had shown the potential for low dissolved oxygen conditions to develop on the floodplain during managed inundation was similar to a natural flood event. He proposed an amendment to EDS SW2 relevant to mitigating the risk of algal blooms to note that, where practicable, timing managed inundation should occur in winter-spring with drawdown prior to the onset of warmer conditions. However, the SIAC identified that the proposed change was not included in the final day version of the EDS.

The SIAC accepted that blackwater conditions and algal blooms may not be avoidable in drying wetland pools and supported adaptive management of inundation events to minimise the severity and duration of low dissolved oxygen conditions. The SIAC considered that EDS SW2 should be amended to provide a clearer focus on the necessary responses to risks of hypoxic or anoxic conditions developing. The SIAC recommended amendments to EDS SW2 to clarify the purposes to guide the site-specific management of operational risks related to surface water. The SIAC also recommended revisions to EDS SW2 to refine the measures to be applied for the identified purposes, such as the timing and management of inundation events and the management of organic matter loads, to reduce the risk of hypoxic or anoxic blackwater events. I support the SIAC's findings and recommended amendments to EDS SW2.

EPA submitted that an additional point was needed in EDS SB3 'Community and Stakeholder Engagement activities – Operation' to provide a protocol for how community expectations will be managed for potential adverse effects during operations, in particular for adverse anoxic (blackwater) events. The SIAC supported the change to EDS SB3 recommended by the EPA and made minor modifications for clarity. I support the recommended amendments to EDS SB3. Stakeholder consultation requirements for operations are further discussed in Section 5.2 of this assessment.

Groundwater and salinity

The ER identified that water quality during construction might be adversely affected due to dewatering of saline groundwater and potential discharge to waterways. The ER also described that during operation, the projects are expected to result in additional groundwater recharge from managed inundation, with an associated increase in groundwater levels around the maximum inundation areas before groundwater being used by deep-rooted vegetation. As Murray River flows subside and/or floodplain drawdown occurs, the hydraulic gradient may be reversed, causing groundwater to discharge into the Murray River as baseflow. The ER stated that the increased groundwater flow into the Murray River (as a result of managed events) may have adverse salinity effects due to the mobilisation of salt from saline groundwater. The ER estimated salt load of the Murray River would increase approximately 1.5 tonnes per day from Vinifera, increasing the salinity of the Murray River to less than 1.5 mg/L or less than 1% the typical background Murray

River salinity of 150 mg/L. The ER estimated the same increase in salt load of 1.5 tonnes per day of the Murray River from Nyah. The ER noted that the salinity concentration of the Murray River would remain well under concentrations that would exceed critical water quality objectives.

The ER stated that potential cumulative adverse effects on water quality in the Murray River, due to return flows high in salinity, could arise if managed inundations across all VMFRP projects occur at the same time, with increased concentrations of up to 10 percent at the South Australian border. However, the ER noted that the actual concentration would remain well below critical thresholds for protecting environmental values and that the increase would be lower than modelled, given the unlikelihood of that scenario. The ER also noted that the potential for increased salt load in the Murray River from increased groundwater flow would require consideration under the Basin Salinity Management 2030 strategy under the Murray-Darling Basin Agreement and identified a broad procedural obligation to comply with the strategy under the proposed EDS GW2.

Environment Victoria and FoNVP raised concerns in their submissions regarding the potential cumulative impacts of VMFRP projects on salinity in the Murray River. Mr Hoxley, a groundwater expert witness for the proponent, highlighted the conservative assumptions underpinning the estimated potential cumulative contributions of the VMFRP projects to salinity at the South Australian border. The SIAC noted that if the cumulative effect eventuated, the outcome would represent a substantial increase relative to the Basin Plan target of 372 mg/L. However, the SIAC found that the Vinifera and Nyah projects would make relatively minor contributions to the cumulative salt loads and salinity levels in the Murray River that would potentially result from the combined VMFRP projects.

The SIAC also found that salinity levels within the Vinifera and Nyah floodplains appear to be variable and that bore data to assess variations in groundwater depths is limited. The SIAC considered that better baseline data and monitoring following managed inundation events are needed to confirm and refine the modelling underpinning the groundwater analysis.

The SIAC reviewed the proposed monitoring of groundwater under EDS GW2 and monitoring requirements M GW1 and M GW2 and recommended amendments. The SIAC adopted the recommended amendments to EDS GW2 made by the EES Central committee regarding additional groundwater monitoring and local adaptive management responses and made minor refinements to the EDS to improve clarity and operational effects. I support the recommended amendments to EDS GW2. The SIAC also considered that groundwater monitoring should be aligned with the proposed monitoring of tree condition under monitoring requirement M TE9, which aims to assess any effects of rising saline groundwater on local floodplain values for environmental watering. The SIAC recommended amendments to monitoring requirement M GW1 to require additional bore sites to monitor changes to groundwater depth and elevation within the maximum inundation areas of both projects, including at the tree condition monitoring sites for M TE9 and in targeted areas predicted to be most sensitive to groundwater rise, particularly where there is high groundwater salinity. I generally support the recommended changes to monitoring requirement M GW1, provided that the text recommended by the SIAC be moved to EDS GW1 and that the bore numbers in monitoring requirement M GW1 are updated once the new groundwater monitoring sites are established. The SIAC also recommended changes to monitoring requirement M GW2 to require a monthly frequency for monitoring groundwater salinity instead of the proposed annual frequency. I support the recommended amendments to monitoring requirement M GW2, noting that the bore numbers should also be updated in this monitoring measure once the new groundwater monitoring sites are established.

Assessment

It is my assessment for each of the Vinifera and Nyah projects that the adverse effects on surface water and groundwater are likely to be low and can be acceptably managed with the implementation of the new EDS SW4 and revised EDSs SW2, GW2 and SB3, and revised monitoring requirements M GW1 and M GW2, as recommended by the SIAC and supported by me.

Further it is my assessment that the changes to the EMF recommended by the SIAC be adopted, as outlined below:

- Addition of EDS SW4 to undertake further analysis of floodplain hydraulics and operational impacts on floodplain vegetation, subject to my further recommendations.

- Revision of EDS SW2 to clarify the purposes to guide the site-specific management of operational risks related to surface water and to refine the measures to be applied for the identified purposes, such as the timing and management of inundation events and the management of organic matter loads, to reduce the risk of hypoxic or anoxic blackwater events.
- Revision of EDS SB3 to provide for a protocol for how community expectations regarding potential adverse effects, in particular adverse anoxic (blackwater) events, will be managed during operations.
- Revision of EDS GW2 to require additional groundwater monitoring and local adaptive management responses.
- Revision of monitoring requirement M GW1 to require additional bore sites to monitor changes to groundwater depth and elevation within the maximum inundation areas of both projects.
- Revision of monitoring requirement M GW2 to require a monthly frequency for monitoring groundwater salinity.
- Revision of EDS GW2 to require groundwater monitoring, including wells or bores within the projects' areas, with a sufficient number to detect and interpret changes to water levels and salinity and review operations if increasing salinity is identified.

Additionally, I recommend that EDS SW4 specify that further hydraulic analysis be undertaken as follows:

- prior to detailed design;
- to inform the minimisation of erosion and sedimentation through design (EDS GS1) and operation (EDS GS3 and EDS SW2);
- including mapping of key hydraulic parameters (depth, velocity and shear stress) for each operating scenario (including managed inundation events and comparable natural and existing flooding events) at key stages of managed inundation events (including filling, holding and releasing with regulators closed and open); and
- using 'difference maps' 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.

6.2 Terrestrial ecology

Assessment context

Terrestrial ecology effects are addressed in chapters 9 and 13 of the ER and the terrestrial ecology specialist study B appended to the ER. Sections 5, 6 and 7 of the SIAC's report discusses the SIAC's findings in relation to terrestrial ecology.

The EMF included 11 EDSs specifically addressing potential effects on ecological values and some of these have been the subject of recommendations by the SIAC. Key measures included in the final day EDSs include the need to minimise disturbance of vegetation within the construction footprint, and the requirement to develop and implement a native flora and fauna management sub-plan as a sub-plan of the CEMP. Minor changes were also made to the final day EDSs to update them from the exhibited versions in response to issues raised during the public review process, including changes to EDS E2d to define that terrestrial and aquatic weeds will be managed, and EDS E2e to include the requirement for weed monitoring and management for rehabilitation following construction.

A number of potential impacts of the projects for terrestrial biodiversity values were examined through the ER and inquiry process, in particular:

- loss or degradation of native vegetation and/or habitat for terrestrial fauna and flora species, due to clearance of significant amounts of native vegetation;
- direct and indirect impacts on threatened communities and species listed under the EPBC Act and FFG Act;

- impacts on non-threatened fauna, including potential disturbance effects from construction (e.g. noise, impacts on fauna movement and vehicle collisions); and
- disturbance effects from changes in hydrology (including surface and groundwater changes), water quality, contaminants and pollutants, environmental weeds, pathogens and pest animals.

The ER concluded that, despite the above adverse impacts, each project is expected to generate overall benefits to terrestrial biodiversity values. This is to occur by improving the health, structure and regeneration of canopy species including hollow-bearing trees (over time) and increasing the diversity and abundance of floodplain dependent understorey species. This would provide positive effects for fauna species which utilise floodplain habitats within the inundation areas. The ER stated that the Vinifera project and the Nyah project will improve the condition of native vegetation and habitats through the delivery of environmental water, by reinstating a wetting and drying regime which is better aligned with the natural conditions of the Murray River prior to regulation. The expected overall biodiversity benefits for each of the projects, as presented in the ER, are discussed in Section 4.1 of my assessment.

The ER considered the potential impact pathways to terrestrial species and communities including impacts from the direct removal of native vegetation, particularly hollow-bearing trees, and habitat during construction and the potential for weeds and pest species to increase due to environmental watering and improved conditions. The EMF includes management and monitoring measures to address potential impacts to threatened terrestrial species and communities.

Key aspects related to terrestrial ecology considered by the SIAC were:

- effects of construction activities on native vegetation and fauna habitat;
- effects of operation on native flora and fauna;
- potential impacts on threatened flora and fauna; and
- evaluation of potential biodiversity benefits and approach to assessing the need for offsets.

Effects associated with aquatic ecology values are discussed in Section 6.3.

Discussion

Native vegetation impacts from construction

The ER identified that both projects would result in impacts to native vegetation in the construction stage. For the Vinifera project, 12.84 ha of native vegetation and 147 large trees would be impacted (100 large trees and 47 very large trees). For the Nyah project, the ER identified that 14.12 ha of native vegetation and 145 large trees would be impacted (including 100 large trees and 45 very large trees).

For both projects, the ER assessed the significance of the residual effect ranging from high (for permanent vegetation removal and large tree removal) to low to medium (for the removal of specific threatened flora species). The ER noted that all the native vegetation that will be directly or indirectly impacted is within conservation reserves for both projects as they are both located within the Nyah-Vinifera Park, however I note the borrow site and the associated 1.1ha of native vegetation removal associated with that for Nyah is located on freehold land.

The ER calculated overall impacts to large trees as those that would be physically removed, have encroachment of tree protection zones (TPZ) or any removal of canopy. Physical removal and encroachment of TPZ were then calculated as a permanent loss/removal (see Tables 6-1 and 6-2).

Table 6-1 Impacts to native vegetation (source: ER specialist study B)

Project site	Native vegetation (ha) removed	Large trees impacted	Hollow-bearing trees impacted
Vinifera	12.84 (3.59 ha of access tracks)	147	90
Nyah	14.12 (4.79 ha of access tracks)	145	27
Totals	**26.96**	**292**	**117**

Table 6-2 Breakdown of impacts to native vegetation (source: ER specialist study B)

Project site	Construction footprint (ha)	Borrow site (ha)	Large trees direct removal	Large trees considered lost
Vinifera	12.84	0	81	66
Nyah	13.03	1.1	76	69
Totals	**25.87**	**1.1**	**157**	**135**

The native vegetation impacts from the Vinifera and Nyah projects have also been assessed in terms of cumulative impacts, in combination with the other seven proposed VMFRP projects. At the time of developing the ER, the cumulative impact figures presented in the ER identified that the nine VMFRP projects would impact a total of 351.1 ha of native vegetation and 4,305 large trees. It is, however, expected that the cumulative impact totals will be revised down as the later projects progress and design refinements are made. The ER noted that the removal of the native vegetation and large trees from Vinifera and Nyah is significant, especially when considered in combination with the impacts at the other project sites. However, the ER also concluded that the combined benefits to biodiversity from the nine projects are expected to significantly outweigh the impacts, with benefits expected to the combined maximum inundation areas totalling 14,107 ha, which supports an estimated 79,862 large trees. I note that while the nine VMFRP projects have the potential to provide an overall benefit in the longer term, there will be significant cumulative impacts to native vegetation in the interim. Detailed assessment of the cumulative effects in relation to MNES is provided in Appendix A.

The SIAC noted submitters' concerns regarding the extent of native vegetation being impacted, including the loss of hollow-bearing trees and the absence of a native vegetation offset strategy. The submissions from Environment Victoria and FoNVP raised concerns regarding the loss of native vegetation that will occur, particularly hollow-bearing trees and the subsequent impacts to biodiversity from this loss. The SIAC noted that the expert statement of the proponent's flora expert, Dr King, which highlighted that the potential impacts outlined in the ER were the "worst-case scenario prior to the implementation of EDS E1" and stated that the results are predicted to be overwhelmingly beneficial for the vegetation communities present and for most of the threatened flora species identified as present or potentially occurring for both project areas.

During the development of the ER documents, the native vegetation impacts were updated from those provided in the EES referrals submitted by the proponents earlier in the assessment processes (see Section 1), as the construction footprint was further refined, and the assessment of impacts was revised to consider impacts on tree canopy driplines. As a result of these changes the area of impact for native vegetation and number of large trees impacted were increased for both projects. At Vinifera, the predicted area of impact for native vegetation increased from 7.82 ha to 12.84 ha, while impacts to large trees to be impacted increased from 121 to 147 (as shown in Table 6-3). For Nyah, the predicted area of

impact for native vegetation increased from 9.58 ha to 14.2 ha, while impacts to large trees increased from 121 to 145 (as shown in Table 6-3).

Table 6-3 Breakdown of impacts to native vegetation at referral stage and ER Submission (source: ER Chapters 9 and 13)

Project site	Native vegetation impact at referral stage (ha)	Native vegetation impact at ER submission (ha)	Large trees impacted at referral stage	Large trees impacted at ER submission
Vinifera	7.82	12.84	121	147
Nyah	9.58	14.12	121	145
Totals	**17.4**	**26.96**	**242**	**292**

During the preparation of the ER, the proponent considered project alternatives and refinements to reduce vegetation loss. Multidisciplinary workshops were held where a number of refinements to the construction footprint were considered to avoid and minimise environmental impacts where possible, with a focus on reducing impacts to biodiversity and cultural heritage values (see further discussion in Section 4.2 of this assessment). Options to avoid impacts to high quality native vegetation by moving/ re-siting infrastructure were limited, given construction is within heavily vegetated conservation reserves. In some instances, impacts to biodiversity values could not be reduced as avoidance of impacts to cultural heritage values were prioritised. The focus for biodiversity was on prioritising works away from higher priority habitat values, and aligning works within areas of existing disturbance where possible to reduce footprints. Both projects sought to avoid impacts to native vegetation that has a bioregional conservation status of endangered and reduce overall impacts to native vegetation and large trees.

For Vinifera, the ER stated that the alternatives assessment resulted in the adoption of five alternatives which avoid or minimise adverse effects on significant terrestrial ecological values. These alternatives included the overall avoidance of 21 large and seven very large trees, along with the realignment of the construction footprint to minimise impacts to 18 large and 11 very large trees which will remain standing, but will be considered lost through impacts to the TPZ. Other design refinements saw a reduction in impacts for the endangered EVC 103 Riverine Chenopod Woodland, and a reduction in the number of FFG listed Branching Groundsel *Senecio cunninghamii var. cunninghamii* individuals for a proposed turning circle.

For Nyah, the alternatives assessment resulted in the adoption of 10 alternatives which avoid or minimise adverse effects on significant terrestrial ecological values. These alternatives included the overall avoidance of 55 large and 30 very large trees, along with the realignment of the construction footprint to minimise impacts to 27 large and 21 very large trees which will remain standing, but will be considered lost through impacts to the TPZ. Other design refinements saw a reduction in impacts for the endangered EVC 103 Riverine Chenopod Woodland, and the avoidance of impacts for populations of critically endangered flora at one location, endangered flora at one location, and vulnerable flora at two locations. Further avoidance measures are proposed through EDSs, including EDS E1 Native vegetation and habitat design minimisation and EDS E2b Construction vegetation management.

I note that ER specialist study B stated that the EPBC listed Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions was modelled to potentially occur within both project areas. However, this has been listed as threatened under the EPBC Act since the original referral decision for the projects. As the referral decision pre-dated the listing of these species and communities, they will not be a consideration for the Australian Government Minister in making an approval decision under the EPBC Act. ER specialist study B considered that no EVCs within the project areas met the relevant criteria to be considered part of this community.

Although the figures presented in Table 6-1 and Table 6-2 provide a worst-case scenario of native vegetation impacts, due to the extent of vegetation and large trees to be impacted in these significant environments, I emphasise the importance of the detailed design stage of both projects focusing on further reducing these impacts. I agree with the

SIAC's recommended changes to EDS E1 and have made further recommendations to strengthen the EMF to further outline the process by which design refinements will be further investigated (see Section 4.2). 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 on these same environments and values during the detailed design and construction phase of the projects.

The SIAC noted that, with the recommendation for additional groundwater monitoring bores (EDS GW2, as discussed in Section 6.1 of this report), there may be further minor vegetation loss if impacts of bore installation cannot be located within the construction footprint. Following consultation with relevant land managers regarding appropriate locations for the additional bores which minimise potential environmental impacts, any additional loss of native vegetation from the impact would need to be included in the review of impact figures recommended in EDS E1 and considered in the additional analysis of impacts to vegetation discussed in the consideration of overall improvement to biodiversity sub-section below, to ensure all impacts associated with the projects are adequately considered. I agree with the SIAC's assumption that any loss of native vegetation from monitoring bore installation could be accommodated in the current worst-case figures (as presented in Table 6-1 and Table 6-2) as it should be readily accounted for by the reductions that should be achieved through detailed design.

The SIAC found that there is likely to be limited opportunities to further reduce native vegetation and large tree loss within the construction footprint. It recommended that EDS E1 be amended to require further assessment of relevant alternatives through the detailed design process and selection of construction methods to ensure adequate consideration is given to further avoidance and minimisation of impacts on native vegetation, large trees and the habitats of threatened species. I support this recommendation. The SIAC also recommended that ESD E2e 'be amended to require the native flora and fauna management sub-plan to include reuse of timber and logs from felled trees on site with habitat improvement uses prioritised where possible'. I support the proposed changes to EDS E1 and E2e, and note the importance of further reducing impacts to native vegetation and large trees during design and construction, given the conservation values of the project settings. I find that while the impacts on native vegetation are significant, the impacts are generally acceptable, subject to the implementation of the SIAC recommendations and those included within this report.

Riparian setback

The SIAC raised concern with the impacts of the project on native vegetation fringing the Murray River, noting the impacts to the riparian zone proposed for Vinifera and Nyah are significantly higher than what those proposed for the EES Central projects. The SIAC noted the importance of protecting riparian vegetation is reflected in government policy including the Victorian Waterway Management Strategy[16] and Northern Region Sustainable Water Strategy[17], as well as the Swan Hill Planning Scheme.

The SIAC noted the ER did not specifically consider the impacts on native vegetation fringing waterways and other water bodies, including the Murray River, and found that this should have been considered as a relevant aspect of environmental values to be protected in accordance with Clauses 12.03-1S and 14.02-1S of the Swan Hill Planning Scheme.

The SIAC accepted that there is an inherent need for some of the works to be located within 30m of the Murray River. However, the SIAC was of the view that there is a need for further assessment to determine if works in these areas could be redesigned to reduce losses of native vegetation and large trees in the immediate vicinity of the banks of the Murray River. The SIAC recommended that the assessment could potentially involve adjustments to the siting, design or construction methods for works (for example, containment banks) in proximity to the riverbanks, and noted that all proposed works within 30m of the Murray River banks should be subject to this further assessment. The SIAC recommended the further assessment of alternatives should be made a requirement under the incorporated document, and also recommended changes to EDS E1. I support these recommendations, and consider that this analysis of opportunities to avoid impacts on areas within 30m of the Murray River banks should be conducted in conjunction with the

[16] https://www.water.vic.gov.au/waterways-and-catchments/our-waterways/victorian-waterway-management-program/victorian-waterway-management-strategy

[17] https://www.water.vic.gov.au/planning/long-term-assessments-and-strategies/northern

consideration of other potential refinements to project footprints during the detailed design process, as discussed above and in Section 4.2 of this assessment.

I note that changing the project footprints to reduce impacts on native vegetation in riparian areas may, in some cases, result in other impacts on other environmental values (e.g. cultural heritage sites and/or threatened flora species locations). Further to the SIAC recommendations, I therefore recommend that EDS E1 includes a requirement that the further consideration of opportunities to reduce impacts on riparian areas (including within 30m of the top of the Murray River bank) ensures that trade-offs between environmental values are transparently considered, in consultation with relevant agencies, stakeholders and experts. However, it will be essential that any changes to the footprint do not result in increased impacts on environmental values from those presented in the ER for each project.

Hollow-bearing trees

Hollow-bearing trees are critical for breeding and shelter for much of the vertebrate fauna of many temperate Australian forests, including River Red Gum forests[18]. As noted in the ER, when near a reliable water source mature trees tend to become very large and often have hollows, including large hollows. This is particularly the case with River Red Gums. These hollows provide shelter and breeding opportunities for a range of fauna, including parrots, woodland birds, reptiles and mammals. Large hollow-bearing trees are an important aspect of the ecosystem and conservation values retained within the Murray River floodplains. The loss of hollow-bearing trees from Victorian native forests is a key threatening process declared under the FFG Act. The ER identified that within the project areas these trees provide potential nesting and roosting habitat for the threatened Regent Parrot *Polytelis anthopeplus monarchoides*, South-eastern Long-eared Bat *Nyctophilus corbeni*, Barking Owl *Ninox connivens*, Major Mitchell's Cockatoo *Lophocroa leadbeateri*, Carpet Python *Morelia spilota metcalfei*.

The ER describes that the projects would result in impacts to approximately 117 hollow-bearing trees, both living and dead, during the construction phase (90 for Vinifera and 27 for Nyah). Impacts to hollow-bearing trees was a concern of a number of submitters, who highlighted that a number of species found or expected to occur within the project areas may be affected by impacts to hollow-bearing trees during the construction phase. They highlighted the loss of hollow-bearing trees is considered a key threat to conservation, as set out under the FFG Act. Concerns were also raised in submissions regarding potential impacts on a number of other hollow-dependent threatened species including the Major Mitchell's Cockatoo and Lace Monitor.

The ER noted there is a high residual effect for both projects due to the proposed removal of a significant number of large hollow-bearing trees, particularly given the considerable time is takes for new large trees to grow. The ER concluded that the operational phase of the projects would support the long-term survival and health of many large trees within the maximum inundation areas and therefore the long term residual impact is less significant. These potential positive outcomes to floodplain vegetation are discussed further in the sections below.

Of the recorded trees assessed within the area of investigation (i.e. a smaller area than the proposed extent of inundation) there were 203 hollow-bearing trees observed at Vinifera and 136 hollow-bearing trees observed at Nyah, with the majority of live trees assessed for health recorded as being of good condition (consisting of more than 70% live canopy) at Vinifera, and moderate condition (consisting of 30 – 70% live canopy) at Nyah. The ER stated that extrapolation of the proportion of hollow-bearing trees detected within the Area of Investigation indicates that there are approximately 1316 hollow-bearing trees within the maximum inundation area at Vinifera, and 963 hollow-bearing trees within the maximum inundation area at Nyah.

The DEECA submission recommended that a Hollow Replacement Plan is developed and implemented as part of the project, which should include:

- the number and type of hollow (i.e. carved hollows, nest-boxes);

[18] For example see Bennett, A. F., L. F. Lumsden, and A. O. Nicholls (1994), Tree hollows as a resource for wildlife in remnant woodlands: Spatial and temporal patterns across the northern plains of Victoria, Australia, Pac. Conserv. Biol., 1, 222– 235 and Gibbons, P., D. B. Lindenmayer, S. C. Barry, and M. T. Tanton (2002), Hollow selection by vertebrate fauna in forests of southeastern Australia and implications for forest management, Biol. Conserv., 103, 1– 12.

- characteristics suitable for a range of hollow-dependent fauna (avian, arboreal mammals and reptiles);
- a 1:1 loss: replacement ratio;
- monitoring measures to determine successes/ failures for the period in which it has been suggested within the ER that hollows may regenerate naturally (this being a predicted period of 15 years); and
- mitigation and contingency measures, able to respond to monitoring success and/ or failures.

The proponent's expert witness for terrestrial ecology (fauna), Mr Alex Holmes, considered that a hollow replacement plan would be unlikely to be effective, citing the abundance of hollows in the area along with the difficulties associated with providing suitable artificial hollows or nest boxes, and meeting the needs of different species. Mr Holmes also stated that if a hollow replacement plan was to proceed, it should 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".

The SIAC agreed with the EES Central committee that one-for-one replacement of hollows is not warranted, citing the availability of similar habitat in the area, the short-term losses, and likelihood of new hollows developing over time. However, the SIAC considered that, unlike the EES prepared for the EES Central projects, the ER did not sufficiently explain how the loss of hollow-bearing trees is compensated by any long-term gain resulting from restoration of floodplain vegetation and concluded that a limited hollow replacement program for priority fauna species is justified. The SIAC recommended that EDS E2e is amended to this effect, including the recommendation for EDS E2e to require reuse of timber and logs from felled trees on site with habitat improvement uses prioritised.

I support the inclusion of the SIAC's proposed changes to EDS E2e for both projects to help mitigate the loss of tree hollows from vegetation clearance required. However, I note that whilst the projects are expected to result in long term benefits to hollow-bearing tree species within the maximum inundation areas, hollows will take many decades to form in the regenerating large trees. There are additional requirements that should be included in the hollow requirement plan due to the importance of replacing the hollows lost for the following reasons:

- A large number of large trees are predicted to be cleared/impacted during construction, yet it will take a considerable time (up to 150 years) for new trees to become hollow-bearing large trees in this high conservation significant landscape.
- Each species has its own requirements for type of hollow, and various habitat and social needs determine the density of hollows that may be most useful to that species[19].
- *Action Statement No 192 Loss of hollow-bearing trees from Victorian native forests and woodlands*[20] identifies that some species need multiple hollows in close proximity in order to support a social community, provide a choice of hollow for different circumstances and to allow regular movements for hygiene and to avoid ectoparasites.
- The demand for hollows changes throughout the year, increasing greatly during the spring breeding season. There is substantial evidence to indicate that hollows are a limiting resource, particularly for threatened hollow-dependent fauna. The National Recovery Plan for the Regent Parrot (eastern subspecies)[21] notes competition for nest hollows as a key threat, with the species competing for nest sites with other birds (including feral bird species) and feral European bees.

[19] Department of Sustainability and Environment (2003) Action Statement, Flora and Fauna Guarantee Act 1988, No.192. Loss of hollow-bearing trees from Victorian native forest and woodlands. Department of Sustainability and Environment, East Melbourne.

[20] Department of Sustainability and Environment (2003) Action Statement, Flora and Fauna Guarantee Act 1988, No.192. Loss of hollow-bearing trees from Victorian native forest and woodlands. Department of Sustainability and Environment, East Melbourne.

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

- Many hollow-dependent species are strongly territorial and defend their hollow site and the area around it (Gibbons and Lindenmayer, 2002)[22], so many individual fauna losing their hollows are likely to be prevented from moving into hollows in surrounding areas by competitors which already occupy that territory.
- There is a risk that, following project vegetation clearance during construction, some displaced hollow-dependent fauna may move into hollows suitable for threatened hollow-dependent species, reducing the number available for use by those threatened species.

To support the immediate and short-term welfare of parrots and other hollow-dependent species, I therefore recommend that EDS E2e is updated to require that a hollow replacement plan is to be prepared to the satisfaction of DEECA[23]. I also recommend that this EDS states that the hollow replacement plan requires:

- supplementary nesting sites/artificial hollows to be installed in adjacent areas prior to the removal of large hollow-bearing trees;
- the number and type of artificial hollows to be installed to be commensurate with the number and type of utilised hollows estimated to be removed, as determined by a qualified zoologist, based on available scientific knowledge;
- the agreed location and specification of artificial hollows 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.

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, and that potential for occupation of nesting boxes by pest and non-target species also need to be considered. These recommendations should be considered in the development of the hollow replacement plan and associated monitoring required under the suggested amendments to EDS E2e.

Threatened flora

The flora surveys for the ER recorded 83 native flora species in the Vinifera project area, and 172 native flora species in the Nyah project area. The Victorian Biodiversity Atlas contains records of 466 flora species within the Vinifera project area and 434 flora species within the Nyah project area. Thirty-nine species of conservation significance (listed under the EPBC Act and/or FFG Act) were identified as present or possibly occurring at Vinifera, and 40 species of conservation significance were identified as present or possibly occurring at Nyah (ER specialist study B). Threatened flora species recorded or with potential habitat present in the study areas are summarised in Table 6-4. Key potential impacts on threatened flora identified in the ER include permanent and temporary loss of vegetation and habitat during construction, and direct and indirect effects from inundation. The ER identified that the Vinifera project would result in the removal of three threatened and 14 protected flora species listed under the FFG Act, with the extent of effect ranging from 90-100 individuals in some locations, to 800 individuals at others. For Nyah, the ER identified that the project would result in the removal of three threatened and 38 protected flora species listed under the FFG Act, with the extent of effect ranging from less than five individuals in some locations, to up to 50 individuals at other locations. For both project areas, the ER concluded that there is an overall residual effect ranging from low to medium to threatened flora.

[22] Gibbons, P. and Lindenmayer, D. (2002) Tree Hollows and Wildlife Conservation in Australia, CSIRO Publishing, Collingwood, Australia

[23] Specifically, the DEECA Regional Director, Loddon Mallee Region.

Table 6-4 Listed threatened flora recorded or with potential habitat present in the study areas (source: ER chapters 9 and 13)

Species	EPBC Act status	FFG Act status	Recorded presence in project study areas
Branching Groundsel		Endangered	Vinifera (recorded area of investigation or construction footprint; recorded maximum inundation area) Nyah (recorded area of investigation or construction footprint; recorded maximum inundation area)
Grassland Bindweed		Endangered	Nyah (recorded area of investigation or construction footprint)
Flax-lily		Critically endangered	Nyah (recorded area of investigation or construction footprint)
Fuzzy New Holland Daisy		Endangered	Nyah (recorded area of investigation or construction footprint; maximum inundation area)
Riverina Bitter-cress		Endangered	Nyah (recorded maximum inundation area)
Spear-fruit Copperburr		Vulnerable	Nyah (recorded area of investigation or construction footprint)
Twiggy Sida		Endangered	Vinifera (recorded area of investigation or construction footprint)
Umbrella Wattle		Critically endangered	Nyah (recorded area of investigation or construction footprint)
Winged New Holland Daisy		Endangered	Vinifera (recorded area of investigation or construction footprint; recorded maximum inundation area)
Winged Peppercress	Endangered	Endangered	Vinifera (possible) Nyah (possible)

The ER identified that construction would result in adverse effects on FFG listed species that have been recorded in the Vinifera and Nyah construction footprint areas. At Vinifera, the works are expected to impact less than five individuals of the critically endangered Umbrella Wattle *Acacia oswaldii*, approximately 700-800 individuals of the endangered Branching Groundsel *Senecio cunninghamii var. cunninghamii*, and approximately 90-100 individuals of the endangered Twigga Sida *Sida intricata.* At Nyah, the works are expected to impact less than five individuals of the critically endangered Flax-lily *Dianella longifolia var grandis*, approximately 30-50 individuals of the endangered Branching Groundsel *Senecio*, and approximately 10-20 individuals of the endangered Fuzzy New Holland Daisy *Vittadinia cuneata var. hirsuta*. The ER noted that, for Vinifera, impacts to Umbrella Wattle and Twiggy Sida will have a medium residual effect as they are “terrestrial dry flora” which have established during the recent drier conditions. The ER specialist study B also noted the potential for the EPBC and FFG listed species Winged Peppercress to potentially occur at Vinifera and Nyah, despite not being recorded during the field surveys.

The SIAC noted that there were no submissions made which raised specific concerns regarding the impacts of construction on listed flora species and communities, however some submissions noted concerns with the removal of threatened and protected flora species listed under the FFG Act (Environment Victoria), or requested that further survey effort is undertaken “to ensure baseline data is accurate" (FoNVP). DEECA submitted that the projects did not pose an unacceptable risk or consequence to the State-wide population of any FFG listed flora, and the SIAC considered that the DEECA submission carried considerable weight with regard to providing confidence that the project would not have unacceptable impacts on FFG listed flora.

The SIAC concluded that provided there is further assessment of design alternatives discussed above, the development and implementation of a Native Flora and Fauna Management Sub-Plan (to be approved by the Secretary of DEECA), is an appropriate mechanism to address the further mitigation of impacts on threatened species.

The SIAC found that the final day version of the EDS and monitoring requirements (Tabled Document 84) did not adequately reflect the need for monitoring of vegetation outcomes, in particular for rehabilitation. The SIAC subsequently recommended that EDS E2e is amended to require monitoring of rehabilitation outcomes including vegetation cover, and that monitoring requirement M TE2 should be amended to require specific monitoring of the cover and quality of rehabilitation of indigenous vegetation, where consistent with any obligation established by a consent or agreement for the projects under the *National Parks Act 1975*. I support the inclusion of these recommendations for both projects to help ensure the success of rehabilitation activities is appropriately monitored.

I consider the impacts to threatened flora from both projects will be significant. However, I consider that these impacts can be acceptable, subject to the effective implementation of the relevant EDSs (e.g. EDS E2a, E2b, and E2e) and refinements to the project footprint during the detailed design and construction phases (see Section 5.2). The amended EMF and EDSs will assist in minimising impacts on threatened species. I also note that if Winged Peppercress is recorded at Nyah during the planned monitoring, adaptive management measures may be required to minimise potential impacts. I recommend that the OEMP to be prepared for the projects include contingency measures for cases where any new records of threatened species are recorded in project areas.

Terrestrialisation

The ER explained that terrestrialisation is the process of colonisation of previously inundated areas by terrestrial flora species. Terrestrialisation has occurred in some parts of the project areas due to a reduction in flooding frequency, duration and extent post river regulation. The ER stated that managed inundation under the projects would result in the reversal of terrestrialisation, that is, the transition of terrestrial native flora to more flood-tolerant species that are likely to have been present pre-river regulation. For both projects, the ER concluded no EVCs are likely to be substantially negatively impacted by the reversal of terrestrialisation, but noted some flora species may be affected.

The ER noted that the Vinifera project could result in the potential decline in abundance of two FFG Act listed terrestrial dry flora species (Fuzzy New Holland Daisy and Spear-fruit Copperburr *Sclerolaena patenticuspis*), which have not been recorded in the maximum inundation area, but are considered to possibly occur within the area. The habitat requirements for these species indicate they are not tolerant to flooding, and therefore the prolonged inundation which would occur through the operational phase of the project is likely to result in the area being unsuitable for these species. The ER noted that the terrestrial dry flora habitat areas will likely transition to more flood-tolerant vegetation types. The ER concluded that as the effects to terrestrial dry flora are considered unlikely, the significance of the residual adverse effect is low.

The SIAC noted that at Nyah there are 11 species of “terrestrial dry” flora which do not require flooding events to persist in the landscape, which may be negatively impacted by environmental watering if they are within the maximum inundation area, but could benefit from environmental watering if they are adjacent to the maximum inundation area. The SIAC noted that these species have not been recorded within the maximum inundation area.

The SIAC agreed with the conclusions of the EES Central committee with regard to terrestrialisation, which considered that the reversal of terrestrialisation for the EVCs within the maximum inundation area should generally be considered a project benefit. However, they also concluded that if the projects were to result in significant negative outcomes for threatened terrestrial species, additional measures to avoid, minimise and mitigate the negative impacts require consideration, as these species still have value despite occurring in areas they may not have traditionally been found. I support the conclusion of the SIAC.

The SIAC considered that there is a need for monitoring for the threatened terrestrial dry flora within and adjacent to the maximum inundated area to inform consideration of the need for additional measures, and recommended that there be flexibility in the timing of the surveys to ensure the maximum diversity of species can be recorded after inundation events. The SIAC recommended monitoring requirement M TAE2 is amended to require transect surveys following inundation events to detect the presence of threatened flora species within and adjacent to the maximum inundation area. I support this recommendation. If threatened flora are identified that are being adversely impacted by increased inundation, contingency measures such as seed collection should be considered.

Threatened fauna

The fauna surveys for the ER recorded 96 native fauna species in the Vinifera project area, and 112 native fauna species in the Nyah project area, including four FFG listed species at Vinifera, and six FFG listed species at Nyah. Table 6-5 below outlines the key threatened fauna species considered in the ER.

The ER identified that the Victorian Temperate Woodland Bird Community (VTWBC) and the Victorian Mallee Bird Community (VMBC) fauna communities listed as threatened under the FFG Act have the potential to occur within the project areas and noted that the VMBC corresponds in part with the Mallee Bird Community of the Murray Darling Depression Bioregion. The VMBC was listed in December 2021 as endangered on the threatened ecological communities list under the EPBC Act, however as the listing occurred after DCCEEW's 'controlled action' decisions for these projects, the community is not required to be considered in the decisions on the approval of the controlled actions under the EPBC Act by the Minister for the Environment and Water. The ER noted it is still recognised by the projects as an EPBC Act-listed Threatened Ecological Community. No other EPBC Act-listed threatened fauna communities known from within the study area were observed during site assessments or are considered to have the potential to occur in these areas.

A number of species which are either present or possibly present within the Vinifera and Nyah project areas have been listed as threatened under the EPBC Act since the original referral decision for the projects. As the referral decision pre-dated the listing of these species and communities, they will not be a consideration for the Australian Government Minister in making approval decisions on the controlled actions under the EPBC Act. Relevant species and communities include:

- Major Mitchell's Cockatoo *Lophochroa leadbeateri* (endangered);
- Diamond Firetail *Stagonopleura guttata* (vulnerable);
- Hooded Robin *Melanodryas cucullata cucullata* (endangered);
- Brown Treecreeper *Climacteris picumnus victoriae* (endangered);
- Murray Mallee Striated Grasswren *Amytornis striatus howei* (endangered);
- Southern Whiteface *Aphelocephala leucopsis* (endangered);
- Blue-winged Parrot *Neophema chrysostoma* (vulnerable); and
- Grey Snake *Hemiaspis damelii* (endangered).

The ER documentation contains references to most of these species, but limited assessment was completed on the presence or potential impacts to these species. I note that a number of these species are considered to either be a part of the VTWBC and/or VMBC communities discussed above, or are referred to in the ER specialist study B as "bush birds" which are noted to generally be uncommon to rare within the construction footprints and maximum inundation areas. ER specialist study B noted that for "bush birds" there is almost certain permanent and temporary loss of small areas of habitat with minor consequences, resulting in a medium overall adverse effect. The report concluded that as there is extensive habitat availability across the landscapes, the reductions in habitat are unlikely to affect the ecology of the species.

The Grey Snake is not discussed in the ER specialist study B, however the Conservation Advice for *Hemiaspis damelii* (grey snake)[24] notes that the species are associated with floodplain areas with cracking clays, and are often found foraging for frogs within 30m of the waters' edge, and not in adjacent woodland or shrubland vegetation. While not considered within the ER, the distribution map in the Conservation Advice show that the species or species habitat may occur within the project areas, with known or likely habitat located on the NSW side of the Murray River.

[24] Department of Climate Change, Energy, the Environment and Water (2022) Conservation Advice for *Hemiaspis damelii* (grey snake)

Table 6-5 Listed threatened terrestrial fauna recorded or with potential habitat present in the study areas (source: ER Chapters 9 and 13)

Species	EPBC Act status	FFG Act status	Presence in project study areas
Grey-crowned Babbler		Endangered	Vinifera (recorded), Nyah (recorded)
Lace Monitor		Endangered	Vinifera (possible), Nyah (recorded)
Major Mitchell's Cockatoo	Endangered	Critically endangered	Vinifera (recorded), Nyah (recorded)
Painted Honeyeater	Vulnerable	Vulnerable	Vinifera (possible), Nyah (possible)
Regent Parrot	Vulnerable	Vulnerable	Vinifera (possible), Nyah (recorded)
South-eastern Long-eared Bat	Vulnerable	Endangered	Vinifera (possible), Nyah (possible)
Yellow-bellied Sheathtail Bat		Vulnerable	Nyah (historical record)

For both the Vinifera and Nyah projects, key impacts to threatened fauna identified within the ER include a loss of habitat through vegetation clearance, degradation of native riparian vegetation along Victorian rivers and streams, and direct and indirect effects from inundation. The ER identified that the permanent and temporary loss of habitat as a result of the projects would have a medium residual effect on woodland fauna, noting that this has the potential to impact FFG and EPBC-listed species such as the Regent Parrot, Painted Honeyeater and South-eastern Long-eared Bat. The ER considered that, with the application of the relevant EDS, the projects would generally provide a benefit to threatened fauna species through improved habitat condition in the long term. The ER also noted that surveys recorded the presence of the FFG Act listed Grey-crowned Babbler, Lace Monitor and Major Mitchell's Cockatoo, though concluded residual impacts for these species to be low and that overall these species would likely benefit from the projects. I note, however, there is a number of state and federally listed threatened species which are expected to be impacted from the significant amount of vegetation clearance required for the construction of the projects, and there will be a substantial time lag between impacts to habitat during construction and the realisation potential benefits to habitat from operations. The potential impacts on fauna habitat from construction remain significant, even with implementation of the proposed EDSs.

The South-eastern Long-eared bat *Nyctophilus corbeni* is listed as vulnerable under the EPBC Act and endangered under the FFG Act. As discussed in Appendix A, the loss of a significant number of hollow-bearing trees has the potential to impact the South-eastern Long-eared bat for both the Vinifera and Nyah projects. As outlined in the hollow-bearing trees subsection above, I support the SIAC recommendation that a hollow replacement plan is required to mitigate against the loss of a significant number of hollow-bearing trees, and have made additional recommendations to strengthen the requirements of the hollow replacement plan for the projects. With implementation of the proposed EDSs, and other recommended amendments of the SIAC and this assessment, I consider the residual impacts to this species are acceptable. My assessment of potential effects on the species in relation to its protection under the EPBC Act is provided in Appendix A.

The SIAC noted that the submissions from Environment Victoria and FoNVP raised concerns for the construction phase of the projects on threatened fauna, including the extent of permanent and temporary loss of suitable habitat and loss of habitat connectivity, with particular concerns raised about for Regent Parrot, Painted Honeyeater, Carpet Python and Lace Monitor due to hollow-bearing tree loss. FoNVP also submitted that the state and federally listed Growling Grass Frog is present in the area, despite not being recorded in the project surveys.

Overall, the SIAC found that the ER adequately considered the impacts to threated fauna from construction, concluding that while the construction works could exacerbate various listed threatening processes, none would be critically exacerbated. The SIAC considered that the operations stage of the projects is unlikely to significantly impact adversely on any terrestrial fauna species, and that projects will likely result in a general beneficial effect on threatened terrestrial

fauna, subject to the effective implementation of measures to manage the risks posed by pest animals, plants and pathogens that may be promoted by increased inundation. I generally support these conclusions, with the exception of Regent Parrot for which I consider further mitigation is required as discussed below and in Appendix A. With implementation of the proposed EDSs, including amendments recommended by the SIAC and this assessment, I consider potential impacts from construction and operations on other FFG Act listed fauna species considered in the ER can be acceptably managed for both projects.

I note that further survey efforts and monitoring for the projects may identify the presence of additional threatened species, and that future revisions of the monitoring evaluation and reporting plan should ensure adaptive management is able to respond to changes to recorded threatened species. An example of additional species needing to be considered is provided in the "Wetland Monitoring and Assessment Program for environmental water – Stage 3 Final Report" from the Arthur Rylah Institute[25], which identified the presence of the EPBC and FFG listed Sloane's Froglet in several VMFRP project locations, including the Nyah floodplain, and subsequent monitoring in 2022 and 2023 recorded this species in Vinifera and Burra Creek. While these discoveries were not made in time to be considered in the development of the ER, their presence cannot be discounted when considering impacts from the project. I therefore recommend that the requirements in monitoring measure M TE7 for the Vinifera and Nyah projects are reviewed annually to ensure the scope of the monitoring includes all relevant species, and considers new and updated information on species presence. I also recommend that EDS GW2 is amended to require the OEMP to consider the need for adaptive management measures for new records of threatened species where project operations could result in significant adverse impacts.

Regent Parrot (eastern)

The Regent Parrot *Polytelis anthopeplus monarchoides* is listed as vulnerable under both the EPBC Act and the FFG Act. Whilst not recorded at Vinifera during the ER surveys, there are previous records of the species in the Vinifera project area. The species was recorded during the targeted surveys conducted in the Nyah project area. ER specialist study B noted that the entire project areas represent potential foraging habitat (for both projects). Potential breeding habitat also occurs within both project areas, but in more isolated patches. This species tends to breed in very large River Red-gum trees (i.e. with mean DBH of 160 cm) within 120 m of water.

The ER described that the construction of the Vinifera project would lead to the following habitat impacts for Regent Parrot:

- removal of up to 13 ha of potential foraging habitat;
- removal of up to 5 ha of potential breeding habitat, which is within 120 m of water; and
- impacts to 20 trees identified as potential breeding trees (with a DBH>160cm).

The ER described that the construction of the Nyah project would lead to the following habitat impacts for Regent Parrot:

- removal of 14 ha of potential foraging habitat;
- removal of up to 6 ha of potential breeding habitat, which is within 120 m of water; and
- impacts to 13 trees identified as potential breeding trees (with a DBH>160 cm).

The population of Regent Parrot present at Vinifera and Nyah is considered an 'important population' as it belongs to the Mid-Murray Victorian sub-population of breeding pairs nominated in the Regent Parrot Recovery Plan[26]. The project will reduce the area of occupancy of this important population due to the loss of 5 ha of potential breeding habitat and 13 ha of potential foraging habitat at Vinifera and 6 ha of potential breeding habitat and 14 ha of potential foraging habitat at Nyah. The species has been confirmed to occur in both these areas. I therefore consider this significant impact criterion under the EPBC Act could be met, and both projects are thus likely to result in a significant impact to the species.

[25] Papas, P., Hale, R., Amtstaetter, F., Clunie, P., Rogers, D., Brown, G, Brooks, J., Cornell, G., Stamation, K., Downe, J., Vivian, L., Sparrow, A., Frood, D., Sim, L., West, M., Purdey, D., Bayes, E., Caffrey, L., Clarke-Wood, B. and Plenderleith, L. (2021). *Wetland Monitoring and Assessment Program for environmental water: Stage 3 Final Report*. Arthur Rylah Institute for Environmental Research Technical Report Series No. 322. Department of Environment, Land, Water and Planning, Heidelberg, Victoria

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

ER specialist study B noted likely impacts are as follows (taking into consideration what is within 2 km of the area of investigation):

- Vinifera project – impact on approximately 1.59% of the available suitable foraging habitat, 5.17% of potential nesting trees and 3.01% of potential nesting habitat in Victoria within the area.

- Nyah project – impact on approximately 0.97% of the available foraging habitat, 1.17% of potential nesting trees, and 1.35% of potential nesting habitat in Victoria within the area.

ER specialist assessment B concluded that the adverse impacts to Regent Parrot are expected to be very localised, minor, and not ecologically significant for both project areas. However, I note that the Regent Parrot Recovery Plan defines all potential Regent Parrot habitat within its current normal range as habitat critical to the survival of the species. All potential habitat within the Vinifera and Nyah project areas is therefore considered critical to the survival of the species.

I note that no breeding activity was recorded during the current surveys and the project areas are outside areas mapped as where breeding is likely to occur in the Recovery Plan's indicative map. However, I consider the ER contains insufficient information to rule out the possibility the potential breeding habitat in either project area could be used by the species in the future. Given these factors, I consider the proposed habitat loss due to vegetation clearance is likely to result in a significant impact to Regent Parrot for both projects. In my previous assessment for EES Central, I considered there is potential for the Belsar-Yungera project to result in a significant residual impact to Regent Parrot under the EPBC Act. There is therefore potential for Vinifera and Nyah, as well as other VMFRP projects, to add cumulatively to this impact due to additional habitat clearance for the species. I note that further work regarding cumulative impacts is being progressed for other VMFRP projects. The accredited environmental assessment processes for five of the other VMFRP projects are still underway and will assist with the understanding of cumulative impacts on key MNES/species including the Regent Parrot.

While the proponent has sought to reduce impacts on native vegetation through refining the project design through the ER process, there is an imperative to further reduce impacts on Regent Parrot habitat during the detailed design and construction phases of the project. I note the SIAC's recommended amendments to EDS E1 include measures for further reducing native vegetation loss, however the EDS does not currently require specific consideration of opportunities to reduce impacts on Regent Parrot habitat. I also consider that conducting some additional analysis to further understand the habitat use and landscape context for the species would assist in guiding further efforts to reduce impacts on habitat for this species.

To assist in strengthening the mitigation measures for the projects and reducing residual impacts, I therefore recommend that the following requirements are added to EDS E1 for both projects:

- Undertake further analysis and mapping to clarify the landscape context for the species, and likelihood for potential breeding habitat to be used by the species in the future, such as whether the project areas include the breeding requirements outlined in the Recovery Plan including:
    - Mallee woodlands within 20 km and ideally within 5 km of nest sites for foraging;
    - Treed flight corridors between potential nesting habitat (i.e. large River Red Gums, generally within 120 m of water for nesting) and the Mallee woodland habitat; and
    - Further identification of historic and potential nesting trees, with reference to potential nesting locations identified in Regent Parrot habitat maps in Appendix I to Specialist Appendix B of the ER.
- Submission of a report documenting the outcomes of the further analysis and mapping described above to DCCEEW and DEECA Loddon Mallee Region, to inform both related approvals and any necessary conditions for further mitigation as part of those (see below).
- Informed by findings of the further analysis described above, implement measures to avoid and minimise impacts on Regent Parrot including:
    - As part of the further assessment of relevant alternatives through the detailed design process to further avoid and minimise impacts on biodiversity values as recommended by the SIAC, consider opportunities

for the projects to specifically reduce impacts on Regent Parrot habitat (particularly impacts on active or potential nesting trees and habitat in their vicinity),

- Conduct removal/lopping/felling of potential and active nesting trees, if required, outside the breeding season.
- Schedule construction activities to avoid active construction within 350m of active nesting trees during the breeding season (spring/early summer). Active construction includes construction activities associated with track upgrades and new track construction, but does not include construction vehicle transit, where vehicles are using tracks for access to construction sites or routine track maintenance.

I consider the potential adverse effects of construction on Regent Parrot are likely to be significant for both projects at the state level due to direct impacts on potential breeding and foraging habitat for the species. However, with implementation of the EDSs and monitoring measures, including amendments of the SIAC and this assessment to support further avoidance and minimisation of impacts on Regent Parrot habitat, I consider the impacts on the species can be acceptably managed. Any habitat that cannot be avoided must be offset in accordance with state and federal offset requirements, where relevant. As recommended by the SIAC and discussed earlier in this section of my assessment, a hollow replacement plan should also be prepared and implemented, which will assist in mitigating the impacts on the species both from direct impacts of vegetation clearance and the potential for increased competition for hollows from other species that are displaced.

Further detail regarding my assessment of potential effects on Regent Parrot and consideration of effects in relation to protection under the EPBC Act are provided in Appendix A.

Pest plants and animals

The ER noted that pest plants and animals are an existing threatening process in the project areas that could be intensified by construction and environmental watering. The ER identified five weeds which are listed as restricted and regionally controlled under the *Catchment and Land Protection Act 1994* (Bridal Creeper *Asparagus asparagoides*, African Box-thorn *Lycium ferocissimum*, Spear Thistle *Cirsium vulgare*, Paterson's Curse *Echium plantagineum*, and Horehound *Marrubium vulgare*) occurring within the maximum inundation areas for both projects, and two additional listed weed species were recorded at Nyah (Great Brome *Bromus diandrus* and Red Brome *Bromus rubens*). One pathogen (*Phytophthora cinnamomic*) and one root parasite (Pale-fruit Ballart *Exocarpos strictus*) were also noted to be of concern in the Nyah-Vinifera Park. The ER specialist study B identified a range of pest animals whose adverse impacts on terrestrial ecology may increase as a result of environmental watering, including Cat *Felis catus*, Red Fox *Vulpes vulpes*, European Rabbit *Oryctolagus cuniculus*, and Pig *Sus scrofa*.

To manage risks from pest plants and animals, the ER proposed EDS E2d that prescribes requirements regarding construction weed and pest management to be included in the Native Flora and Fauna Management Sub-Plan of the CEMP, EDS E2e that prescribes requirements regarding construction rehabilitation management be included in the same sub-plan, and EDS E3 that proposes a Pest Plant and Animal Monitoring and Management Plan be prepared and implemented by Parks Victoria during operations. The ER concluded for both projects that the residual effects from the potential introduction of weeds, pest species or pathogens range from low (for increases in pest animal populations) to high (for introducing or exacerbating the spread of pest plants or plant pathogens) during construction. Notably the residual effects of introducing or exacerbating the spread of pest plants or plant pathogens was predicted to be medium during the operations phase.

The SIAC noted that the evidence provided in the ER suggests there will be some positive effects in relation to pest plants from the operational phase of the projects, including drowning of invasive weeds, however noted that adverse effects such as potential increases in pest plant and animal populations may also occur. The SIAC noted that ER specialist study B raised that Parks Victoria is already facing constraints to funding pest plant and animal control programs, and states that it is essential that the land manager has adequate resources and effective controls to improve the outcomes for limiting or reducing invasive flora and fauna.

The SIAC concluded that the operational phase of the projects may result in some positive outcomes for terrestrial weed suppression, but may also increase other terrestrial weed species. The SIAC noted that the monitoring and effective

mitigation of any significant increase in pest plant and animal abundance will be critical to the success of the projects, and noted that while EDS E3 provides a framework for pest plant and animal management for the projects, the capacity of Parks Victoria to implement this will be vital. I agree with these conclusions.

Hydraulic effects on floodplain vegetation

The consideration of the hydrologic requirements of EVCs in terms of frequency, duration and depth was discussed throughout the hearing due to concerns raised by submitters (including from ANU Fenner School, Environment Victoria and Ms Thornton). These submitters questioned the nature of the ecological outcomes, and considered that the proposed water regimes may not deliver the predicted benefits to floodplain vegetation due to the manner in which they are expected to be delivered. DEECA's submission further noted the importance of considering the level of certainty associated with the AOIB reports within the ER, and noted that the expert elicitation process outlined in ER Accompanying Document 2 had produced outcomes on EVC preferences to inundation which differed from the information shown within the ER main report and attachments.

The SIAC considered the information provided by the proponent and submitters relating to inundation regimes and their relationship to the vegetation communities at Vinifera and Nyah, and concluded that the proponent did not present a consolidated interpretation of the various analyses, assessments and guidelines referenced within the ER. The SIAC noted that some of the methodologies and assumptions underpinning the hydrologic assessments were not clearly articulated, including in the AOIB reports (Attachments V and VI). As a result, the SIAC considered they were unable to complete a full analysis and reconcile all the different assessments.

The SIAC noted that the ER did not identify the significant risks that extended frequencies, periods or depths of inundation might have on some vegetation communities, outside of a reference in the ER that some River Red Gums (*Eucalyptus camaldulensis*) may be subject to 'drowning' where they have colonised former wetland areas, but this is considered to be a desirable outcome by the proponent. The SIAC noted that Section 9 of Attachment V includes a high-level discussion on the ecological risks of project operations, but this section does not address risks that vegetation communities or species may face from inappropriate inundation.

The SIAC considered that the likely impact of the proposed managed inundation regime on the vegetation communities of the Nyah-Vinifera Park depends on the hydrological responses of key vegetation communities, and noted that there is a need for further hydraulic analysis of vegetation impacts. The SIAC recommended that a more refined and integrated characterisation of the vegetation communities of the Vinifera and Nyah floodplains is needed, including with respect to their hydrology, geomorphological setting and soils.

The SIAC recommended that this further hydraulic analysis of vegetation inundation should serve to better understand the EVCs of Vinifera and Nyah and the historic patterns of inundation, and should identify the optimal inundation regimes to achieve specific outcomes for the EVCs in both project areas. The SIAC also recommended that the further analysis should be used to inform the development and implementation of the OEMP, including any necessary operational changes and adaptive management. The SIAC also recommended that this further analysis should be used to inform the assessment of any likely vegetation losses from the proposed inundation regime relevant to the information to be provided to the Secretary of DEECA under clause 4.6.1 of the proposed incorporated document, and the AOIB reports to be provided to the Secretary of DEECA under clause 4.6.1 of the incorporated document.

The SIAC concluded that, while they expect that an increased frequency and duration of inundation will result in an overall improvement in health for most of the floodplain EVCs within the Vinifera and Nyah project areas, there is a need for a more refined analysis of the patterns of inundation of EVCs in order to provide a more accurate basis for assessing the predicted effects on vegetation. This is also essential to provide guidance for adaptive management measures. To address this uncertainty, the SIAC recommended the inclusion of a new EDS SW4 'Surface water – Further hydraulic assessment of operational impacts on floodplain vegetation', which is to be based on the results of the refined hydraulic modelling the SIAC recommended for ESD GS1, and will result in the better characterisation of the ecological outcomes that are sought. The SIAC require this additional work to include maps showing the locations where particular outcomes are expected, and provide a clearer understanding of the interactions between the vegetation, hydrology, and soil management interactions in the specific context of the Vinifera and Nyah floodplains. The SIAC recommended that the

further analysis should also identify the patches of “terrestrialised” vegetation, which include the areas of proposed loss of species which may be negatively impacted by the proposed inundation regime, such as River Red Gums.

I note the SIACs proposed new EDS SW4 should include the requirement to undertake hydraulic analysis, including measures to:

- better understand the existing distribution of EVCs within the maximum inundation area;
- identify optimal inundation regimes to achieve specific outcomes for EVCs; and
- assess potential losses of vegetation that could result from managed inundation regimes.

The SIAC’s proposed new EDS SW4 also states that the further hydraulic analysis is to include measures to:

- determine the frequency and duration of flood events that would inundate each EVC under relevant flow scenarios;
- analyse the location, maximum extent, durations and depths of inundation of different EVCs for representative flood events, using both mapped and tabular presentations as appropriate;
- assess the preferred frequencies, durations and depth ranges of inundation for each EVC based on the hydraulic analysis of existing patterns; and
- map the extent of appropriate watering in the preferred depth range, “over-” and “under-watering” of each EVC within the MIAs, relative to the preferred EVC inundation depths, for representative flood events.

As outlined in Section 6.1, I support the inclusion of SW4, subject to my additional amendments. However, I consider that that further measures are needed in the EMF to ensure this further analysis is adequately considered and synthesised with existing information, including preparation of appropriate reporting/outputs to inform decisions relating to native vegetation. Accordingly, I recommend the EMF includes a new EDS (E5) requiring the AOIB reports for both projects (ER Attachments V and VI) to be updated with consideration of:

- outcomes of the further hydraulic analysis and assessment of EVC responses required by EDS SW4;
- site-specific hydrological analyses of EVCs (Tabled Documents 23 and 24), together with *A guide to water regime, salinity ranges and bioregional conservation status of Victorian wetland Ecological Vegetation Classes* (2016, Frood and Papas) and the expert elicitation report (ER Accompanying Document 2); and
- predicted responses of EVCs under the VMFRP (with Basin Plan) scenario and proposed initial operating scenarios.

With this additional information incorporated, these updated AOIB reports should provide a single reference point on the expected overall improvement to biodiversity in a clear and informed manner. Once these updated AOIB reports are prepared, I recommend the reports are:

- provided to the Secretary of DEECA[27] under Clause 4.5.1 of the incorporated document, to inform decisions regarding the proposed alternative offset arrangement; and
- used to inform refinement of initial operating scenarios that will be evaluated through environmental monitoring of response of vegetation to watering events, and guide adaptive management.

Inclusion of the recommended information in the updates of the AOIB reports is necessary to address residual uncertainties in relation to EVC responses to inundation, and provide an appropriate basis for decision making which incorporates and synthesises all available information. It should be noted my recommendations regarding EDS E5 are generally consistent with those of my assessment for EES Central, as the residual uncertainties that need to be addressed are similar between the projects considered in both of my assessments.

[27] Specifically, the Secretary of DEECA as constituted under Part 2 of the *Conservation, Forests and Lands Act 1987*.

The SIAC also recommended that the incorporated document is amended to require the OEMP to include objectives, targets and indicators to be used in the monitoring and evaluation of biodiversity responses, and to also include the conceptual framework of environmental system interactions that will guide adaptive management of both managed inundation and land management. I support these recommendations to help strengthen the approach to monitoring of biodiversity responses to environmental watering and a provide a systematic approach to how this information informs adaptive management. The SIAC also recommended that the amendment should require the proponent to consult with Swan Hill Rural City Council and other nominated parties, with respect to the development and implementation of the OEMP. I support this recommendation to help ensure relevant parties are consulted regarding the operation of the projects and associated environmental management measures.

Consideration of overall improvement to biodiversity

As discussed in the preceding sections of my assessment, the proponent undertook an assessment of overall improvement to biodiversity (AOIB) for each project (ER Attachments V and VI). The AOIB reports were intended to demonstrate the expected overall improvement to biodiversity of each project and support the decisions regarding the proposed alternative arrangement to offsets[28]. Based on the findings of the AOIB reports, the ER stated that for Vinifera it is expected that 331 ha of floodplain vegetation would receive improved frequency and duration of inundation under the 20,000 megalitres per day (ML/day) scenario and that there is the potential to benefit 2,159 large trees within the maximum inundation area. At Nyah, it is expected that 470 ha of floodplain vegetation would receive improved frequency and duration of inundation under the 25,000 ML/day scenario and it is expected that 3,193 large trees may benefit within the Nyah maximum inundation area. The AOIB report for Vinifera (ER Attachment V) did however note that one species – Murray Hardyhead (*Craterocephalus fluviatilis*) – was predicted, by the EnSym NVR tool for the Vinifera site, to suffer a greater impact than benefit. The ER concluded, however, that the species is highly unlikely to be present, and therefore the predicted impact is unlikely to reflect actual ecological outcomes for the Murray Hardyhead from the project.

The AOIB reports included modelled operating scenarios, which were analysed to determine whether and to what extent preferred inundation depths were achieved for EVCs. For both project areas, it was found that under all scenarios the preferred inundation depths were exceeded at some point for most of the EVC types. To help address these uncertainties the proponent commissioned an independent expert elicitation by the Arthur Rylah Institute to assist in predicting likely responses of the floodplain vegetation communities (ecological vegetation classes, EVCs) under various watering regimes. Due to the timing of the assessment, the expert elicitation report was included as an 'accompanying document' to the ER (Accompanying Document 2). The expert panel was comprised of public and private sector botanists and floodplain ecologists experienced with the vegetation and hydrology of the Murray River floodplain. The panel considered the optimal and tolerable ranges (based on frequency and duration of inundation) of the 24 identified EVCs associated with the broader VMFRP. The report concluded that four of the EVCs would not receive benefit from the projects' proposed watering regime.

In response to the expert elicitation report, the proponent also tabled a technical note (TN01, Tabled Document 22) which presented further site-specific work for the Vinifera[29] and Nyah[30] floodplains, carried out by Ecological Associates.

The Ecological Associates report said the expert elicitation report had limited usefulness when applied to specific sites, due to the generalised nature of the expert elicitation advice on the optimal and tolerable ranges of each EVC. In the covering technical note (TN01), the proponent noted that neither the expert elicitation report nor the Ecological Associates report considered the full range of factors which will be relevant to achieve the intended ecological and biodiversity benefits of the projects through future environmental water decision-making processes.

The SIAC considered that the information in the AOIB reports did raise questions regarding claimed benefits to some specific species. For example, the SIAC noted that Umbrella Wattle is listed as "unlikely to occur" within the maximum inundation area, however the AOIB report for Vinifera also lists that it is expected that 96 hectares of suitable habitat for

[28] The alternate offset arrangement referenced here are referring to the proposal to utilise the Conservation Works Exemption process, and are not in accordance with the alternative arrangements for offsets referenced in the 'Guidelines for the removal, destruction or lopping of native vegetation" DELWP 2017

[29] Ecological Associates (2023). Hydrological analysis of Ecological Vegetation Classes in relation to expert elicitation report – Vinifera Floodplain (Tabled Document 24)

[30] Ecological Associates (2023). Hydrological analysis of Ecological Vegetation Classes in relation to expert elicitation report – Nyah Floodplain (Tabled Document 23)

the species will benefit from the project, and that the impacts to Branching Groundsel from the Vinifera project are likely to be outweighed by the benefits, despite being is listed as "unlikely to occur" within the maximum inundation area. The SIAC also noted that over 1,000 Winged New Holland Daisy plants were recorded in the maximum inundation area in the spring 2021 surveys, but the AOIB report stated that "habitat for the species is associated with areas of higher elevations, where inundation during environmental watering is likely to be infrequent and shallow".

The SIAC further noted that some of the statements of project benefits in the ER documentation appear to be overstated and considered that the assessment of potential benefits to EVCs is still subject to a range of uncertainties, particularly the hydrological requirements of different EVCs and the robustness and resolution of the hydraulic modelling used in the ER documents to date. The SIAC was of the view that the hydrological requirements need to be better characterised to enable more confident predictions of outcomes and to guide managed inundations.

The SIAC concluded that it is likely the increased frequency and duration of inundation achieved through the implementation of the Vinifera and Nyah projects has the potential to improve the health of most floodplain vegetation in the proposed inundation areas, and, overall, the projects are likely to result in an overall improvement to the biodiversity values of the floodplains. However, the SIAC highlighted that there is uncertainty in both the extent and timeframes of beneficial outcomes that may be realised as a result of both projects. As discussed in Section 6.1 and this section of my assessment, the SIAC recommended additional work to address specific uncertainties relating to floodplain hydraulics and floodplain ecology, with the results of this work to be used to confirm the predicated extent of benefits. Specifically, the SIAC recommended the addition of EDS SW4 and amendments to EDS GS1 which requires further analysis to address the uncertainties surrounding the implications of hydraulic effects for floodplain vegetation. The SIAC consider the intent of this further analysis is to provide an appropriate level of certainty regarding preferred and tolerable water regimes to inform initial operating scenarios and adaptive management.

As referenced in the section above, I recommend amendments are made to EDS SW4 and the inclusion of EDS E5 to further address residual uncertainties with regard to the EVC responses for both project areas. I consider it important this work is undertaken to provide greater certainty regarding the expected improvements to the floodplain vegetation communities, prior to native vegetation related decision-making.

Alternative arrangement to offsets

In their final day submissions, the proponent submitted a final day version of the draft incorporated document[31] which noted that condition 4.5 was "the exhibited version of this clause, which is subject to deliberation by the SIAC and assessment by the Minister for Planning as part of the EES Central process".

Condition 4.5 of the exhibited draft incorporated document includes the following requirements:

- information about the native vegetation to be removed to be submitted to and approved by the Secretary prior to native vegetation removal;
- offsets to be provided prior to native vegetation removal, unless written agreement is obtained from the Secretary stating it has been demonstrated the removal of native vegetation necessary to enable the use and development provides for an overall improvement to biodiversity; and
- any secured offsets to be reconciled within six months of the completion of construction, and evidence provided that offsets have been secured.

The DEECA submission[32] supported the inclusion of condition 4.5.2 Native Vegetation within the draft incorporated document, which would require the proponent to obtain agreement from the Secretary of DEECA that the project demonstrates overall improvement to biodiversity and therefore offsets under Victorian legislation are not required. DEECA noted they consider that is it appropriate for such a mechanism to be included in the incorporated document, as this prevents there being an "otherwise unrestrained capacity to remove native vegetation without offsetting". DEECA

[31] Tabled Document 85

[32] VMFRP SIAC submission no. 12, DEECA

considers that the Secretary is best placed to administer such safeguards to ensure the 'no net loss' objective of state native vegetation policy is met.

As noted above, the SIAC highlighted the outstanding uncertainties regarding the ER AOIB reports for the projects, and considered that "an evaluation of actual outcomes across the maximum inundation areas could be appropriate to inform a deferred decision on offset requirements." The SIAC considered that, as there is uncertainty in both the extent and timeframes of beneficial outcomes that may be realised, a deferred offset would allow the Secretary to consider actual biodiversity outcomes before making a decision. This decision would be informed by a report on the monitoring and evaluation. The SIAC suggested a two stage approach:

1. the Secretary might agree to defer a decision on whether an offset is required, if they are satisfied that the project "is reasonably likely to achieve an overall improvement for biodiversity"; and
2. a later decision by the Secretary on whether an offset is required would be informed by a report on the monitoring and evaluation of actual biodiversity outcomes.

The SIAC noted that under this approach the Secretary could require the further hydraulic assessment of operational impacts on floodplain vegetation (as required by the suggested EDS SW4) at either of the decision points listed above.

The SIAC considered that the suggested approach would provide an enhanced level of accountability and transparency in terms of offset requirements that comply with the "no net loss" state policy objective, and would provide an incentive for the project to deliver an overall improvement to biodiversity. The SIAC provided reasoning as to why they considered that a deferred offset obligation is practicable, including that if the evaluation of actual outcomes finds that there has been an overall improvement, then no offset obligation would apply, or if it finds that there has been partial or insufficient improvement in biodiversity, then a commensurate offset obligation would apply.

The SIAC noted that whilst no evidence was provided to them relating to the feasibility of achieving offsets, the issue was discussed at the EES Central hearing. During discussions for the offset requirements for the EES Central projects, the proponent submitted that offsets provided by a "third-party" at other sites might not be readily available, and that there may be multiple challenges with offsetting via an "offset management plan". The SIAC concluded that applicable policy requires that accountability must be established for ensuring "no net loss to biodiversity", and therefore there is a responsibility for necessary offsets.

The SIAC concluded that they considered there to be merit in allowing for a process whereby the final decision on ecological offsets can be made based on the actual environmental benefits achieved from the operational phase of the project, and recommended that the incorporated document is revised to provide that the Secretary of DEECA may authorise the removal of native vegetation for the purpose of project works, subject to a deferred decision on offset requirements that would consider an evaluation of actual biodiversity outcomes.

I note the points raised by the SIAC regarding outstanding uncertainties regarding the evaluation of the extent of benefits that will occur for floodplain vegetation from the projects, however I do not support the recommendation for a deferred decision on offset requirements, as this approach is not consistent with state planning policy and does not allow sufficient clarity regarding offset requirements and their ability to be secured prior to construction and vegetation clearance occurring. As per the state's Native Vegetation Guidelines[33], for any native vegetation to be removed, any offsets required are to be identified and secured *prior to commencing vegetation removal*. The Native Vegetation Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria. Requiring offsets to be identified and secured prior to native vegetation removal is a precautionary approach that aims to ensure that there is appropriate certainty regarding the availability and implementation of the offset/compensation for any removal of native vegetation that is approved. This policy is intended to provide an appropriate safeguard to achieve the state policy objective of 'no net loss' of biodiversity in Victoria. I consider that the Vinifera and Nyah projects should be implemented in accordance with state policy, with appropriate determination of the need for offsets prior to the commencement of native vegetation removal for each project.

[33] DELWP (2017) Guidelines for the removal, destruction or lopping of native vegetation.

I also note that this approach is inconsistent with the specific requirements for a conservation works exemption (CWE), which is the general approach on which the proposed alternative offset arrangement is based on for these projects. As noted in the AOIB reports prepared for the ER, the standard CWE is not available to the projects as the planning approval for the projects is proposed to be bespoke (via a PSA) rather than planning permit applications. The proponent is thus seeking an alternative offset arrangement[34] which would be the equivalent of a CWE for the projects. The AOIB reports sought to provide the information required for DEECA to consider the suitability of such an alternative offset arrangement. In a submission from DEECA, it was noted the Environment Portfolio had drafted and supplied un-published guidance information[35] specific to the projects which aimed to assist the proponent in understanding how the intended benefits of environmental watering could be assessed and documented, including what information was needed to support the proposed alternative offset arrangement. There are key aspects that need to be considered in evaluating applications for large-scale conservation works exemptions / alternative offset arrangements, which are essentially unique at this point, given the unprecedented scale of the VMFRP projects. These key aspects, as noted in the DEECA submission, are:

- *That a clear overall improvement in biodiversity must be demonstrated through a comparison assessment of impacts and benefits, which clearly provides the predicted benefits to biodiversity values.*
- *That methodology and information including data, expert opinion, previous reports for similar projects that have delivered these benefits and published work should be included.*
- *That proposed monitoring is described and undertaken to ensure the primary objectives of the conservation work are being achieved.*

Conditions included within the incorporated document provide scope for the consideration of this approach including:

- Condition 4.5.2 (outlining the requirements for offsets to be acquired prior to the removal destruction or lopping of native vegetation, unless the Secretary of DEECA provides written agreement that the project demonstrates an overall improvement for biodiversity); and
- Condition 4.6.1 (outlining monitoring requirements to evaluate the extent to which an overall improvement to biodiversity has been achieved).

As noted in the DEECA submission, an application for a CWE for large and complex projects must demonstrate a "clear overall improvement in biodiversity through a comparison assessment which clearly provides the predicted benefits to biodiversity values".

In light of this and other relevant Victorian government policy surrounding offsets, I do not support the recommendation by the SIAC to allow a deferred decision on offset requirements. Consistent with my assessment for the EES Central projects, I maintain that the incorporated document should include conditions consistent with state policy, requiring offsets (should they be deemed necessary) to be secured prior to construction. Accordingly, I recommend that condition 4.5 of the exhibited draft incorporated document is retained. It should specify that offsets need to be provided prior to native vegetation removal unless written agreement is obtained from the Secretary of DEECA stating it has been demonstrated the removal of native vegetation necessary to enable the use and development of the projects provides for an overall improvement to biodiversity. My recommendations for further hydraulic analysis and updated AOIB reports in the section above will help to address the key residual uncertainties regarding the assessment of overall improvement to biodiversity from each project, and should be considered by the Secretary of DEECA in determining whether to approve the alternative offset arrangement proposed.

I note the concern raised by the SIAC regarding monitoring relating to expected gains against actual gains once the projects are operational. The DEECA submission includes the expectation that the operating plan would "include the objectives, targets and indicators to be used for the monitoring and evaluation of biodiversity". I note that condition 4.5.8(d) of the incorporated document requires the proponent to specify "objectives, targets and indicators to be used for the monitoring and evaluation of biodiversity response in accordance with Clause 4.6, as well as the process for

[34] The alternate offset arrangement referenced here are referring to the proposal to utilise the Conservation Works Exemption process, and are not in accordance with the alternative arrangements for offsets referenced in the 'Guidelines for the removal, destruction or lopping of native vegetation" DELWP 2017

[35] Conservation Work Exemption - Further Guidance (Large and/or Complex Projects) (DELWP Biodiversity Division guidance to VMFRP 2021), as referenced in submission no. 12

preparation, approval and implementation of a Monitoring, Evaluation and Reporting Plan", I recommend that the operating plan and the projects' monitoring, evaluation and reporting plan are reviewed after the further analysis that I have recommended as part of EDSs SW4 and E5 is undertaken to ensure the monitoring program appropriately considers the outcomes of the further analyses conducted.

With my recommended changes, I consider the incorporated document will provide an appropriate safeguard mechanism for decision making on native vegetation removal, and allow decisions to appropriately take into account the findings of the additional analysis to address residual uncertainties regarding the extent of benefits to floodplain vegetation and the AOIB reports. I also note that condition 4.5 of the incorporated document specifies the need to provide information about native vegetation removal which is required by DEECA for reporting and data collection purposes regardless of whether offsets are required or not. The related conditions of the incorporated document are discussed further in Section 5.1.

My assessment in relation to biodiversity offsets under Commonwealth legislation is provided in Appendix A.

Assessment

It is my assessment that construction of the Vinifera and Nyah projects will each result in significant adverse effects on biodiversity and habitat values particularly due to:

- direct clearance of up to 12.84 ha of native vegetation and 147 Large trees for Vinifera, and 14.12 ha of native vegetation and 145 Large trees for Nyah to facilitate construction of the projects, most of which is occurring on land reserved for conservation;
- loss of fauna habitat due to vegetation clearance, including loss of approximately 117 hollow-bearing trees during the construction phase which provide fauna habitat (90 for Vinifera and 27 for Nyah);
- removal of a high number of individuals of threatened flora species protected under the FFG Act for both projects; and
- potential for cumulative impacts on biodiversity values in conjunction with the construction of other proposed VMFRP projects, including for the FFG Act and EPBC Act-listed Regent Parrot.

I support SIAC's recommendations on the relevant EDSs to mitigate and manage these impacts, and I have recommended further amendment to EDSs E1, E2e, E3 and GW2 (see Appendix B) and monitoring requirement M TE7, as well as the addition of EDS E5. I support the SIAC's proposed amendments to EDS E2e to require a hollow replacement plan to be developed for the projects, and have recommended amendments to this EDS to help ensure the plan supports the immediate and short-term welfare of parrots and other hollow-dependent species, including the need to prepare the plan to the satisfaction of DEECA.

I consider the construction of both projects will result in significant adverse impacts on Regent Parrot at the state level due to the proposed removal of potential breeding and foraging habitat (for each project). I have recommended further analysis and mapping of breeding sites, foraging habitat within the broader landscape and movement corridors to inform the further avoidance and minimisation of direct impacts on habitat needed during design and construction. This will also help confirm the likelihood of the habitat impacted by the projects to be used by the species for breeding in the future. Any habitat that cannot be avoided must be offset in accordance with state and federal offset requirements, where relevant. With implementation of the additional mitigation measures recommended by the SIAC and this assessment, I consider that the risks and potential impacts on Regent Parrot can be acceptably managed. The development of the hollow replacement plan will contribute to mitigating impacts on the species.

I consider that the potential impacts on other FFG Act listed species and communities can be acceptably managed via the implementation of the EDSs, as amended by the SIAC and this assessment. Further survey efforts and monitoring may identify the presence of additional threatened species, and that future revisions of related management and monitoring plans for the projects should allow for adaptability to respond to changes to recorded threatened species. I have made recommendations to strengthen the approach to monitoring and adaptive management in relation to these aspects.

Further, it is my assessment that the proponent needs to improve short term biodiversity outcomes for both projects through further avoidance and minimisation of vegetation clearance and other impacts wherever possible, through the detailed design, construction and operational phases of the projects. I have made recommendations in Section 4.2 regarding investigation of opportunities to further avoid and minimise adverse effects (including reducing the removal of large hollow-bearing trees) during the detailed design and construction phases. I also support the recommendations of the SIAC for opportunities to avoid impacts on areas within 30m of the Murray River banks to be further considered, which should be conducted during the detailed design phase.

Consistent with the findings of the SIAC, I consider that both the Vinifera and Nyah projects can result in an overall improvement to terrestrial biodiversity values within their respective maximum inundation areas over the long-term. However, along with the SIAC, I support the need for some further analysis of floodplain hydraulics and its implications for specific floodplain vegetation communities to inform initial operating scenarios and adaptive management. I have also recommended addition of a new EDS (E5) requiring the AOIB reports for both projects (ER Attachments V and VI) to be updated with consideration of:

- outcomes of the further hydraulic analysis and assessment of EVC responses required by SW4;
- site-specific hydrological analyses of EVCs (Tabled Documents 23 and 24), together with *A guide to water regime, salinity ranges and bioregional conservation status of Victorian wetland Ecological Vegetation Classes* (2016, Frood and Papas) and the expert elicitation report (ER Accompanying Document 2); and
- predicted responses of EVCs under the VMFRP (with Basin Plan) scenario and proposed initial operating scenarios.

This will allow the updated AOIB reports to provide a single reference point on the expected overall improvement to biodiversity for the projects, to inform decisions regarding the need for biodiversity offsets and support refinement of initial operating scenarios.

I do not support the recommendation by the SIAC to allow a deferred decision on offset requirements, primarily as it is not consistent with state planning policy and does not allow sufficient clarity regarding offset requirements and their ability to be secured prior to vegetation clearance occurring. I recommend that condition 4.5 of the exhibited draft incorporated document is retained to specify that offsets need to be provided prior to native vegetation removal unless written agreement is obtained from the Secretary of DEECA stating it has been demonstrated the removal of native vegetation necessary to enable the use and development of the projects provides for an overall improvement to biodiversity. It is my assessment that inclusion of this condition in the incorporated document will provide an appropriate safeguard mechanism for decision making on native vegetation removal and the alternative offset arrangement, and allow decisions to appropriately take into account the findings of the additional analyses I have recommended in this assessment.

While the residual effects of the construction of the projects will be significant, it is my overall assessment that these effects on terrestrial biodiversity are acceptable when taking into account the predicted positive effects for these floodplain environments from the projects over the long-term, with the successful implementation of the proposed EDSs and adaptive management (subject to amendments set out in SIAC recommendations and this assessment).

My detailed assessment in relation to all relevant MNES for both projects is provided in Appendix A, which includes consideration of potential effects on terrestrial species listed under the EPBC Act.

6.3 Aquatic ecology

Assessment context

Effects on aquatic ecology are addressed in Chapters 9 and 13 of the ER and in the Ecology - Aquatic specialist study A appended to the ER. Sections 5 and 6 of the SIAC's report discussed their findings in relation to aquatic ecology, with the majority of the SIAC's findings on the issue provided in Section 6.6.

The EMF included 10 EDSs specifically addressing potential effects of Vinifera and Nyah on ecology values and some of these have been the subject of recommendations by the SIAC. Key measures included in the EDSs include preparation of a native flora and fauna management sub-plan (EDS E2). A pest plant and animal monitoring and management plan is also proposed in EDS E3.

As noted by the SIAC, the assessments of aquatic ecology effects for both the Vinifera and Nyah projects were closely aligned. A number of potential impacts of the projects on aquatic biodiversity values were examined through the ER and inquiry process, in particular: loss or degradation of aquatic habitats; effects on threatened aquatic species; pest plant and animal species, including carp; stranding of aquatic species during drawdown; and cumulative effects.

The ER also considered potential benefits of the projects for aquatic ecology and concluded that both of the projects would result in increased hydrological variation and would create large areas of shallow, still and slow flowing waters that favour small bodied native fish including threatened species such as the Murray-Darling Rainbowfish. The ER also stated for both projects that there would be benefits to short-term foraging habitat for medium to large-bodied fish and freshwater turtle species, and that there would be increased breeding habitat for native small-bodied fish, and nursery habitat for large-bodied native fish.

The ER examined the potential impact pathways to threatened aquatic species including the potential for aquatic fauna to become stranded on the floodplain during drawdown and the potential that the operational phase of each project to increase food resources for a range of terrestrial fauna, including foxes. The ER concluded that there is potential for fox abundance to increase as a result of the projects, which could pose a significant risk to turtle populations. The EMF includes monitoring and control measures for both projects to address this potential impact on threatened aquatic species, and a number of these measures have been subject to recommendations by the SIAC as discussed below.

Overall, the ER concluded that both of the projects would increase the extent and condition of potentially suitable habitat for EPBC Act and FFG Act listed threatened aquatic fauna species, as well as for floodplain and wetland flora.

This section provides my assessment of the acceptability of potential impacts on aquatic ecology, which are closely linked to the effects on surface water as discussed in Section 6.1, as well as other impacts on biodiversity as discussed in Section 6.2. Additional detail on my assessment of effects on aquatic species protected under the EPBC Act is also provided in Appendix A of this assessment.

Discussion

Effects on threatened aquatic species

The ER stated that the projects have the potential to impact a number of threatened aquatic fauna listed under the EPBC Act and FFG Act which are considered to be likely or possibly present within the study areas based on desktop assessment (see Table 6-6 below). The ER undertook an assessment of potential impacts on listed species from the construction and operational phases of the projects and developed key mitigation measures to reduce potential impacts on these species.

Table 6-6 Listed threatened aquatic fauna considered likely or possibly occurring in the study areas in the ER.

Species	EPBC Act status	FFG Act status	Presence in project study areas
Broad-Shelled Turtle	-	Endangered	Vinifera (possibly occurring) Nyah (possibly occurring)
Freshwater Catfish	-	Endangered	Vinifera (possibly occurring) Nyah (possibly occurring)

Species	EPBC Act status	FFG Act status	Presence in project study areas
Murray Cod	Vulnerable	Endangered	Vinifera (likely occurring) Nyah (likely occurring)
Murray-Darling Rainbowfish	-	Endangered	Vinifera (possibly occurring) Nyah (likely occurring)
Murray River Turtle	-	Critically endangered	Vinifera (possibly occurring) Nyah (possibly occurring)
Silver Perch	Critically endangered	Endangered	Vinifera (likely occurring) Nyah (likely occurring)

ER specialist study A noted that the study area includes the FFG Act listed Lowland Riverine Fish Community of the Southern Murray-Darling Basin and that a number of species that define that community are likely to occur within the study areas.

The ER identified that the FFG Act listed species Murray-Darling Rainbowfish *Melanotaenia fluviatilis*, Freshwater Catfish *Tandanus tandanus*, Murray River Turtle *Emydura macquarii* and Broad-shelled Turtle *Chelodina expansa* possibly occur within the Vinifera and Nyah study areas, and could be potentially impacted by the projects. Chapters 9 and 13 of the ER identified that the species are generally expected to positively benefit from the operational phase of the projects, through increases in habitat availability and habitat connectivity, and an increase in riparian vegetation for shading and bank stabilisation. The ER noted that the operational phase of both of the projects has the potential to result in impacts to threatened aquatic fauna, noting that Carp pose the greatest risk to wetland ecosystems and both projects would increase the extent of potential habitat for spawning and recruitment of Carp, potentially leading to an increase in local populations. The ER also noted the potential for the projects to lead to anoxic blackwater events which may impact aquatic fauna, and that increased abundances of the Red Fox may result in increased predation on freshwater turtles.

While the ER noted that the FFG listed species Murray Spiny Crayfish *Euastacus armatus* is unlikely to occur in the Vinifera and Nyah project areas, several submitters raised concerns that the operation of the projects would pose a risk to the species through water quality changes and degradation of aquatic habitat. The submission from DEECA states that DEECA does not consider the projects to pose an unacceptable risk or consequence to the State-wide population of any aquatic FFG listed fauna species.

The ER included a range of EDSs for both projects to mitigate potential impacts on aquatic ecology including pest animal control to minimise impacts of turtle predation by foxes (EDS E2d), monitoring of water quality (EDS SW2 and SW3) and mitigation measures to minimise the potential effect that Carp may have on threatened species and their habitat (EDS SW2).

I consider the proposed EDSs are appropriate to manage potential adverse impacts on FFG Act listed species potentially occurring in the area including the Murray-Darling Rainbowfish, Freshwater Catfish, Murray River Turtle and Broad-shelled Turtle. With implementation of the EDSs and monitoring measures proposed, including amendments recommended by the SIAC and this assessment, the potential adverse impacts on these species are acceptable.

The ER also identified that Murray Cod *Maccullochella peelii* (listed as vulnerable under the EPBC Act and as endangered under the FFG Act) and Silver Perch *Bidyanus bidyanus* (listed as critically endangered under the EPBC Act and as endangered under the FFG Act) are both likely to occur in the Vinifera and Nyah project areas, as suitable habitat is present in the Murray River adjacent to the project areas and both species have been regularly recorded upstream and downstream of each area. For both Murray Cod and Silver Perch, the ER stated that these species are unlikely to occur

within any of the smaller ephemeral or intermittent waterways present within the Vinifera project area and are also unlikely to be present within the Parnee Malloo Creek or any of the smaller ephemeral or intermittent wetlands present within the Nyah project area.

The ER found that Murray Cod is unlikely to be significantly impacted by either of the projects. Residual impacts from invasive species such as Carp, pathogens, potential barriers to movement with the construction and operation of the projects, noise, spills and water quality deterioration were not considered to be significant with the implementation of relevant mitigation measures. The ER also found that Silver Perch is unlikely to be significantly impacted by the projects. Residual impacts from Carp, potential barriers to movement with the construction and operation of the projects, spills and water quality deterioration were not considered to be significant with the implementation of relevant mitigation measures. The ER stated that both projects are expected to lead to slight improvements in populations of Murray Cod and Silver Perch due to increased foraging opportunities when the floodplains are inundated, increased food availability and improved habitat quality and connectivity.

With the implementation of the EDSs including amendments recommended by the SIAC and this assessment, I agree with the SIAC that each of the projects individually are unlikely to have a significant adverse impact on Murray Cod and Silver Perch. Cumulative impacts on Murray Cod are discussed further below. My consolidated assessment of the potential impacts of the projects on EPBC Act matters is also provided in Appendix A of this assessment.

Construction impacts

Chapters 9 and 13 of the ER considered a range of potential impacts to aquatic ecosystems from the projects including direct impacts, loss of habitat connectivity, degradation of aquatic habitat, spread of weeds, pest species and pathogens, noise and vibration, and light.

Concerns regarding the impacts of construction works on aquatic ecology were not raised in submissions. The SIAC was satisfied that the proposed fauna salvage protocols under EDS E2c would be appropriate to manage any trapped aquatic fauna during the construction of drop structures and regulators at the Murray River that could require short-term use of cofferdams within the river. In line with the EES Central committee, the SIAC recommended amendment of EDS E2f to specify that, in relation to works requiring coffer-damming, where practical these should be undertaken under no-flow conditions or outside the periods of time when fish migration occurs. I support the recommended changes to EDS E2f to improve avoidance and minimisation of impacts on fish.

The SIAC also examined the risk from construction of the projects to introduce or spread weeds or plant pathogens. The SIAC noted that the final day version of EDSs E2d and E2e provide for biosecurity checks of all vehicles entering the construction footprints, hygiene protocols and monitoring and management of terrestrial and aquatic weeds. Given the high significance residual effect of spread of weeds due to construction, the SIAC considered that accountability for monitoring and management of environmental weeds should be reinforced through conditions of any consent or agreement for the projects made under the *National Parks Act 1975*. The recommended wording for the conditions is presented in Section 5.4 of the SIAC report. I agree with the SIAC that the conditions proposed should be considered by relevant decision-makers when considering any decisions or approvals made under the *National Parks Act 1975*.

I consider that the proposed and amended EDSs and monitoring measures are appropriate to manage construction impacts on aquatic ecology. Erosion and sedimentation from construction activities will need to be carefully managed to minimise risks to aquatic ecology. Further consideration of potential effects on surface water and mitigation measures is provided in Section 6.1 of this assessment.

Operational impacts

Aquatic fauna connectivity

Both the projects have the potential to impede passage of aquatic fauna and result in the loss of connectivity through the construction of key project infrastructure such as regulators and containment banks. The ER noted that the residual effect on connectivity and passage for native aquatic species from the operation of the fishway and regulators is expected to be medium at both Vinifera and Nyah.

The SIAC noted submitter concerns regarding the potential for the construction of structures, including regulators and containment banks to reduce the connectivity of floodplain ecosystems by impeding the passage of aquatic fauna, including fish and turtles. The submissions from FoNVP and Environment Victoria also highlighted the risk of reduced connectivity for native fish, including from stranding during inundation drawdown.

The SIAC highlighted the importance of ensuring the fish are able to exit the maximum inundation area, to help minimise the risk of fish strandings which commonly occur on floodplains, and the importance of the regulators being designed to allow fish to enter the maximum inundation area.

The SIAC noted that the ability of different fish species to pass through the proposed regulators will be strongly influenced by their size and swimming strength, and uncertainties remain as to whether the regulator designs are compatible with fish passage for the range of native species present, particularly in light of the further hydraulic analysis work recommended to be undertaken (as discussed in Section 6.1 of this assessment). To help address this uncertainty, the SIAC recommended addition of a new EDS SW5 to the EMF for both projects which provides the following requirements for the design phase:

- 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; and
- the design of the containment banks and spillways should facilitate turtle passage.

I support this recommendation to help ensure that the detailed design of the regulators provides suitable velocities for the passage of target species of native fish. I also note that this recommendation is consistent with the recommendations of the EES Central committee, as well as my assessment for Belsar-Yungera and Hattah Lakes North.

The monitoring measures proposed for aquatic ecology as part of the exhibited EMF (e.g. M AE1) will be important to help verify the success of the regulator designs in allowing fish passage, to support adaptive management.

Degradation of aquatic habitat

The potential for the operations phase of the projects to result in the degradation of aquatic habitat was considered in the ER, with a focus on potential water quality and water regime changes. The impact pathways assessed were:

- introduction of water to floodplain environment leading to anoxic blackwater events on the floodplains or in receiving waterways that adversely impact aquatic species;
- operation of the projects leading to salinity changes that adversely impact aquatic species;
- operation of the projects leading to changes in geomorphology and aquatic habitat degradation due to increased erosion/sedimentation;
- operation of the projects leading to alteration to the natural flow regimes of rivers and streams, leading to conditions unsuitable for aquatic species; and
- spillage or leaks of toxic substances or litter during refuelling or maintenance of infrastructure such as pumps or from storage facilities entering waterbodies, leading to water quality unsuitable for aquatic species.

Several EDSs were identified for both projects to address the risks of the potential impact pathways including EDS SW2 (Surface Water – Operation) and EDS SW3 (Surface Water – Monitoring, Evaluation and Reporting) which aim to identify and mitigate effects on water quality and potential impacts to biodiversity values. With the implementation of the relevant EDSs, the ER concluded that the significance of the residual effects of the projects related to aquatic habitat degradation from changes to water quality or the water regime are low to insignificant for Vinifera and Nyah.

A number of submitters, including FoNVP and Environment Victoria, were concerned about risks to aquatic ecosystems and biota associated with poor water quality, especially the increased frequency of blackwater events. The SIAC noted submitters' concerns regarding the potential for the operational phase of the project to result in the degradation of aquatic habitat through water quality changes and pose a risk to aquatic fauna, in particular fish and the Murray Crayfish.

The SIAC highlighted in their report that low dissolved oxygen is a significant risk to aquatic fauna and floodplain inundation and will need to be carefully managed to minimise risks. This finding is consistent with my assessment of water quality aspects in Section 6.1. As described in that section, EDS SW2 and monitoring requirement M SW2 were proposed for the projects to assist in managing and monitoring water quality issues relating to low dissolved oxygen and blackwater events. As discussed in that section, the SIAC recommended amendments to EDS SW2 to refine the measures to be applied for reducing the risk of blackwater events, which I support. I am satisfied that these measures are appropriate for the projects and can be used to inform the adaptive management process to assist in minimising the impacts of low dissolved oxygen on aquatic ecology values where possible.

Aquatic pest species

The ER examined the potential effects on Common Carp (Carp), which are present in the Vinifera and Nyah project areas. Carp are considered a significant pest in aquatic ecosystems due to their ability to out-compete native species for habitat and food. They are also known to impact native species directly through egg and larvae/tadpole predation and indirectly through an increase in sedimentation which can smother eggs and impact the gills of native fish. The ER stated that the operation of both of the projects is likely to lead to habitat and water quality conditions suitable for breeding or dispersal of Carp, leading to an increased population on the floodplains or in receiving waterways with a medium significance residual effect at Vinifera and Nyah.

The proposed mitigation measures, including EDS SW2, are intended to minimise the potential effect that Carp may have on threatened species and their habitat. However, the ER noted that even with the implementation of these mitigation measures there is a risk that Carp populations may still increase on the floodplain and in receiving waters such as the Murray River. As noted in ER specialist study A, inundation of the Vinifera-Nyah floodplains during spring and summer would provide ideal conditions for Carp breeding. Given the potential for Carp to negatively affect aquatic ecosystem health if they become established within aquatic habitat, the ER concluded that the significance of the residual effect is medium at both Vinifera and Nyah.

The SIAC noted submitter concerns regarding the potential for the projects to result in increased Carp populations. For example, FoNVP raised concerns that the residual risks of the projects on carp invasion had not been adequately dealt with.

The SIAC noted there is uncertainty in terms of the ability of the Vinifera and Nyah projects to re-establish at least seasonal populations of small-bodied native fish. The SIAC also noted there are uncertainties regarding the effectiveness of the proposed EDSs for managing Carp populations and that Carp will pose an ongoing threat to the achievement of benefits for aquatic ecosystems and would require ongoing active management until effective measures are found. To address these uncertainties, the SIAC found that likely aquatic ecological responses should be clarified for different scenarios and recommended that the EMF include a new monitoring requirement M AE3 for assessing the effects and benefits of floodplain watering for small-bodied native fish and control of Carp. I support the addition of this monitoring requirement to the EMF. The SIAC further recommended that general developments in Carp control measures should be monitored, and the operating plan should be periodically reviewed in relation to any new developments. I support these recommendations which should be referenced in the EMF. Additionally, the SIAC recommended revisions to EDS SW2 to clarify the purpose of the EDS requirement to factor seasonal implications in the timing of filling and drawdown, and timing of inundation events to reduce Carp breeding, which I support.

In relation to EDS E3 'Pest Plant and Animal Monitoring and Management Plan', the SIAC noted that it does not specifically refer to Carp and recommended amendments to EDS E3 to clarify that both aquatic and terrestrial pest species should be covered by the plan, with specific reference to including Carp, Gambusia and Goldfish. I support this recommendation to help ensure the pest plant and animal monitoring and management plan to be prepared considers all relevant pest species.

The SIAC recommended further changes to the EMF including amendment of EDS E3 to encompass consideration of aquatic weeds during operation of the projects, as well as amendment of monitoring requirement M TE3 to require monitoring of aquatic weeds. I support the recommended amendments to EDS E3 and monitoring requirement M TE3 to help ensure aquatic weeds are monitored during operation of the projects.

The SIAC also recommended amending monitoring requirement M AE1 which requires fish surveys of wetlands in the project areas to assess the effects on small-bodied native fish populations, to also require (i) monitoring of the recruitment, seasonal populations and exit of small-bodied native fish and (ii) monitoring of pest species to inform adaptive management. I support the recommended amendments to monitoring requirement M AE1 to help ensure that the management and monitoring program appropriately considers native and pest species.

In line with the recommendations of the EES Central committee, the SIAC recommended that fish strandings are monitored under a new monitoring requirement M AE7. I support this recommendation to add monitoring requirement M AE7 to the EMF so that the monitoring results can be used to inform operational practices through the adaptive management process.

In relation to aquatic weeds, the SIAC highlighted the finding of ER specialist study A that the managed inundation scenarios proposed would greatly increase the extent and quality of potential habitat suitable for aquatic weed species for the Vinifera project. A similar risk would also occur for Nyah. The key measure proposed for mitigation of aquatic weed issues for the projects is EDS E3, which requires the development and implementation of a pest plant and animal monitoring and management plan. The scope of this plan would include specification of monitoring as well as contingency measures.

The SIAC concluded that aquatic weeds or excessive dominance of native macrophytes would need to be monitored and appropriate responses put in place including land management measures. I agree with this conclusion and consider the proposed final day EDSs and monitoring measures, incorporating amendments proposed by the SIAC, will be appropriate to address this issue.

Cumulative effects on aquatic ecology

The ER considered the potential cumulative effects related to aquatic ecology with the implementation of all VMFRP projects. The following effect pathways were identified in ER specialist study A Ecology – Aquatic and specialist study C Surface Water:

- loss of connectivity and impeded passage for native aquatic species;
- drawing down wetlands strands aquatic species on the floodplains;
- spread of weeds, pest species or pathogens;
- changes in the Murray River flow that could impact river users and environmental values as a result of delivering environmental water to multiple sites; and
- impacts on Murray River water quality due to construction of multiple sites at the same time or during operation due to poor quality of water.

The ER concluded that most of the effect pathways were unlikely to result in significant cumulative impacts, however noted that there was potential for the projects to result in increased numbers of invasive terrestrial fauna in the Vinifera and Nyah project areas and considered it possible that this increase in terrestrial pest species could result in a cumulative adverse effect within the Murray Darling Basin.

Submissions from FoNVP and Environment Victoria raised concerns about the cumulative impacts of the VMFRP projects on aquatic ecology, with specific reference to the potential for cumulative salinity impacts.

The SIAC report discussed the potential for cumulative impacts on the proliferation of Carp from managed inundation. As discussed above, the SIAC considered Carp as an ongoing threat to aquatic ecosystems which would require ongoing active management. However, the SIAC considered it would not be a sufficiently serious risk, in terms of cumulative impacts, for the projects to be unacceptable. The SIAC concluded that Carp would be a risk to the feasibility of restoring small-bodied native fish populations as a result of the projects, but the projects should not have a significant, adverse cumulative impact on Carp proliferation. I agree with this conclusion.

Cumulative effects of the Vinifera and Nyah projects in relation to the other seven proposed VMFRP projects, the New South Wales Sustainable Diversion Limit Adjustment Mechanism projects, and The Living Murray projects at Gunbower Forest, Hattah Lakes and Chowilla on Murray Cod were assessed in ER Accompanying Document 1. This report concluded there are unlikely to be cumulative adverse effects on Murray Cod. Based on the information provided in the ER Central documentation I support the view that the Vinifera and Nyah projects are unlikely to have significant impacts on this species when considered individually, however I note that under the National Recovery Plan for the Murray Cod[36], low level impacts to Murray Cod which may be deemed to be insignificant on their own can be considered significant when the impacts are viewed cumulatively.

The Recovery Plan notes that the cumulative impact of many small or low risk threats, including changes to water quality or fish kills, can pose significant impacts to the species. The SIAC concluded that potential fish strandings should be monitored as well as the monitoring of fish populations, and recommended the inclusion of the monitoring requirement M AE7 which was included in the Ministers Assessment for Belsar-Yungera and Hattah Lakes North. In the assessment for Belsar-Yungera and Hattah Lakes North, this measure required the monitoring and reporting on native fish stranding events from managed inundation events, to enable the identification of any recurrent strandings and the implementation of management measures included within EDS SW2. I support the inclusion of this measure for Vinifera and Nyah as well, and recommend that M AE1 is updated to require monitoring for medium- and large-bodied native fish within the Murray River and in any sites within the project areas which may support the species. The results of this monitoring should be considered in developing the seasonal operating plans as outlined in EDS SW2, and updating mitigation measures as part of the adaptive management process.

Provided that the proposed EDSs and monitoring requirements are implemented, including amendments recommended by the SIAC and this assessment, I consider the potential cumulative impacts on aquatic biodiversity, including for the Murray Cod, can be managed acceptably. Further consideration of cumulative impacts in relation to fish species protected under the EPBC Act is provided in Appendix A.

Assessment

It is my assessment for both projects that the adverse effects on aquatic values associated with the projects can be acceptably managed with the implementation of the proposed EDSs and monitoring measures, including amendments recommended by the SIAC and this assessment.

I support the proposed amendments to the EMF proposed by the SIAC, as outlined below:

- Revision of EDS E2f to specify that in relation to works requiring coffer-damming, where practical, these should be undertaken under no-flow conditions or outside the periods of time when fish migration occurs.
- Addition of EDS SW5 to specify that (i) the design of the regulators should ensure suitable flow velocities are provided to enable the passage of all target species of native fish to the extent reasonably practicable and that (ii) the design of the containment banks and spillways should facilitate turtle passage.
- Addition of monitoring requirement M AE3 to assess the effects and benefits of floodplain watering for small-bodied native fish and control of Carp.
- Revision of EDS SW2 to clarify the purpose of the requirement to factor seasonal implications in the timing of filling and drawdown, and timing of inundation events to reduce Carp breeding.
- Revision of EDS E3 to clarify that both aquatic and terrestrial pest species should be covered by the pest plant and animal monitoring and management plan, with specific reference to including Carp, Gambusia and Goldfish.
- Revision of EDS E3 to encompass the consideration of aquatic weeds during operation of the projects
- Revision of monitoring requirement M TE3 to require monitoring of aquatic weeds.

2. Clunie and Koehn (2010) National Recovery Plan for the Murray Cod *Maccullochella peelii peelii*[36]. Department of Sustainability and Environment.

- Revision of monitoring requirement M AE1 to require (i) monitoring of the recruitment, seasonal populations and exit of small-bodied native fish and (ii) monitoring of pest species to inform adaptive management.
- Addition of monitoring requirement M AE7 to require monitoring of fish strandings.

The proposed amendments will assist in strengthening the ability of adaptive management processes to respond to issues potentially affecting native fish and other aquatic species. Managing the impacts on aquatic ecology will be highly dependent on the success of measures implemented to manage risks to water quality during both construction and operations, which I have discussed further in Section 6.1 of this assessment.

The Vinifera and Nyah projects may result in increased proliferation of Carp, however, with implementation of the proposed measures to manage and monitor Carp populations, in line with the SIAC I consider these effects acceptable. The development of a robust pest plant and animal monitoring and management plan covering Carp and other pest aquatic species will be important, given the potential for Carp to adversely impact on native aquatic species. Monitoring and data analysis for measures related to Carp will be critical during project implementation so any issues can be rapidly responded to via adaptive management processes.

Overall, potential impacts on FFG Act listed aquatic fauna will be acceptable. My assessment of threatened aquatic species listed under the EPBC Act (Murray Cod and Silver Perch) is provided in Appendix A.

6.4 Aboriginal cultural heritage

Assessment context

Effects on Aboriginal cultural heritage are addressed in the ER within Chapters 11 and 15 of the main report, as well as in the Aboriginal Cultural Heritage specialist study F, appended to the environment report and in Section 8 of the SIAC report.

The projects are located in areas where Traditional Owners and interested parties and/or organisations have not been formally recognised under relevant legislation, either as a Registered Aboriginal Party (RAP) or through a Recognition Settlement Agreement. Traditional Owner groups identified by the proponent in the environment report as having an interest in the lands for which the Vinifera and Nyah projects are located include Dadi Dadi Weki Weki Aboriginal Corporation, Tati Tati Aboriginal Corporation, Tati Tati Land and Water Indigenous Corporation, Wadi Wadi Land and Water Indigenous Corporation and Wadi Wadi Wemba Wamba Barapa Barapa First Nations Aboriginal Corporation.

The projects are located within the greater Murray Basin, which is a highly sensitive region for Aboriginal cultural heritage. The areas where the project sites are located are complex and rich in Aboriginal cultural heritage. Aboriginal place types common to the greater geographic region that are present in the project areas are scarred trees, earth features, shell middens and ancestral remains. The ER's analysis of Aboriginal place patterning across the greater Murray Basin identified that the Aboriginal cultural heritage (excluding scarred trees) within the geographic region is more likely to occur on higher drier landforms within the greater floodplain rather than the low-lying floodplain.

The ER stated that the assessment of effects on Aboriginal cultural heritage was informed by consultation with Traditional Owner groups and interested parties. Two CHMPs for the construction phase are currently in preparation and will require approval prior to the projects proceeding (refer to Section 3.3): Vinifera CHMP No. 16901 and Nyah CHMP No. 16900.

The 'activity area' for these CHMPs generally correlates with the construction footprint and does not cover the proposed maximum inundation area (except where the construction footprint overlaps with the maximum inundation area). Therefore, effects on Aboriginal cultural heritage from operation of the projects (i.e. inundation, watering) are not fully mitigated through the two draft CHMPs. As such, obligations under the Aboriginal Heritage Act (see Section 3.3) for effects from operations would need to be addressed separate to the CHMPs.

The ER identified the following potential adverse effects of project construction on Aboriginal cultural heritage:

- permanent damage or removal of heritage, such as stone artefacts, earth features (hearths and mounds), shell middens (both surface and subsurface deposits), scarred trees and ancestral remains; and
- impact to the root protection zone of scarred trees which could kill live trees or destabilise dead standing trees.

Specifically, the construction of the projects would have direct impacts on:

- 3 Aboriginal cultural heritage components within the Vinifera construction footprint (i.e. two earth features and one cultural place); and
- 7 Aboriginal cultural heritage components within the Nyah construction footprint (i.e. four earth features and three scarred trees).

Impact pathways identified during the operation of the projects that may result in direct and indirect adverse effects on Aboriginal cultural heritage (including ancestral remains) include: (i) erosion and sedimentation, (ii) increased water availability and fluctuations in moisture content, (iii) altered pest animal activity, and (iv) changes in visitation and tourism activities.

The ER documented an extensive process that was undertaken to assess alternatives to project design to avoid and minimise impacts during the construction of the projects, including to Aboriginal cultural heritage values, particularly where there were known or suspected sites of ancestral remains. Discussion of the assessment of alternatives is provided in Section 4.2.

The environment report proposed three specific EDSs to manage adverse effects on Aboriginal cultural heritage (ACH1 to ACH3). These EDSs would manage cultural heritage impacts during construction and operation through compliance with the CHMPs (ACH1), continued engagement with traditional owners (ACH2) and processes for management and monitoring of risks in operation through Environmental Watering Management Plans, Watering Proposals and Delivery Plans (ACH3). Other relevant EDSs to assist in managing effects on Aboriginal cultural heritage included E3, GS1 to GS3, and SW1 to SW3.

Discussion

The assessment of effects in the ER was informed by the desktop and standard assessments undertaken for the CHMPs, which focused on the construction footprint. The nature, extent and significance of effects was inferred for areas not subject to field assessment, which included the majority of the maximum inundation area. To inform the specialist study, an inundation assessment was undertaken to identify the potential for Aboriginal cultural heritage values within the maximum inundation area and assess the nature and magnitude of potential direct and indirect effects of inundation.

The ER assessed the significance of residual effects on Aboriginal cultural heritage places during construction and operations as low, but noted that any impact on Ancestral remains during construction or operation of the project would be of extreme significance. The ER stated that the likelihood of impacts occurring to Ancestral remains during construction was rare with a high degree of confidence. This conclusion was due to both extensive fieldwork conducted and consultation with Traditional Owners to identify both potential and actual locations of Ancestral remains in areas of proposed construction. Any locations identified were treated as ‘no-go zones’ and have been avoided by project design.

The ER identified that there is potential for adverse effects to Ancestral remains from pests or overabundant native species or human activity during operation. The ER proposed EDS ACH3 and M ACH1 to M ACH3 to monitor and manage potential impacts to Ancestral remains as a result of pest animal and visitor activity. Under the Aboriginal Heritage Act any impact to Ancestral remains is unacceptable and therefore residual risk of such effects should be eliminated or mitigated regardless of its likelihood.

Management of potential impacts to Aboriginal cultural heritage, particularly ancestral remains, as a result of altered pest activity during operations is dependent on the implementation of a Pest Plant and Animal Monitoring and Management Plan as detailed in EDS E3 (which is linked to ACH3). As discussed in Section 4 and 6.2, the provision of adequate funding and resourcing in relation to monitoring and adaptive management is key to the management of these residual effects.

A number of submitters raised the issue of Aboriginal cultural heritage, although most submissions were focussed on the adequacy of Traditional Owner engagement. FoNVP highlighted the importance of the floodplain for Aboriginal cultural heritage and raised that there is a significant lack of knowledge about Aboriginal cultural heritage in the project areas and it is likely that some significant sites remain unreported.

The SIAC was satisfied that effects on Aboriginal cultural heritage values were appropriately assessed in the ER, and that the EMF and CHMPs will provide appropriate mechanisms to manage residual risks. The SIAC was supportive of the specific EDSs proposed to manage adverse effects on Aboriginal cultural heritage (ACH1 to ACH3) and the SIAC did not recommend any amendments to these measures. Along with the SIAC, I agree that the proposed EDSs ACH1 to ACH3 are appropriate.

The ER found that the likelihood of impacts occurring to Ancestral remains during operations as a result of erosion, moisture content and water availability was low because landforms considered to have potential for this place type are located on high sand dunes and lunettes. These are not located inside the maximum inundation area. Thirty-six previously recorded Aboriginal places were identified within the Vinifera maximum inundation area and 55 Aboriginal places were identified within the Nyah maximum inundation area. These included earth features (such as mounds), scarred trees and shell middens. Previously recorded Aboriginal places comprising Ancestral remains components were also identified within 50 m of both the Vinifera and Nyah maximum inundation areas. During the standard assessment conducted as part of the CHMP preparation, previously recorded Aboriginal places were inspected to gather further information and confirm spatial data accuracy. These inspections noted that some Aboriginal places, including areas of Ancestral remains, plotted outside the maximum inundation area actually extended into the maximum inundation area. A large portion of the Aboriginal places previously recorded within the maximum inundation areas are mounds. These features are of high sensitivity and can have the potential to contain Ancestral remains.

As discussed in Sections 6.1, 6.2 and 6.5 the SIAC recommended the addition of EDS SW4 and revisions to EDS GS1 to require further hydraulic analysis to inform floodplain vegetation assessment and the minimisation of erosion and sedimentation through design and operation. The assessment of effects on Ancestral remains during operation in the ER relied on hydrological and geomorphological modelling to identify heightened risk of erosion and hydrological change, to determine the likelihood of the residual effects to Aboriginal cultural heritage and Ancestral remains. The assessment also relied on inferred nature, extent and significance of values across the maximum inundation areas based on the extrapolation of previously recorded sites and modelled landforms. While this assessment is reasonable, it does not sufficiently take account of the uncertainties discussed above (particularly with regard to spatial accuracy of previously recorded sites and mapping of landforms). Therefore, I recommend a new EDS (ACH4) to mitigate residual risk to Aboriginal heritage associated with operations, particularly for Ancestral remains. This recommended EDS (ACH4) requires an update to the assessment of residual effects associated with inundation, based on the outcomes of the further hydraulic analysis, erosion and sedimentation required by EDS SW4 and EDS GS1. This 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.

The potential for some benefits to Aboriginal cultural heritage values were also noted in the ER. These benefits include potential reduction in erosion through watering of dryer parts of the floodplain, that would otherwise see erosion expose and potentially distribute archaeological sites across the landscape. The ER also concludes that watering would improve the health and therefore lifespan of living scar trees.

Realisation of the expected ecological improvements to the project areas are also considered as benefits to the cultural heritage values (tangible and intangible) of these floodplain environments, although as noted earlier in this assessment, this is dependent on sustained, effective environmental watering proposed during the operational phase of the project. Achievement of benefits will also be dependent on appropriate management of environmental effects during construction and operation of the project, consistent with my recommendations contained within this assessment. I note that the ER did not specify the expected timeframe for achievement of benefits, instead stating that it would be in the “long-term”. My assessment of project benefits is further discussed in Section 4.1.

I support the SIACs findings in relation to project construction and am satisfied that CHMPs 16900 and 16901 will be subject to the requirements and approval of First Peoples-State Relations, before construction of the projects. However, I

note that the two CHMPs in preparation only cover construction and do not cover the operations phase of the project. Effects and mitigation of effects associated with the operation of the projects will need to be addressed, in the context of obligations under the Aboriginal Heritage Act. This may require further CHMPs or cultural heritage permits to be prepared and approved. The approach to meeting obligations under the Aboriginal Heritage Act will need to be determined in consultation with First Peoples-State Relations and should be informed by the outcomes of the updated assessment recommended (EDS ACH4). In conjunction with the EDSs proposed in the EMF including amendments recommended by this assessment, I consider that these mechanisms will be appropriate to ensure environmental effects associated with Aboriginal cultural heritage, including ancestral remains, will be able to be acceptably managed during operations.

Traditional owner engagement

One of the VMFRP project objectives is to facilitate Traditional Owner aspirations for restoration of floodplain ecosystems by:

- engaging and collaborating with Traditional Owners to integrate their knowledge into the planning, delivery and evaluation of VMFRP; and
- creating opportunities for enhancing and sharing cultural connections to Country.

No submissions were received from Traditional Owner groups during exhibition of the ER. A number of submitters from other parties raised concern regarding Traditional Owner engagement. Prior to the roundtable, the SIAC sought the assistance of the proponent and Mallee CMA to invite Traditional Owner groups to participate in the roundtable. Traditional Owners were in attendance for most days of the roundtable either observing or as participants. A session was also held on day 5 of the roundtable specifically for Traditional Owners to attend to discuss First Peoples' issues and concerns with the projects. A brief confidential session on Aboriginal cultural heritage was also held with one person on request.

The SIAC acknowledged the complexity in consulting with Traditional Owner groups and interested parties in the absence of a RAP, due to the need to engage multiple Traditional Owner groups who may have differing perspectives or views. During the roundtable session it was raised that during the preparation of the ER and CHMPs some Traditional Owners chose to be involved in consultation and others did not, and some criticised the level of consultation undertaken, suggesting they were not contacted. Some Traditional Owners also noted that their involvement in consultation did not mean they supported the projects.

The proponent outlined the ongoing involvement Traditional Owners have had in the development of the projects, preparation of the ER and investigations for the CHMPs, and noted that this involvement is planned to continue during detailed design, construction and operation. Based on the proposed measures for ongoing engagement outlined in the EMF, the SIAC was satisfied that Traditional Owners will have a continuing role in the development of the projects.

The SIAC was satisfied that Traditional Owners have had opportunities to be involved in the ER and CHMP processes. I agree with this finding. I strongly endorse the continued engagement of Traditional Owners through detailed design, construction and operation, and am comfortable that the EMF provides the appropriate framework for this. I note that the EMF requires the Project Control Group (Operation) include an Independent Advisor in relation to Traditional Owner engagement and project management, which I support to help facilitate this ongoing engagement.

Assessment

It is my assessment for both projects that:

- While the construction of the projects will result in direct impacts on a number of recorded Aboriginal heritage sites within a highly sensitive cultural landscape, the effects on Aboriginal cultural heritage values from construction of the projects can be acceptably managed through the implementation of the proposed EDSs, which include preparation and approval of a CHMP for each project.
- The management and mitigation of effects on Aboriginal cultural heritage during operations will need to be in accordance with the proponent's obligations under the Aboriginal Heritage Act, which may require further CHMPs or cultural heritage permits (subject to outcomes of further consultations with First Peoples-State Relations).

- Implementation of the projects is likely to result in benefits to Aboriginal cultural heritage values associated with these floodplain environments. However, achievement of these benefits will be dependent on the appropriate management of effects during construction and operation of the projects, for which I have made recommendations throughout this assessment.
- Active engagement with Traditional Owners and interested parties should continue during project approvals, detailed design, construction and operation; the EMF will provide an appropriate mechanism to ensure continued engagement with Traditional Owners, in addition to their further involvement in the CHMP processes for the two projects.
- A new EDS (ACH4) is needed, to require review and update of the assessment of residual effects on Aboriginal cultural heritage associated with inundation, based on the outcomes of the further hydraulic analysis required by EDS SW4 and EDS GS1 (see sections 6.1, 6.2 and 6.5). This 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.
- The outcomes of the further assessment conducted for ACH4 should inform consultation with First Peoples-State Relations regarding approval requirements and conditions to satisfy obligations under the Aboriginal Heritage Act for the operational phase of the projects.

6.5 Soils and land stability

Assessment context

Effects on soils are addressed in the ER within Chapters 10 (Vinifera) and 14 (Nyah) of the main report, as well as in the Geology, Soils and Contamination specialist study E appended to the ER. Soils and land stability issues were considered in Section 4 of the SIAC report.

The ER stated that the Vinifera and Nyah project areas are predominantly underlain by verosols, a soil type sensitive to erosion, shrink and swell when subject to moisture change, which can affect rates of groundwater recharge and lead to deep cracks. Verosols may also present areas of weakness within the soil, which may impact stability during excavation. Other soil types present in minor areas include sodosols, which are sensitive to gullying, tunnel erosion and dispersion if the overlying soil is removed or if surface runoff is poorly managed. The ER explained that, based on the soil types present across the Vinifera and Nyah project areas, there is potential for site-wide erodible, structurally unstable, dispersive, saline and reactive soils, with associated sedimentation.

The ER noted that, for Vinifera, localised areas of the construction footprint and maximum inundation area were identified as a having a high probability of presenting acid sulfate soils. For Nyah, a high probability for acid sulfate soils was identified for areas along the eastern border of the construction footprint and maximum inundation area, adjacent to the Murray River.

The ER explained that it is expected that operation of Vinifera and Nyah would improve soil structure in the project areas and the ability of soils to support vegetation. This would reduce soil erodibility, which would avoid and minimise processes contributing to land degradation, such as erosion.

The ER analysed potential adverse effects of the projects on soils, which were consistent between the two projects. For construction, the ER identified the following impact pathways:

- excavation, stockpiling, transport, use and/or disposal of contaminated material or acid sulfate soils leading to potential effects on human health and the environment; and
- potential effect of construction activities on landform stability or soils.

For operation, the ER identified the following impact pathways:

- potential contamination, migration of contaminated material or formation and mobilisation of acid sulfate soils during managed inundation events; and

- potential effect of managed inundation events on landform stability or soils.

For both Vinifera and Nyah, the ER proposed eight specific EDSs to manage the adverse effects related to soils (CM1a, CM1b, CM1c, CM2, CM3, GS1, GS2 and GS3) and one monitoring requirement (M GSC1). The ER concluded that with the implementation of the proposed EDSs and monitoring, the significance of the residual adverse effects related to soils is insignificant to low for both projects.

Discussion

The SIAC considered that the key issues associated with soils relate to erosion and land stability, the potential for acid sulfate soils as well as potential for soil contamination. The ER examined the potential for erosion due to operation of the projects and determined that it is expected to be similar at most of the modelled locations, except downstream the V2 regulator (Vinifera) and N2 and N5 regulators (Nyah), where unmitigated release of water from the floodplains back to the Murray River following a managed inundation event would increase the potential for erosion.

The SIAC noted that the geomorphic setting and varying soil conditions influence erosion risks and other soil-related issues. The SIAC referred to description of the geomorphic context of the Vinifera and Nyah floodplains contained in the ER, which identified that the Vinifera and Nyah floodplains consist of deposits from past meanders of the Murray River and anabranches. The ER noted that the current channel of the Murray River continues to shift as it erodes its banks and deposits sediments, although the current channel alignment at the project areas is relatively stable. The ER identified the potential for seepage from ponding behind containment banks contributing to bank erosion and proposed this risk would be considered during detailed design of containment banks under EDS GS1 and monitored in accordance with EDS GS3.

The SIAC identified that the Geology, Soils and Contamination specialist study E appended to the ER gave more weight to the risk of riverbank failure due to Murray River meander migration and the potential of this to affect project infrastructure such as drop structures and containment banks. The SIAC also identified that the Surface Water specialist study C appended to the ER drew on the outputs of the hydraulic modelling (refer to discussion in Section 6.1) in relation to erosion risk. The study concluded that, where velocities and shear stress values approach critical thresholds, further modelling would be required at the design stage to mitigate against any risks associated with operational procedures, and that a full assessment of risks associated with the regulator operation and opening procedures should be conducted.

During the roundtable, FoNVP submitted concerns that the location of some proposed infrastructure such as turning circles and hard stops (as part of access tracks works) might exacerbate existing bank erosion in the Murray River. As part of the SIAC process, the SIAC also inspected key project infrastructure locations for Nyah and Vinifera.

Based on the ER, discussion at the roundtable and site inspection, the SIAC identified risks and uncertainties regarding soil erosion or other land instability during project construction and operation. One identified risk relates to inadequate design, construction or maintenance of the regulator or drop structures, or sections of the containment banks in the vicinity of the river, leading to undercutting or seepage erosion and eventual structural failure. The SIAC considered this risk was partially addressed in the ER specialist studies C and E. The proponent also responded to questions from the SIAC indicating the requirement under EDS GS3 for the operation and maintenance plan considers monitoring and responding to erosion risks affecting infrastructure. With consideration of the EDSs proposed, the SIAC accepted that erosion risk at infrastructure locations should be able to be mitigated through design and operation. I support this finding.

The SIAC considered that uncertainties remain in terms of the hydraulic performance of the proposed infrastructure and the longer-term risk of erosion of the river channel and intersecting creeks and flood runners. During its site inspection, the SIAC observed numerous instances of erosion in the vicinity of project infrastructure for Vinifera and Nyah, as well as at the exit of several flood runners to the river in the vicinity of proposed containment banks. The SIAC concluded that erosion risks require further investigation at the N2 regulator (Nyah) given the high flow velocities identified in specialist study C and that more detailed hydraulic modelling is required more generally. I support this finding.

As discussed in Section 6.1 of this assessment, the SIAC reached the same conclusion as the EES Central committee that further detailed modelling of hydraulic effects for the projects is needed under EDS SW4. The SIAC adopted the same recommendation from the EES Central committee that an hourly time-step (rather than daily) for the initial release

of water from regulators should be used to better examine the peak velocities and shear stresses during this higher-risk period of operation. I agree with this rationale and support this recommendation.

The SIAC also recommended revisions to EDS GS1, which relates to the minimisation of erosion and sedimentation through design. In line with the EES Central committee, the SIAC recommended changes to link EDS GS1 to the hydraulic analysis required under EDS SW4 and to specify that design of the projects should have regard to the hydraulic effects of the projects on erosion, sedimentation and related risks. The SIAC recommended further changes to EDS GS1 to clarify that, in addition to the analysis required under EDS SW4, a hydraulic analysis of floodplain erosion risks should be undertaken to inform project design and implementation. The SIAC specified that this analysis should be undertaken:

- by using a hydraulic model that has been calibrated to reflect local conditions and that is suitably scaled to inform the detailed project design;
- to identify flow depths, velocities and bed shear stresses that could affect the proposed infrastructure and its intended 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; and
- to assess the risks that are associated with the hydraulic performance of the project construction and operation and provide for their mitigation.

The SIAC detailed that the recommended analysis of floodplain erosion risks should involve:

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

I support the changes to EDS GS1 recommended by the SIAC to clarify approach to conducting hydraulic analysis of floodplain erosion risks and consider this additional analysis will be useful to inform project design and implementation.

The SIAC also recommended revisions to EDS GS3 and monitoring requirement M GSC1 in line with the changes recommended by the EES Central committee to monitor bank and bed erosion within the waterways connecting the Vinifera and Nyah project areas to the Murray River. I support these recommended revisions to assist in informing adaptive management of bank and bed erosion.

Given the significance and location of the proposed works on and near the Murray River, the SIAC considered that a direct accountability for robust assessment, design, construction, operation and maintenance of the project works may be appropriate under the conditions of approval for a licence for works on a waterway under section 67 of the *Water Act 1989*. The recommended wording for the condition or conditions is presented in Section 4.2 of the SIAC report. I agree with the SIAC that the conditions proposed should be considered by relevant decision-makers when considering any approvals required under the *Water Act 1989*, such as for works on waterways permits.

As with all construction projects involving substantial soil disturbance and movement, risks associated with erosion and sedimentation will need to be carefully managed. Monitoring of turbidity of waterways downstream of construction areas and regular inspection of erosion and sediment control measures as proposed under monitoring requirements M SW1 and AI GSC2 will be important to verify the efficacy of the site controls implemented, and inform the need to adapt mitigation measures if required.

The SIAC also examined other soil-related effects, including the potential for acid sulfate soils and soil contamination. The ER identified a high probability of occurrence of acid sulfate soils at several localised areas of the construction footprints for both projects. A number of EDSs were proposed in the EMF, including CM2 and GW1, to mitigate and manage the potential for acid sulfate soils. The ER also identified that some soil contamination from past agricultural activity could be present at the Vinifera project area. The ER proposed several EDSs to mitigate the risk of contamination, including CM1a, CM1b, CM1c, CM2, GW1, SW1 and RU1. The final day version of EDS CM1a included amendments recommended by EPA in their submission to address procedures and requirements for management of contaminated land and storage of chemicals and fuels. I support these amendments.

Submissions by EPA and FoNVP also addressed soil contamination risks. FoNVP raised concerns that importation of soil could pose biosecurity risk to the area. The proponent noted that soil would be re-used where possible, and that material sourced from borrow pits would be managed in accordance with the EMF.

The SIAC concluded that risks related to soil contamination, acid sulfate soils and other soil hazards can be adequately managed during both construction and operation, subject to some refinement of relevant EDSs. The SIAC recommended minor revisions to EDSs CM1c, CM2 and GS1 to better guide the identification and characterisation of risk factors like acid sulfate soils and dispersive soils. I support the revisions to EDSs CM1c, CM2 and GS1 recommended by the SIAC.

Assessment

It is my assessment for both projects that the adverse effects on soils associated with the projects are expected to be low and can be acceptably managed with the implementation of the revised EDSs GS1, GS3, CM1c and CM2, and revised monitoring requirement M GSC1, as recommended by the SIAC and supported by me.

I support the changes to the EMF recommended by the SIAC, as outlined below:

- Revision of EDS GS1 to specify that design of the projects should have regard to the hydraulic effects of the projects on erosion, sedimentation and related risks, and to specify the hydraulic analysis of floodplain erosion risks that should be undertaken to inform project design and implementation.
- Revision of EDS GS3 and monitoring requirement M GSC1 to specify monitoring of bank and bed erosion within the waterways connecting the Vinifera and Nyah project areas to the Murray River to inform adaptive management.
- Revision of EDS CM1c, CM2 and GS1 to better guide the identification and characterisation of soil risk factors including acid sulfate soils and dispersive soils.

6.6 Other social and environmental impacts

As noted in the conditions issued by the Minister for Planning in the decisions to require an ER (in lieu of an EES), as well as in the scope for the ER, the ER was to largely focus on the potentially significant effects of the projects related to floodplain restoration to enhance ecosystem function, biodiversity, water quality and Aboriginal cultural heritage values. The ER also considered historic heritage issues in Chapters 11 (Vinifera) and 15 (Nyah) of the main report, as well as in the Historic Heritage specialist study G appended to the ER.

The main report of the ER did not cover land use and agriculture, air quality, bushfire, landscape and visual, noise and vibration, social and business, or traffic and transport issues in detail as these were not included in the required scope of the ER. However, air quality, bushfire, landscape and visual, noise and vibration, social and business, and traffic and transport issues were covered by specialist studies H, I, J, K, L and M appended to the ER. Land use and agriculture issues were covered in the strategic assessment report for the draft PSA attached to the ER.

The SIAC report discussed historic heritage effects of the projects in Section 9.1 and social and business effects in Section 9.2 of the SIAC report. In relation to land use and agriculture, air quality, bushfire, landscape and visual, noise and vibration, and traffic and transport issues, the SIAC concluded that these issues can be managed through the incorporated document, EMF and other project approvals, and they were not addressed in detail in the SIAC report.

Table 6-7 outlines the findings and SIAC's recommendations on these other environmental and social issues not covered by the preceding sections of this report, and provides my assessment on those issues.

Generally, I support the findings of the ER and SIAC in relation to these issues. It is my assessment that these effects are indeed localised and can be effectively managed through well-established practices including mitigation measures that would be given statutory effect through the EMF, conditions of approval and associated management plans. I have made some additional recommendations to strengthen the EDSs and monitoring requirements for some aspects.

Table 6-7 Assessment of other social and environmental effects.

Findings and SIAC recommendations	Assessment
Historic heritage Potential impacts on historic heritage values were discussed in ER Chapters 11 (Vinifera) and 15 (Nyah), as well as specialist study G. The ER outlines the potential impacts of the Vinifera project on historic heritage values including direct impacts on part of one Heritage Overlay site in the Swan Hill Planning Scheme; the HO186 - the Takasuka Levee Bank. In Nyah, a number of heritage overlay sites were identified as being just outside the project area but not expected to be affected by the project. The exhibited EMF included two proposed EDSs to mitigate potential impacts on historic heritage during construction and operations for both projects: HH1 and HH2. Proposed monitoring requirements for historic heritage are also set out in the EMF (AI HH1 – AI HH4). The ER concluded that the residual effects of the Vinifera project on the Takasuka Levee Bank would be of low significance for construction and operation after the application of mitigation measures. The ER also noted that the projects have the potential to encounter unrecorded historic heritage sites or artefacts. Both EDS HH1 and HH2 include proposed development of 'unexpected finds' protocols. Historic heritage was not raised in any of the submissions. The SIAC found that the assessment of historical heritage in the ER and proposed EDSs are appropriate for the projects. In addition to the EDSs proposed, the SIAC recommended the incorporated document wording should be modified to include the photographic recording of any structures to be modified or removed, to ensure any original areas of the Takasuka Levee Bank disturbed are recorded.	I support the SIAC's findings that the historic heritage effects of both projects will be low and can be managed acceptably with the implementation of the proposed EDSs, subject to the SIAC's amendments. I further recommend that the monitoring program include monitoring of compliance with conditions issued as part of any consents provided for the projects under the *Heritage Act 2017.*
Social and business Potential effects on social and business values were discussed in ER Chapter 3 (in relation to project benefits), as well as specialist study L. The ER outlines the potential impacts of the construction phase for the projects include: • temporary reduction in amenity for visitors including from noise, dust, and lighting; • temporary impacts including impeded access on nature based recreational activities including bushwalking, birdwatching, fishing,	I support the finding of the SIAC that the proposed EDSs are appropriate to address the social and business impacts of the projects. I consider that social and business impacts can be managed acceptably with the implementation of the proposed EDSs.

Findings and SIAC recommendations	Assessment
camping, 4WD driving and trail bike riding and in water activities (Vinifera only); • temporary impact on business licence holders such as apiarists. Potential impacts of the projects during the operations phase include: • diminishment of the nature based experience for recreational users from the presence of infrastructure in the forest; • reduced access for recreational use due to increased inundation events; • periodic disruptions to business licence holders due to inundation events; and • perceived impacts on businesses due to impacts related to increased inundation events (reduced accessibility and potential related reduced visitation to region). A range of potential social and business benefits of the projects were also outlined in the ER including: • direct and indirect employment; • flow on economic benefits from the need to source supplies and equipment from the region; • improved natural values and amenity benefits due to the improved health of the floodplains from environmental watering. The exhibited EMF included three EDSs to mitigate potential effects on social and business aspects for both projects: SB1, SB2 and SB3. Several other EDSs also relate to social impacts such as those relating to traffic and transport, noise and air quality. The EMF also included measures for monitoring complaints, feedback and enquiries during construction and operations (AI SB1). The ER concluded that the residual impacts on social and business values would be of low significance during both construction and operations. The SIAC concluded that the analysis of social and business aspects in the ER and proposed EDSs are appropriate for the projects. The SIAC highlighted in their report that the construction activities would have some short-term adverse impacts on visitors and there would be changes to the project areas due to the establishment of project infrastructure and inundation activities that may have adverse effects on some people. However, on balance the SIAC considered the opportunities for environmental improvement, if realised, will produce an overall benefit for social and business values.	I note that the monitoring proposed in monitoring requirement AI SB1 does not include monitoring of the implementation of EDS SB2. I recommend the monitoring program includes monitoring/verification of the implementation of EDS SB2 during the construction phase, given that the areas affected by construction will change as construction activities progress. As outlined in Section 5.2, I have recommended the preparation of a Communication and Stakeholder Engagement Plan for the operations phase of the project. This should include the aspects outlined in the description of the plan in Chapter 4 of the ER, as well as the approach to engagement activities proposed in EDS SB3.
Land use and agriculture Potential impacts on land use and agriculture were covered in the strategic assessment report for the draft PSA attached to the ER (Attachment 4).	Consistent with the EMF exhibited for the EES Central projects, I recommend an additional EDS (AG1) is added which requires the CEMP to

Findings and SIAC recommendations	Assessment
Potential impacts of the projects on land use and agriculture identified in the ER included: • temporary and minor changes to access and movement, occupation of land for construction purposes and temporary track closures that may affect business operations or agricultural uses; and • perceived risk to water availability for agriculture or other irrigator-related uses. The report concluded that, while the PSA would affect farming land, (i) the use and development of the land would be managed in accordance with landowner agreements and property management plans, and (ii) the PSA would not introduce a land use that would conflict with regionally significant agriculture and would allow for the continued use of farming land for horticulture and dryland agriculture purposes. The EMF included one monitoring requirement (AI AG1) regarding measures to minimise the impact of biosecurity issues on agricultural land and farming operations during construction. I note the monitoring requirement refers to EDS AG1, which has not been included in the EMF. FoNVP raised concerns that the VMFRP projects could adversely impact agriculture. While the SIAC did not address agriculture issues in detail in the SIAC report, the SIAC concluded that land use and agricultural issues can be managed through the PSA and associated approval documents, and other statutory approvals required.	include measures to manage (i) biosecurity risks in accordance with the *Catchment and Land Protection Act 1994* and best practice viticulture biosecurity (Victoria Agriculture, 2021) and (ii) access disruptions to private land and infrastructure in accordance with EDS TT2. This is required to ensure that impacts on agriculture are appropriately managed. Subject to my recommendation to include EDS AG1 in the EMF, I consider that the land use and agriculture effects of both projects can be acceptably managed. Ongoing consultation with affected landowners and other local residents will be important during both the construction and operations phase. My recommendations regarding consultation plans for the project are provided in Section 5.2. Land use issues associated with the PSA are considered in Section 5.1 of this assessment.
Air quality The ER analysed potential impacts on air quality in specialist study H. Potential impacts of the projects on air quality for sensitive receptors during construction identified in this study included: • generation of air emissions from construction vehicle activities including dust and exhaust emissions; and • generation of air emissions from on-site construction involving civil works such as moving soil (dust and vehicle exhaust). Potential impacts on sensitive receptors identified for the operations phase included those related to: • emissions from temporary diesel-powered pump infrastructure; • maintenance vehicle exhaust emissions; • dust emissions due to wind erosion from exposed, disturbed soil surfaces and stockpiles; and	I consider that the air quality effects of both projects can be acceptably managed with implementation of proposed EDSs, including amendments recommended by the SIAC. The EMF will provide a suitable basis for managing these effects.

Findings and SIAC recommendations	Assessment
• potential for blackwater events due to plant matter build up on the ground between floods and during droughts resulting in odour amenity issues after rain events or during subsequent flooding. The EMF included two EDSs for managing air quality during construction (AQ1 and AQ2), and one EDS for air quality during operations (AQ3). Dust monitoring was also proposed during construction (M AQ1). The SIAC recommended a minor edit to EDS AQ1 in appendix F of their report. The SIAC concluded that air quality issues can be managed through the incorporated document, EMF and other project approvals.	
Noise and vibration The ER analysed potential impacts from noise and vibration in specialist study K. The study found that in the absence of mitigation during construction, at some sensitive receiver locations, there would be exceedances of noise criteria during recommended/normal standard working hours for both projects and outside recommended/normal standard working hours at Vinifera. However, with the implementation of EDS NV1, the residual effects were found to be of low significance. During operation it was found that the use of the proposed temporary pumps would exceed noise criteria for both projects in the absence of mitigation. However, with the implementation of EDS NV2 it was found the residual effect would be insignificant. The submission from the EPA recommended EDS NV1 be amended to require a framework for justification and approval of out-of-hours works that is established in consultation with relevant stakeholders. This was recommended to meet EPA guidance requirements as well as ensure the determination is independently verified and there has been adequate community consultation in a timely and appropriate manner. The proponent made the appropriate changes in the final day version of the EDS, which were supported by the SIAC.	I consider that the noise and vibration effects of both projects can be managed acceptably with the implementation of the proposed EDSs, subject to the SIAC's recommendations. I support the SIAC's findings and the proponent's changes to EDS NV1 in response to EPA's submission. My assessment of potential noise impacts on biodiversity values is provided in Section 6.2.
Landscape and visual The ER analysed potential impacts on landscape and visual aspects in specialist study J. Four Landscape Character Areas (LCAs) and eight public and private viewpoints were identified within the Vinifera study area and four LCAs and seven public and private viewpoints within the Nyah study area. Potential impacts of the projects on landscape and visual aspects during construction were considered to be localised and short-term as a result of vegetation clearance and increased construction traffic. The EMF in the ER proposed EDSs LV1, LV2 and LV3 and noted other EDSs (EMF4, E2a, E2e and TT2) to mitigate adverse landscape and visual effects. ER specialist study J concluded that with the implementation of these EDSs, despite localised adverse impacts, the improved floodplain health and future regrowth will contribute to mitigate expected effects once the projects are established and operational.	I consider that landscape and visual effects of both projects can be acceptably managed with the implementation of proposed EDSs. The EMF will provide a suitable basis for managing these effects. I support the SIAC's recommended change to EDS LV3 to avoid and minimise lighting effects.

Findings and SIAC recommendations	Assessment
The SIAC recommended a minor change to EDS LV3 to clarify mitigation measures are to avoid and minimise lighting impacts on terrestrial and aquatic fauna during construction.	
Traffic and transport The ER analysed potential impacts on traffic and transport in specialist study M. Potential impacts of the projects on traffic and transport during construction identified in the study included: • increases in delays to traffic on the road network; and • temporary access restrictions to the project areas due to partial or full track closures. Potential impacts identified for the operations phase included sections of tracks becoming inaccessible to public vehicles during managed inundation events. The ER noted that several segments of tracks within the project areas would be upgraded to provide all-weather access during managed inundation events and some natural flood events, which would benefit the wider community through accessibility to camping areas and recreation facilities, as well as improved access for maintenance works and during emergencies. The EMF included five EDSs for traffic and transport (TT1 – TT5). Monitoring requirements for traffic and transport impacts were also proposed (AI TT1 and AI TT2). The ER concluded that the residual effects on traffic and transport would be of low significance during both construction and operations. The SIAC recommended minor changes to EDSs TT2 and TT5 in appendix F of their report to specify that maintenance of emergency service access and tracks should be consistent with the fire access road plan required in the incorporated document. The SIAC concluded that traffic and transport issues can be managed through the incorporated document, EMF and other project approvals.	I consider that the traffic and transport effects of both projects can be acceptably managed with implementation of proposed EDSs. The EMF will provide a suitable basis for managing these effects. I support the SIAC's recommended changes to EDSs TT2 and TT5 to ensure consistency with the fire access road plan. Planning aspects related to the proposed fire access road plan are discussed in Section 5.1 of this assessment.
Bushfire The ER analysed potential impacts on bushfire in specialist study I. The ER concluded that the risks and adverse effects relating to bushfire would be of medium to low significance with no significant increase in risk to life and property. The ER also concluded that there are likely benefits associated with the projects as result of increased greening of vegetation. The EMF included two EDSs for the management of bushfire risk (BF1 and BF2). In their final day version of the EMF the proponent made changes to EDS BF2 to apply guidelines for Total Fire Ban days to both construction and operation phases of the projects. This change included the requirement to prepare guidelines for operational or maintenance activities on Total Fire Ban days and during the Fire Danger Period.	It is my assessment that the bushfire effects of both the projects can be acceptably managed with implementation of proposed EDSs, EMF and conditions set out in the incorporated document. I accept the proponent's changes to EDS BF2 to address operational or maintenance activities on Total Fire Ban days and during the Fire Danger Period. I support the SIAC's recommendation to include reference to the Joint Fuel Management Plan and cultural burning in EDS BF2.

Findings and SIAC recommendations	Assessment
In line with the EES Central committee, the SIAC recommended changes to EDS BF2 to include reference to the Joint Fuel Management Plan and cultural burning as existing relevant processes.	I recommend that the fire access road plan is included in the management plans described in the final EMF. My assessment and recommendations regarding mitigation of bushfire risk via conditions in the incorporated document are provided in Section 5.1.

7 Conclusions

This assessment has considered the acceptability of the potential environmental effects of the Vinifera and Nyah projects, including their potential cumulative impacts with other VMFRP projects.

The Vinifera and Nyah projects are two of the nine projects forming the wider VMFRP. The underlying rationale for the VMFRP projects is to restore and enhance floodplain environments, their ecosystems, biodiversity values (particularly for listed threatened species and communities), water quality, and cultural values, through the implementation of engineered environmental watering. Implementation of the two projects will, however, result in some significant adverse impacts on environmental values particularly due to native vegetation clearance and disturbance of recorded Aboriginal heritage sites to facilitate construction of project infrastructure. These impacts (and intended benefits) will primarily occur in sensitive, high conservation value environments within the Nyah-Vinifera Park.

Through consideration of project alternatives and the iterative development of mitigation measures as part of the ER process for Vinifera and Nyah, the proponent has sought to avoid and minimise the potential impacts of the proposed projects. Importantly, there will also be opportunities for further reducing residual impacts during design and delivery, particularly for habitat and biodiversity values such as large trees. There is an imperative to continue to improve environmental outcomes for both projects through further avoidance and minimisation of vegetation clearance and other impacts wherever possible, as the projects are designed, constructed and operated. These important measures will be strengthened through the recommendations of the SIAC and my assessment. For example, further investigation of opportunities for the final project footprint to avoid impacts on riparian vegetation along the banks of the Murray River has been recommended.

Consistent with the findings of the SIAC, I consider that both the Vinifera and Nyah projects can result in an overall improvement to biodiversity values of the floodplains they will inundate over the long-term. I note the issues and gaps raised by the SIAC regarding the understanding of some aspects of the likely benefits, which are similar to the issues raised in relation to the proposed EES Central projects (Belsar-Yungera and Hattah Lakes North). I support the SIAC's findings regarding the need for additional modelling and analysis to provide greater certainty on the effects of managed inundation on floodplain vegetation communities as well as soil erosion risks, to inform the detailed design and operational parameters. I have also recommended the outcomes of this further analysis are used to inform an update of the AOIB report for each project.

It is considered unlikely that this additional analysis will identify adverse effects not already considered in this assessment and addressed by the EDSs (also taking account of the recommendations of the SIAC and this assessment). It is however, expected to result in refinement of and increased certainty regarding the extent of native vegetation expected to benefit from watering within each of the maximum inundation areas. The outputs of this hydraulic modelling and analysis and further work needs to feed into the detailed design of the projects and operational scenarios, to provide opportunity for any issues to be addressed. This could involve design modifications, as well as any necessary refinement of aspects of the approach to adaptive environmental management. The outcomes of this further analysis (along with other recommendations of this assessment) will also need to be considered in relevant project approval decisions and secondary consent matters.

Given the role that operations plays in mitigating or compensating for significant adverse effects of the construction phase for these projects, there should be sufficient certainty in the implementation of effective operations before vegetation clearance and/or construction begins. Further to this, the SIAC's and indeed this assessment's conclusions have been made on the basis that the implementation of the EMF, associated EDSs and adaptive management will be effective and sustained. The realisation of project benefits is dependent on the full implementation of operations, which is conditional on primary and secondary approvals and interactions between these approvals.

Construction and operation of the projects will require careful management to ensure appropriate minimisation of adverse impacts, particularly with respect to ecological values, Aboriginal cultural heritage values and surface water management. The loss of native vegetation proposed within the construction footprints remains a significant impact for both of the projects and while the expected ecological and biodiversity benefits of each project are likely to be significant, they will take some time to realise. The success of each project will rely on effective risk mitigation through implementation of the

recommendations of the SIAC and this assessment, including those related to the effectiveness of adaptive management. The resourcing and sustained commitment of project partners is key to adaptively and effectively managing long term outcomes for these floodplain environments.

The construction and operation of the projects will require careful management to ensure appropriate minimisation of adverse impacts, particularly with respect to ecological values, Aboriginal cultural heritage values and surface water management. The loss of native vegetation proposed within the construction footprints remains a significant impact for both of the projects. However, I consider that the proposed EDSs, including amendments recommended by the SIAC and this assessment, will provide appropriate measures to ensure that the adverse effects of both construction and operations are further minimised and managed to acceptable levels. This also takes account of the predicted benefits for these same biodiversity values in the floodplain environments that will experience improved environmental watering.

Continued consultation and engagement with relevant stakeholders will also be critical to the success of the projects, particularly to ensure local community interests and needs are considered appropriately, and to help facilitate Traditional Owner aspirations for restoration of the floodplains.

In conclusion, it is my assessment that while both the Vinifera and Nyah projects will give rise to significant adverse environmental effects during construction, they can proceed with acceptable effects, and can achieve an overall improvement to biodiversity in the long term within these floodplains. The acceptability of adverse effects is subject, however, to the completion of further detailed analysis as discussed in this assessment, as well as the implementation of an environmental management regime consistent with that endorsed by the SIAC and refined through the findings and recommendations of this assessment.

I am satisfied that the environmental effects of the projects have been sufficiently identified and considered. I am also satisfied in principle that the proposed PSA and incorporated document, with changes addressed in accordance with this assessment, can establish an appropriate mechanism to facilitate planning controls for the construction and operation of the projects. I also note that formal decision-making on the PSA and EMF still needs to occur in light of this assessment.

My assessment concludes the accredited state assessment for each of the projects for the purposes of the EPBC Act and will inform the Commonwealth Government Minister for Environment and Water's decisions about whether and under what conditions to approve the projects under the EPBC Act. It is my assessment that residual impacts on EPBC Act-listed species and communities of both the Vinifera and Nyah projects are unlikely to be significant with the implementation of the proposed EDSs, except for likely significant impacts on the Regent Parrot. I support amendments to EDSs as recommended by the SIAC and further strengthened by my assessment, to ensure appropriate avoidance and minimisation of adverse impacts on MNES as detailed in Appendix A. There is potential for cumulative impacts on MNES from the Vinifera and Nyah projects in conjunction with other VMFRP projects (assuming they proceed), in particular cumulative habitat loss for Regent Parrot from vegetation clearance during construction. However, there are also expected to be long term benefits for MNES from operations, including for the Regent Parrot, through improved ecosystem health in areas of the floodplains that provide habitat. It is my finding that the residual impact on Regent Parrot can be acceptably managed with the adoption of recommendations set out within this assessment.

My assessment includes specific recommendations to inform the proponent and statutory decision-makers responsible for approval decisions for these two projects under Victorian and Commonwealth law. When deciding whether and how the projects should be approved, decision-makers should consider this assessment and as a matter of good practice, I expect decision-makers to write to me to advise how my assessment was considered and applied through statutory decisions and conditions for these two projects.

Table 7-1 sets out a summary of my responses to the SIAC's recommendations and any additional recommendations associated with those within this assessment. A summary of my response to the SIAC's detailed recommendations to the EDSs and monitoring requirements is provided in Appendix B.

Table 7-1 Response to SIAC's recommendations and additional recommendations.

SIAC recommendations		Minister's responses and recommendations	Section
Planning controls			
1	Approve draft Planning Scheme Amendment C78 to the Swan Hill Planning Scheme subject to the Committee's recommendations in this report, including: a) Revisions to the Incorporated Document as shown in Appendix E b) Revision to the Environment Delivery Standards and Monitoring Requirements in the Environmental Management Framework as shown in Appendix F.	Generally supported subject to recommendations below and set out within this assessment, noting that formal decision-making on the PSA and EMF still needs to occur. The formal PSA request submitted should adequately respond to whether the PSA results in a net community benefit. This should be considered in the context of this assessment and the SIAC report, and include an assessment of the environmental, social and economic effects of the PSA, using the ER documentation as appropriate. It should also include an evaluation of the costs and benefits to businesses and the community informed by the ER, arising from any requirement that is proposed to be implemented via the PSA during construction and operation.	5.1
2	Revise the Incorporated Document to amend the requirements for an Operational Environmental Management Plan to include: a) the objectives, targets and indicators that are to be used for the monitoring and evaluation of biodiversity responses b) the conceptual framework of environmental system interactions that will guide adaptive management of both managed inundation and land management c) a requirement to consult Swan Hill Rural City Council, as well as other nominated parties, with respect to the development and implementation of the OEMP. The changes are shown in Appendix E.	Supported.	5.1
3	Revise the Incorporated Document to require submitted Development Plans to be supported by an assessment of the following to the satisfaction of the Minister for Planning: a) the need for siting of any works within 30 metres of the banks of the Murray River having regard to relevant alternatives	Supported.	5.1

SIAC recommendations		Minister's responses and recommendations	Section
	b) proposed measures to avoid and minimise impacts on native vegetation, large trees and habitats of threatened flora and fauna, as well as on cultural heritage, within 30 metres of the banks of the Murray River. The changes are shown in Appendix E		
4	Revise the Incorporated Document to provide that the Secretary of Department of Energy, Environment and Climate Change may authorise the removal of native vegetation for the purpose of project works, subject to a deferred decision on offset requirements that would consider an evaluation of actual biodiversity outcomes. The proposed changes are included in Appendix E.	Not supported. The incorporated document should include conditions that retain an appropriate safeguard to require offsets (or an alternative offset arrangement) prior to construction and vegetation clearance commencing. In addition, the findings of the further hydraulic assessment of the operational impacts on floodplain vegetation should be used to update the AOIB, prior to final decision-making on the alternative arrangement to offsets as set out in the exhibited incorporated document. In line with the final day version of the incorporated document, I recommend the incorporated document include the requirement for monitoring of biodiversity change during operation including a report of monitoring results and proposed adaptive management in the timeframe of 5 years after the first environmental watering and thereafter every 10 years to help provide a robust monitoring system for adaptively managed inundation. This report of monitoring results should be submitted to the Secretary of DEECA.	4, 5.1 and 6.2
5	Revise the Incorporated Document to include the photographic recording of any heritage *structures* as well as buildings. The change is shown in Appendix E.	Supported.	
-		The formal PSA request should include confirmation of the extent of the SCO related to the outcomes of further technical assessments (including the hydraulic analysis to refine the floodplain vegetation assessment) and any associated design or operational changes informed by that refined understanding.	5.1

SIAC recommendations		Minister's responses and recommendations	Section
-		Revise the incorporated document to specify that the EMF be approved by the Minister for Planning.	5.1
-		Prepare a Bushfire Emergency Response Plan for construction in consultation with and to the satisfaction of the different land managers, emergency management and fire authorities, to ensure a consistent, workable and valid framework. The BERP should be submitted to the Minister for Planning for approval.	5.1
-		To inform the incorporated document, seek specific advice from relevant agencies and land manager as to what preparatory works are likely to be appropriate to be undertaken before the plans and requirements set out in the incorporated document conditions are approved.	5.1
-		The formal PSA request should include a separate consultation report with which summarises the key stakeholders, landholders and community engagement processes on the draft PSA referencing the ER documentation as appropriate and a consolidated summary of Traditional Owner consultation.	5.1
-		As recommended by the SIAC, update the Explanatory Report included as part of the draft PSA to address the EPA's submission in relation to contaminated land. The EPA recommended that the reference to Ministerial Direction No. 1 – Potentially Contaminated Land in the Explanatory Report is amended to confirm that where the project intersects with potentially contaminated land (Acid Sulfate Soils) and the use of the land is as a sensitive use, that the appropriate steps will be taken to ensure that the risks of harm are appropriately assessed and managed.	5.1
Environmental Management Framework			
6	Amend Section 20.8.3.4 Operating Plan of the Environmental Management Framework (page 20.32) to state:	Supported.	5.2

SIAC recommendations		Minister's responses and recommendations	Section
	The Operating Plans are not intended to prescribe particular watering events. They are a 'living document' that would be further refined and updated over time if legislation changes or operations in the major river systems require it or outcomes of monitoring identify an issue that requires rectification or there are significant advances in science or technology.		
-		The Minister for Planning should be responsible for the approval of the final EMF.	5.2
-		In the final EMF, responsibility for approval of the OEMP should be changed to the Secretary of DEECA.	5.2
-		Amend the final EMF to include separate descriptions of the scope of both the OEMP and the Environmental Water Management Plan, including a description of associated consultation requirements for each.	5.2
-		Amend the final EMF to state that the full operational environmental performance reports are provided to the Victorian Minister for Environment as well as the Minister for Planning, and published on the DEECA website.	5.2
-		Amend the final EMF to specify that the independent environmental auditor is retained or a new one engaged to conduct periodic audits of both projects during the operations phase. Independent auditing should entail an audit at the commencement of the operations phase, to verify all environmental management and monitoring documentation for operations is appropriately prepared/approved and fit for purpose. Auditing should be at least 5-yearly thereafter during operations. The operations audits should have a similar scope to the audits proposed in the EMF for the construction phase. The scope and timing of operation audits should be outlined in the final EMF.	5.2
-		Amend the final EMF to specify that the selection criteria for the independent environmental auditor for operations be	5.2

SIAC recommendations		Minister's responses and recommendations	Section
		the same as set out for the construction independent environmental auditor in the EMF and the selection and reporting of the auditor should be done in consultation with the Secretary of DEECA or delegate.	
-		Amend the final EMF to include a commitment to prepare a communication and engagement plan (or similar) for the operation phase. The scope and requirements for review and approval of the plan should be specified in the EMF, as per the other environmental management documentation.	5.2
Surface water and groundwater			
7	Environmental Management Framework Include the following changes: a) Revised EDS SW2 in relation to: • the purposes that are to guide the site-specific management of operational risks related to surface water • the timing and management of inundation events, as well as the management of organic matter loads, to reduce the risk of hypoxic or anoxic blackwater events.	Supported.	6.1
	b) A provision in EDS SB3 for protocol be developed and implemented for communicating with the community and stakeholders regarding: • the risk or occurrence of blackwater events • intended responses for different stages of specific managed inundation events. The changes are shown in Appendix F.	Supported.	6.1
8	Environmental Management Framework Revise the Environmental Delivery Standards and Monitoring Requirements to include: a) Revised EDS GW2 to address requirements for additional groundwater monitoring and local adaptive management responses.	Supported.	6.1
	b) Revised Monitoring Requirement M GW1 to require additional bore sites to monitor changes to groundwater depth and elevation.	Supported.	6.1

SIAC recommendations		Minister's responses and recommendations	Section
	c) Revised Monitoring Requirement M GW2 to require additional bore sites and a monthly frequency for monitoring groundwater salinity. The changes are shown in Appendix F.	Supported.	6.1
Soils			
9	Environmental Management Framework Revise the Environmental Delivery Standards and Monitoring Requirements to include: a) Revised EDS GS1 to specify requirements for further hydraulic assessment to inform the detailed design and implementation of the Project.	Supported.	6.5
	b) Revised EDS GS3 and M GSC1 to require monitoring of waterway erosion within the project area. The changes are shown in Appendix F.	Supported.	6.5
10	Environmental Management Framework Revise the Environmental Delivery Standards to make minor changes to EDS CM1c, CM2 and GS1 in relation to soil characterisation and mapping. The changes are shown in Appendix F.	Supported.	6.5
Terrestrial ecology			
11	Environmental Management Framework Revise the Environmental Delivery Standards to include the following changes: a) Revise EDS E1 to require further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species, with particular attention to be given to avoiding and minimising impacts within 30 metres of the top of the Murray River bank.	Generally supported, with the following recommendations: • Adjust requirement for further avoidance and minimisation of vegetation clearance to encompass both identified alternatives and any others wherever possible, explored through detailed design, and then construction. • Amend EDS E1 to include a requirement that the further consideration of opportunities to reduce impacts on riparian areas (including within 30m of the top of the Murray River bank) ensures that trade-offs between environmental values are appropriately considered, in consultation with relevant	6.2

SIAC recommendations		Minister's responses and recommendations	Section
		stakeholders and experts, however it will need to be ensured that any changes to the footprint do not result in increased impacts to environmental values from those presented in the ER for each project. • 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. • Add requirement to undertake further analysis and mapping to clarify the landscape context for the Regent Parrot, and likelihood for potential breeding habitat to be used by the species in the future, such as whether the project areas include the breeding requirements outlined in the Recovery Plan including: ○ Mallee woodlands within 20 km and ideally within 5 km of nest sites for foraging; ○ Treed flight corridors between potential nesting habitat (i.e. large River Red Gums, generally within 120 m of water for nesting) and the Mallee woodland habitat; and ○ Further identification of historic and potential nesting trees, with reference to potential nesting locations identified in Regent Parrot habitat maps in Appendix I to Specialist Appendix B of the ER. • Add requirement for submission of a report documenting the outcomes of the further analysis and mapping described above to DCCEEW and DEECA Loddon	

SIAC recommendations		Minister's responses and recommendations	Section
		Mallee Region, to inform both related approvals and any necessary conditions for further mitigation as part of those (see below); • Add requirement that, informed by findings of the further analysis described above, implement measures to avoid and minimise impacts on Regent Parrot including: ○ As part of the further assessment of relevant alternatives through the detailed design process to further avoid and minimise impacts on biodiversity values as recommended by the SIAC, consider opportunities for the projects to specifically reduce impacts on Regent Parrot habitat (particularly impacts on active or potential nesting trees and habitat in their vicinity); ○ Conduct removal/lopping/felling of potential and active nesting trees, if required, outside the breeding season; and ○ Schedule construction activities to avoid active construction within 350m of active nesting trees during the breeding season (spring/early summer). Active construction includes construction activities associated with track upgrades and new track construction, but does not include construction vehicle transit, where vehicles are using tracks for access to construction sites or routine track maintenance.	

SIAC recommendations		Minister's responses and recommendations	Section
	b) Revise EDS E2e to require: • development and implementation of a hollow replacement plan that is: o to provide for nominated priority fauna species on the basis of suitable evidence of their habitat requirements o o be implemented progressively over a ten-year period with appropriate monitoring to ensure its cost-effectiveness o to the satisfaction of the Secretary of the Department of Energy, Environment and Climate Action. • where possible, appropriate re-use of felled timber and logs. The changes are shown in Appendix F.	Generally supported, including additions to specify that the hollow replacement plan: • be prepared to the satisfaction of DEECA (specifically, the DEECA Regional Director, Loddon Mallee Region); • requires supplementary nesting sites/artificial hollows to be installed in adjacent areas prior to the removal of large hollow-bearing trees; • requires the number and type of artificial hollows to be installed to be commensurate with the number and type of utilised hollows estimated to be removed, as determined by a qualified zoologist, based on available scientific knowledge; • requires the agreed location and specification of artificial hollows to be incorporated into site maps and as a Project GIS layer prior to the commencement of works; and • requires monitoring and adaptive mitigation measures to determine and respond to the success/failures of artificial hollows.	6.2
12	Environmental Management Framework Revise the Environmental Delivery Standards and Monitoring Requirements to: a) Amend EDS E2e to require monitoring of rehabilitation outcomes including vegetation cover.	Supported.	6.2
	b) Adjust the terrestrial ecology monitoring requirement M TE2 to specify monitoring of the cover and quality of rehabilitation of indigenous vegetation, where consistent with any obligation established by a consent or agreement for the Projects under the *National Parks Act 1975*. The changes are shown in Appendix F.	Supported.	6.2

SIAC recommendations		Minister's responses and recommendations	Section
13	Environmental Management Framework Revise the Environmental Delivery Standards to include a new EDS SW4 'Surface water – Further hydraulic assessment of operational impacts on floodplain vegetation'. The change is shown in Appendix F.	Supported, including additions to specify that the hydraulic analysis should: • be undertaken prior to detailed design; • inform the minimisation of erosion and sedimentation through design (EDS GS1) and operation (EDS GS3 and EDS SW2); • include mapping of key hydraulic parameters (depth, velocity and shear stress) for each operating scenario (including managed inundation events and comparable natural and existing flooding events) at key stages of managed inundation events (including filling, holding and releasing with regulators closed and open); and • include using 'difference maps' 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.	6.1
14	Environmental Management Framework Revise the Monitoring Requirements M TAE2 'Terrestrial and aquatic' to require transect surveys following inundation events to detect any presence of threatened flora species either within or adjoining the inundated area. The change is shown in Appendix F.	Supported.	6.2
-		Add a new EDS (E5) requiring the AOIB reports for both projects (ER Attachment V and VI) to be updated with consideration of: • outcomes of the further hydraulic analysis and assessment of EVC responses required by SW4; • site-specific hydrological analyses of EVCs (Tabled Documents 23 and 24), together with A guide to water regime, salinity ranges and	6.2

SIAC recommendations		Minister's responses and recommendations	Section
		bioregional conservation status of Victorian wetland Ecological Vegetation Classes (2016, Frood and Papas) and the expert elicitation report (ER Accompanying Document 2). • predicted responses of EVCs under the VMFRP (with Basin Plan) scenario and proposed initial operating scenarios. Once these updated AOIB reports are prepared, I recommend the reports are: • provided to the Secretary of DEECA under Clause 4.5.1 of the incorporated document, to inform decisions regarding the proposed alternative offset arrangement; and • used to inform refinement of initial operating scenarios that will be evaluated through environmental monitoring of response of vegetation to watering events, and guide adaptive management.	
-		The OEMP to be prepared for the projects should include contingency measures for cases where any new records of threatened species are recorded in project areas.	6.2
-		Update the requirements in monitoring measure M TE7 for the Vinifera and Nyah projects to specify that they are reviewed annually to ensure the scope of the monitoring includes all relevant species, and considers new and updated information on species presence.	6.2
Aquatic ecology			
15	Environmental Management Framework Revise the Environmental Delivery Standards and Monitoring Requirements to include the following changes: a) Revise EDS SW2 in relation to: • timing of inundation events to reduce carp breeding	Supported.	6.3

SIAC recommendations		Minister's responses and recommendations	Section
	• clarifying the purpose of the requirement to factor seasonal implications in the timing of filling and drawdown.		
	b) Include a new monitoring requirement M AE3 for assessing the effects and benefits of floodplain watering for small-bodied native fish and control of Carp.	Supported.	6.3
	c) Include a new EDS SW5 in relation to: • the design of regulators and the passage of native fish • the design of containment banks and spillways and the passage of turtles.	Supported.	6.3
	d) Revise EDS E3 that requires the Pest Plant and Animal Monitoring and Management Plan to address both 'terrestrial and aquatic' pests, including Carp.	Supported.	6.3
	e) Revise M AE7 to include monitoring and evaluation of fish strandings associated with the Project. These changes are shown in Appendix F.	Supported, noting that M AE7 is a new monitoring requirement.	6.3
-		Amend M AE1 to require monitoring for medium- and large-bodied native fish within the Murray River and in any sites within the project areas which may support the species.	6.3
Aboriginal cultural heritage			
-		Add a new EDS (ACH4) requiring review and update of the assessment of residual effects on Aboriginal cultural heritage associated with inundation, based on the outcomes of the further hydraulic analysis required by EDS SW4 and EDS GS1. This 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.	6.4
Historic heritage			
-		The monitoring program include monitoring of compliance with conditions issued as part of any consents provided	6.6

SIAC recommendations		Minister's responses and recommendations	Section
		for the projects under the *Heritage Act 2017*.	
Social and business			
-		The monitoring program include monitoring/verification of the implementation of SB2 during the construction phase, given that the areas affected by construction will change as construction activities progress.	6.6
Agriculture			
-		Add a new EDS (AG1) requiring the CEMP to include measures to manage (i) biosecurity risks in accordance with the *Catchment and Land Protection Act 1994* and Best practice viticulture biosecurity (Victoria Agriculture, 2021) and (ii) access disruptions to private land and infrastructure in accordance with EDS TT2.	6.6
Bushfire			
-		Include the fire access road plan in the management plans described in the final EMF.	5.1
Other approvals			
16	The Minister for Planning should ask the Minister for Water to consider, in relation to any approval for a licence for works on a waterway under section 67 of the *Water Act 1989*, applying a condition or conditions requiring the design, construction, operation and maintenance of project works on the Vinifera and Nyah floodplains to: a) Be informed by an assessment of geomorphic and hydraulic risks, including of waterway erosion or other instability over the long-term, to the satisfaction of the Minister. b) Provide for timely action to monitor and address risks or evidence of waterway erosion or other instability either attributable to or affecting the project works to the extent necessary to protect waterway values. c) Coordinate assessments of risks and implementation of any relevant requirements	The conditions proposed by the SIAC should be considered by relevant decision-makers when considering any approvals required under the *Water Act 1989*, such as for works on waterways permits.	6.5

SIAC recommendations		Minister's responses and recommendations	Section
	relating to the Murray River with the responsible authorities in New South Wales.		
17	The Minister for Planning should ask the Minister responsible for the *National Parks Act 1975* to consider applying a binding obligation under that Act through section 27 consent for the Proponent to: a) Monitor any increase of environmental weeds within or adjoining all sections of the construction footprint, including proximate downstream sections of waterways, to the satisfaction of Parks Victoria for the first 12 months following construction or such longer period as Parks Victoria may direct. b) Implement measures to control any local proliferation of environmental weeds associated with the project works to the satisfaction of Parks Victoria. c) Monitor the cover and quality of rehabilitation of indigenous vegetation within the construction footprint.	The conditions proposed by the SIAC should be considered by relevant decision-makers when considering any decisions or approvals made under the *National Parks Act 1975*.	6.3

HON SONYA KILKENNY MP

Minister for Planning

Date: 28/10/23

Appendix A - Matters of national environmental significance

The environment report (ER) and this assessment examine the likely impacts on matters of national environmental significance (MNES), relevant to the controlling provisions identified in the Commonwealth EPBC Act controlled action decisions, i.e. listed threatened species and communities (sections 18 and 18A) for both projects.

This appendix details and consolidates information on the likely effects of the proposal on relevant MNES protected under the EPBC Act. It draws upon the assessment of specific matters discussed in other sections of my assessment, including assessment findings on terrestrial ecology (Section 6.2), aquatic ecology (Section 6.3), surface water and groundwater (Section 6.1).

Potential impacts on relevant MNES were assessed for each project in ER Attachment X Vinifera Matters of National Environmental Significance Assessment, ER Attachment XI Nyah Matters of National Environmental Significance Assessment and summarised in Chapters 9 and 13 of the ER. Impacts are assessed in detail in the aquatic ecology specialist study A and terrestrial ecology specialist study B appended to the ER. Cumulative Impacts were assessed in the ER Accompanying Document 1 – Assessment of potential cumulative effects on matters of national environmental significance. The key finding of the ER was that there is unlikely to be significant impacts on any MNES for either of the projects.

Section 10.2 of the SIAC report considered the likelihood of impacts on MNES, with further discussion of evidence and submissions related to MNES provided in Chapters 3 to 7 of the SIAC report. The SIAC recommended the refinement and strengthening of several relevant mitigation measures to assist in further reducing potential impacts to MNES, which are discussed in the following sections of this appendix. The overall finding of the SIAC was that residual impacts on MNES can be acceptably managed through implementation of the recommended mitigation measures, and that the projects will not have significant residual impacts on any MNES.

Species considered in relation to MNES that have a likelihood of occurrence in either project area of 'possible' or higher are summarised in Table A1.

Table A1 Species considered in the ER in relation to MNES for both Vinifera and Nyah projects (with a likelihood of occurrence of 'possible' or higher in each project area).

Species	EPBC Status	Vinifera	Nyah
Australian Painted Snipe	Endangered	X	X
Growling Grass Frog	Vulnerable	X	X
Murray Cod	Vulnerable	X	X
Painted Honeyeater	Vulnerable	X	X
Regent Parrot	Vulnerable	X	X
Silver Perch	Critically endangered	X	X
South-eastern Long-Eared Bat	Vulnerable	X	X
White-throated Needletail	Vulnerable	X	
Winged Peppercress	Endangered	X	X
Australian Gull-billed Tern	Migratory		X
Caspian Tern	Migratory		X

Species	EPBC Status	Vinifera	Nyah
Common Greenshank	Migratory	X	X
Fork-tailed Swift	Migratory	X	X
Glossy Ibis	Migratory	X	X
Latham's Snipe	Migratory	X	X
Marsh Sandpiper	Migratory		X
Sharp-tailed Sandpiper	Migratory		X

A.1 Listed threatened species

Murray Cod

Murray Cod is listed as vulnerable under the EPBC Act. The ER identified that the species is likely to occur in both the Vinifera and Nyah project areas, as suitable habitat is present in the Murray River adjacent to the project areas and the species has been recorded up and downstream of each area. The ER described that the species occupies a broad range of flowing and standing waters but favours permanent flowing river reaches and creeks with hydraulic complexity and instream woody habitat.

The ER stated that it is unlikely that Murray Cod occurs within any of the smaller ephemeral or intermittent waterways present within the Vinifera project area. Fish passage between Vinifera Creek and the Murray River has been blocked and the creek acts as a backwater wetland. The ER stated that under current conditions the wetlands and the Vinifera Creek are inundated only briefly by high river levels and few fish species are able to utilise the Vinifera floodplain.

The ER stated that Murray Cod are unlikely to be present within the Parnee Malloo Creek or any of the smaller ephemeral or intermittent wetlands present within the Nyah project area. The Parnee Malloo Creek is ephemeral and highly modified, with fish passage between the creek and the Murray River impeded by existing infrastructure, such as levees, within the creek. The ER stated that under current conditions, very few fish species are able to utilise the Nyah floodplain due to the short period of inundation and the use of pumps to fill Parnee Malloo Creek and the wetlands.

An assessment of the impacts on Murray Cod under the Significant Impact Guidelines 1.1[1] was undertaken for both projects and it was determined that the species is unlikely to be significantly impacted (ER specialist study A). Residual impacts from invasive species such as Carp, pathogens, potential barriers to movement in the construction and operation stages, noise, spills and water quality deterioration were not considered to be significant with the implementation of relevant mitigation measures. With implementation of the EDSs including amendments recommended by the SIAC and this assessment, I agree with the SIAC that both projects are unlikely to have a significant impact on the species.

The ER stated that both projects are expected to lead to slight improvements in populations of Murray Cod (Tables 7-2 and 10-2, ER specialist study A). This is expected due to increased foraging opportunities when the floodplains are inundated, increased food availability and improved habitat quality and connectivity.

Cumulative effects of the Vinifera and Nyah projects in relation to the other seven proposed VMFRP projects, the New South Wales Sustainable Diversion Limit Adjustment Mechanism projects, and The Living Murray projects at Gunbower Forest, Hattah Lakes and Chowilla on Murray Cod were assessed in Accompanying Document 1. The cumulative impact assessment presented in the ER concluded there are unlikely to be cumulative adverse effects on Murray Cod. I agree that based on the information provided in the ER documentation that the Vinifera and Nyah projects are unlikely to have significant impacts on this species, when considered individually, however I note that under the National Recovery Plan

[1] Department of the Environment (2013) *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance.*

for the Murray Cod[2], low level impacts to Murray Cod which may be deemed to be insignificant on their own can be considered significant when the impacts are viewed cumulatively. The Recovery Plan notes that the cumulative impact of many small or low risk threats, including changes to water quality or fish kills, can pose significant impacts to the species. The SIAC concluded that potential fish strandings should be monitored as well as the monitoring of fish populations, and recommended the inclusion of the monitoring requirement M AE7 which was included in the EES Central Minister's Assessment. In the EES Central assessment, this measure required the monitoring and reporting on native fish stranding events from managed inundation events, to enable the identification of any recurrent strandings and the implementation of management measures included within EDS SW2. I support the inclusion of this measure for Vinifera and Nyah as well, and recommend that monitoring requirement M AE1 is updated to require monitoring for medium- and large-bodied native fish within the Murray River and in any sites within the project areas which may support the species. The results of this monitoring should be considered in developing the seasonal operating plans as outlined in EDS SW2, and updating mitigation measures as part of the adaptive management process.

The operational phase of the projects, along with the seven other VMFRP projects has the potential to cumulatively result in a significant impact to Murray Cod, however the impacts can be acceptably managed provided that the proposed EDSs and monitoring requirements are implemented effectively, including amendments recommended by the SIAC and this assessment.

Silver Perch

Silver Perch is listed as critically endangered under the EPBC Act. The ER identified that the species is likely to occur in both the Vinifera and Nyah project areas, as suitable habitat is present in the Murray River adjacent to the project areas and the species has been regularly recorded upstream and downstream of each area. The ER described that the species occurs in a variety of river habitat, ranging from fast flowing river reaches to slower flowing, turbid areas. The species prefers areas of rapid flow and requires perennial flowing water to complete its life cycle. The species is thought to rarely utilise the floodplain (ER Attachments IX and X).

The ER stated that it is unlikely that Silver Perch occur within any of the smaller ephemeral or intermittent waterways present within the Vinifera project area. Surveys undertaken for Vinifera did not detect Silver Perch. As described above for Murray Cod, fish passage between Vinifera Creek and the Murray River is impeded by existing infrastructure.

The ER stated that it is unlikely that Silver Perch occurs within Parnee Malloo Creek or any of the smaller ephemeral or intermittent wetlands which are present within the Nyah project area. As described for Murray Cod, fish passage between Parnee Malloo Creek and the Murray River is impeded by existing infrastructure.

An assessment of the impacts of the projects on Silver Perch under the Significant Impact Guidelines 1.1 was undertaken for both projects and it was determined that the species is unlikely to be significantly impacted (ER specialist study A). Residual impacts from Carp, potential barriers to movement in the construction and operation stages, spills and water quality deterioration were not considered to be significant with the implementation of relevant mitigation measures. The ER stated that both projects are expected to lead to slight improvements in populations of Silver Perch (Tables 7-2 and 10-2, ER specialist study A). This is expected due to increased foraging opportunities when the floodplains are inundated, improvements to the food web from nutrient return and improved habitat quality and connectivity. With implementation of the EDSs including amendments recommended by the SIAC and this assessment, I agree with the SIAC that both projects are unlikely to have a significant impact on the species.

Cumulative effects of the Vinifera and Nyah projects in relation to the other seven proposed VMFRP projects, the New South Wales Sustainable Diversion Limit Adjustment Mechanism projects, and The Living Murray projects at Gunbower Forest, Hattah Lakes and Chowilla on Silver Perch were assessed in Accompanying Document 1. The cumulative impact assessment presented in the ER concluded there are unlikely to be cumulative adverse effects on Silver Perch. I agree that based on the information provided in the ER documentation that the Vinifera and Nyah projects are unlikely to have significant cumulative impacts on this species, provided that the proposed EDSs are implemented effectively, and with the inclusion of the additional monitoring recommended by the SIAC and this assessment to monitoring requirements M AE1 and M AE7. This includes measures to manage impacts to water quality, and impacts of weeds, pest and pathogens,

2. Clunie and Koehn (2010) National Recovery Plan for the Murray Cod *Maccullochella peelii peelii*[2]. Department of Sustainability and Environment.

return woody debris habitat following construction and provide for appropriate fish passage at regulating structures during operation (e.g. EDSs E2d, E2e, SW2 and SW3).

South-eastern long-eared bat

South-eastern Long-eared Bat is listed as vulnerable under the EPBC Act. Targeted surveys using a combination of acoustic detection and harp-trapping were undertaken at both Vinifera and Nyah project sites. Whilst South-eastern Long-eared Bat was not recorded during the surveys and had not been recorded previously it is considered possible that the species may occur within suitable habitat in both project sites. The ER described that the species forages within understory vegetation in a variety of treed vegetation types, including mallee, Buloke and Black box woodland. South-eastern Long-eared Bat is more abundant where vegetation has a distinct canopy and dense cluttered understory layer. The species roosts in tree hollows, crevices and under loose bark and in Victoria is known to roost in mallee eucalypts in long-unburnt vegetation and within Belah trees.

The ER described that within the Vinifera and Nyah project areas, the species has the potential to occur within both the construction footprints and the maximum inundation areas. The ER described that the core known range for the species is within old growth mallee and Buloke and Black Box woodlands around the Hattah township and Hattah Kulkyne National Park (100 km to the northwest of the Vinifera and Nyah project areas). The species was recorded during the VMFRP surveys at Gunbower National Park Forest (approximately 100 km southeast of the Vinifera and Nyah project areas). The ER stated that no important populations of this species have been defined and there is no indication that an important population of the species occurs within the project areas.

The ER stated that the species is unlikely to be impacted by occasional flooding of low-lying areas during environmental watering and that the projects are likely to have a long-term positive effect on the species through the additional watering of the floodplain habitats used by the species.

The ER discussed that the permanent and temporary loss of small areas of potential habitat for the species may occur as a result of vegetation clearance during construction. It is possible that individuals of the species roosting in tree hollows may be killed during tree clearance. The ER concluded that these impacts are expected to be localised, minor and not ecologically significant. I agree with the findings of the ER that the ecology of the species is unlikely to be significantly impacted by the projects, given the small extent of the construction works relative to habitat availability across the broader landscape. The EDSs proposed will also assist in minimising impacts on fauna associated with vegetation clearance through protocols such as staged clearance, pre-clearance surveys and fauna salvage (e.g. EDS E2b). However, I note that the loss of hollow bearing trees has the potential to impact South-eastern Long-eared bat by removing hollows potentially used for roosting by the species. I also note there is a risk that, following project vegetation clearance, some displaced hollow-dependent fauna may move into hollows suitable for South-eastern Long-eared bat, reducing the number available for use by the species and increasing competition with other species. As discussed in Section 6.2 of this assessment, I support the recommendation of the SIAC that a hollow replacement plan is required to mitigate this loss, and I have made additional recommendations regarding the scope of the plan. This mitigation measure will assist in mitigating the impacts on the species both from direct impacts of vegetation clearance and the potential for increased competition for hollows from other species that are displaced.

An assessment of the impacts of the projects on South-eastern Long-eared Bat under the Significant Impact Guidelines 1.1 was undertaken in the ER and it was determined for both projects that, with implementation of the proposed EDSs, the species is unlikely to be significantly impacted (ER specialist study B). With implementation of the EDSs including amendments recommended by the SIAC and this assessment, I agree that the projects are unlikely to have a significant impact on the species, given the small extent of the construction works relative to habitat availability across the broader landscape. The ER states that the projects are likely to have a long-term positive effect on the species through the additional watering of the floodplain habitats used by the species. I support this conclusion.

South-eastern Long-eared Bat was not considered in the ER cumulative impact assessment as the species was only detected at one of the other VMPRP project sites: Gunbower. Consequently, it was considered to be unlikely that cumulative adverse effects would occur. I agree that there are unlikely to be significant cumulative impacts on the species associated with the VMFRP projects.

Regent Parrot

The Regent Parrot is listed as Vulnerable under the EPBC Act. The species was recorded during the targeted surveys conducted in the Nyah project area. Whilst not recorded at Vinifera during the ER surveys, there are previous records of the species in the Vinifera project area. The ER described that the species is highly mobile, and notes they typically nest within suitable hollows in River Red-gums and feed mostly on the ground in mallee woodland, with some foraging occurring in mallee trees, vineyards, orchards, cereal crops and riparian woodlands. ER specialist study B noted that the entire project areas represent potential foraging habitat (for both projects). Potential breeding habitat also occurs within both the project areas, but in more isolated patches. This species tends to breed in very large River Red-gum trees (i.e. with mean DBH of 160 cm) within 120 m of water.

The ER described that the construction of the Vinifera project would lead to the following habitat impacts for Regent Parrot:

- removal of up to 13 ha of potential foraging habitat;
- removal of up to 5 ha of potential breeding habitat, which is within 120 m of water; and
- impacts to 20 trees identified as potential breeding trees (with a DBH>160cm).

The ER stated that there are no breeding records of Regent Parrot within the Vinifera project area, with the closest breeding records being 62 km to the north at Boundary Bend. The ER also stated that whilst potential foraging habitat for the species occurs within the Vinifera project area, the habitat in the area it is not mallee woodland which is the favoured foraging habitat for the species. The ER further noted that the potential foraging habitat in the construction footprint is more likely to be used by the species for dispersal, occasional perching or non-preferred foraging.

The ER found that there are few records of Regent Parrot within the Vinifera project area, and the project area is considered to be at the south-eastern edge of the species range along the Murray River (ER specialist study B). I note that being at the limit of the species range does not decrease the value of a population in this area, and conversely is a factor for determining important populations of vulnerable species under the Significant Impact Guidelines 1.1.

The ER described that the construction of the Nyah project would lead to the following habitat impacts for Regent Parrot:

- removal of 14 ha of potential foraging habitat;
- removal of up to 6 ha of potential breeding habitat, which is within 120 m of water; and
- impacts to 13 trees identified as potential breeding trees (with a DBH>160 cm).

The ER stated that there are no breeding records of Regent Parrot within the Nyah project area, with the nearest approximately 50 km away at Boundary Bend. The ER further detailed that whilst potential foraging habitat for the species occurs within the Nyah project construction footprint it is not the favoured foraging habitat for the species and the species is considered to be an occasional visitor to the area only.

An assessment was undertaken in the ER of the impacts on Regent Parrot under the Significant Impact Guidelines 1.1 for both projects. The ER concluded that adverse impacts to Regent Parrot are possible but were considered unlikely to be a significant impact under the EPBC Act guidelines for either project (ER specialist study B). The ER also concluded that the projects will likely benefit the species by providing water to floodplain habitats used by the species, which would result in greater foraging resources, and succession of woodland trees that would eventually support suitable nesting hollows.

However, I note that residual impacts on Regent Parrot could meet two of the criteria to be considered a significant impact under the Significant Impact Guidelines 1.1. These criteria are:

1) reduce the area of occupancy of an important population (criterion B); and
2) adversely affect habitat critical to the survival of the species (criterion D).

The ER contended that Regent Parrot is unlikely to be significantly impacted by either project with implementation of the EDSs proposed. However, I do not consider the EDSs to be adequate to demonstrate that significant impacts under the

Significant Impact Guidelines 1.1 are going to be avoided, or to adequately mitigate against the risk of unacceptable impacts on the species with sufficient certainty, for the reasons outlined below.

The population of Regent Parrot present at Vinifera and Nyah is considered an 'important population' as it belongs to the Mid-Murray Victorian sub-population of breeding pairs nominated in the Regent Parrot Recovery Plan[3]. The project will reduce the area of occupancy of this important population due to the loss of 5 ha of potential breeding habitat and 13 ha of potential foraging habitat at Vinifera and 6 ha of potential breeding habitat and 14 ha of potential foraging habitat at Nyah. The species has been confirmed to occur in both these areas. Based on the current information regarding the habitat use for the species and the levels of habitat clearance proposed, I therefore consider significant impact criterion D could be met for both projects, and each of these projects would thus likely result in a significant impact on the species.

The Regent Parrot Recovery Plan defines all potential Regent Parrot habitat within its current normal range as habitat critical to the survival of the species. All potential habitat within the Vinifera and Nyah project areas is therefore considered critical to the survival of the species. I note that no breeding activity was recorded during the current surveys and the project areas are outside areas mapped as where breeding is likely to occur in the Recovery Plan's indicative map. However, I consider the ER contains insufficient information to rule out the possibility the potential breeding habitat could be used by the species in the future.

Cumulative effects of the Vinifera and Nyah projects in relation to the other seven proposed VMFRP projects, the New South Wales Sustainable Diversion Limit Adjustment Mechanism projects, and The Living Murray projects at Gunbower Forest, Hattah Lakes and Chowilla on Regent Parrots were assessed in ER Accompanying Document 1.

The cumulative impact assessment noted Regent Parrots are considered present in six of the nine VMFRP project areas (Lindsay Island, Belsar-Yungera, Hattah Lakes North, Vinifera, Nyah and Burra Creek), and breed or may breed at four project areas (Lindsay Island, Belsar-Yungera, Hattah Lakes North and Burra Creek). The assessment stated that given the geographic spread of the project areas where the Regent Parrot occurs (spanning over 550 km of river), different project areas are considered likely to support different Regent Parrot populations. The assessment also noted that, across the projects relevant to the Regent Parrot, 273.70 ha of potential foraging habitat (not including non-native vegetation, crops or orchards) and 45.15 ha of potential breeding habitat within 120 m of water would be removed during construction.

I disagree with the statement that different areas support different populations. The Regent Parrot Recovery Plan[4] states that there is a single population in the lower Murray-Darling basin region of South Australia, New South Wales and Victoria. Within this population there are three sub-populations, with all Regent Parrots within the VMFRP project areas belonging to the mid-Murray sub-population. Therefore, any impacts on the mid-Murray sub-population are cumulative.

In my previous assessment for EES Central, I considered there is potential for the Belsar-Yungera project to result in a significant residual impact to Regent Parrot. As noted above, both the Vinifera and Nyah projects will also result in habitat loss for the species including both potential foraging and breeding habitat. There is therefore potential for Vinifera and Nyah, as well as other VMFRP projects, to add cumulatively to this impact due to additional habitat clearance for the species. I note that further work regarding cumulative impacts is being progressed for other VMFRP projects. The accredited environmental assessment processes for five of the other VMFRP projects are still underway and will assist with the understanding of cumulative impacts on key MNES/species including the Regent Parrot.

Overall, I consider there to be a risk of unacceptable impacts on Regent Parrot for both projects due to the proposed removal of habitat without further mitigation. While the proponent has sought to reduce impacts on native vegetation through refining the project design through the ER process, there is an imperative to further reduce impacts on Regent Parrot habitat during the detailed design and construction phases of the project. I note the SIAC's recommended amendments to EDS E1 includes measures for further reducing vegetation loss, however the EDS does not currently require specific consideration of opportunities to reduce impacts on Regent Parrot habitat. I also consider that conducting

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

some additional analysis to further understand the habitat use and landscape context for the species would assist in guiding further efforts to reduce impacts on habitat.

To assist in strengthening the mitigation measures for the projects and reducing residual impacts, I recommend that the following requirements are added to EDS E1 for both projects:

- Undertake further analysis and mapping to clarify the landscape context for the species, and likelihood for potential breeding habitat to be used by the species in the future, such as whether the project areas include the breeding requirements outlined in the Recovery Plan including:
    - Mallee woodlands within 20 km and ideally within 5 km of nest sites for foraging;
    - Treed flight corridors between potential nesting habitat (i.e. large River Red Gums, generally within 120 m of water for nesting) and the Mallee woodland habitat; and
    - further identification of historic and potential nesting trees, with reference to potential nesting locations identified in Regent Parrot habitat maps in Appendix I to Specialist Appendix B of the ER.
- Submission of a report documenting the outcomes of the further analysis and mapping described above to DCCEEW and DEECA Loddon Mallee Region, to inform both related approvals and any necessary conditions for further mitigation as part of those (see below).
- Informed by findings of the further analysis described above, implement measures to avoid and minimise impacts on Regent Parrot including:
    - As part of the further assessment of relevant alternatives through the detailed design process to further avoid and minimise impacts on biodiversity values as recommended by the SIAC, consider opportunities for the projects to specifically reduce impacts on Regent Parrot habitat (particularly impacts on active or potential nesting trees and habitat in their vicinity);
    - Conduct removal/lopping/felling of potential and active nesting trees, if required, outside the breeding season; and
    - Schedule construction activities to avoid active construction within 350m of active nesting trees during the breeding season (spring/early summer). Active construction includes construction activities associated with track upgrades and new track construction, but does not include construction vehicle transit, where vehicles are using tracks for access to construction sites or routine track maintenance.

It may be that further analysis (recommended above) provides information the proponent can use to demonstrate that each project does not meet the significant impact criteria (criterion D). However, the adequacy of such information in this context would need to be determined by DCCEEW.

Further to this, any habitat that cannot be avoided must be offset in accordance with federal offset requirements, where relevant. Positive effects of the projects on floodplain vegetation within the inundation area during operations may be able to serve as EPBC offsets (if required) for significant residual impact on Regent Parrot, if this is considered by DCCEEW to be appropriate, during the EPBC Act approval decisions.

As recommended by the SIAC and discussed in Section 6.2 of this assessment a hollow replacement plan should also be prepared and implemented, which will assist in mitigating the impacts on the species both from direct impacts of vegetation clearance and the potential for increased competition for hollows from other species that are displaced.

With implementation of the additional mitigation measures described above, I consider that the risks and potential impacts on Regent Parrot can be acceptably managed for both projects.

Consideration of overall improvement to biodiversity

As discussed in sections 4.2 and 6.2 of my assessment, the proponent undertook an assessment of overall improvement to biodiversity (AOIB) for each project (ER Attachments V and VI). The AOIB reports were intended to demonstrate the expected benefits of each project and support the decisions regarding the proposed alternative arrangement to offsets.

Based on the findings of the AOIB reports, the ER stated that for Vinifera it is expected that 331 ha of floodplain vegetation would receive improved frequency and duration of inundation under the 20,000 megalitres per day (ML/day) scenario and that there is the potential to benefit 2,159 large trees within the maximum inundation area. At Nyah, it is expected that 470 ha of floodplain vegetation would receive improved frequency and duration of inundation under the 25,000 ML/day scenario and it is expected that 3,193 large trees may benefit within the Nyah maximum inundation area.

The SIAC concluded that it is likely the increased frequency and duration of inundation achieved through the implementation of the Vinifera and Nyah projects has the potential to improve the health of most floodplain vegetation in the proposed inundation areas, and, overall, the projects are likely to result in an overall improvement to the biodiversity values of the floodplains. However, the SIAC highlighted that there is uncertainty in both the extent and timeframes of beneficial outcomes that may be realised as a result of both projects. As discussed in sections 6.1 and 6.2 of my assessment, the SIAC recommended additional work to address specific uncertainties relating to floodplain hydraulics and floodplain ecology, with the results of this work to be used to confirm the extent of benefits. Specifically, the SIAC recommended the addition of EDS SW4 and amendments to EDS GS1 which requires further assessment and analysis to address the uncertainties surrounding the implications of hydraulic effects for floodplain vegetation. The intent of this further work is to provide an appropriate level of certainty regarding preferred and tolerable water regimes to inform initial operating scenarios and adaptive management.

In my assessment, I recommend the findings of this further work required by EDS SW4 and EDS GS1 should then be used to update the AOIB reports, prior to final decision-making on the alternative arrangement to state offsets, set out in the proposed incorporated document designed to establish state approval for the two projects.

Approval decisions under the EPBC Act should, as appropriate, consider the outcomes of the additional analysis that I have recommended relating to floodplain hydraulics and any implications for relevant floodplain vegetation, as described further in sections 6.1 and 6.2 of this assessment, particularly for any instances where assumed positive effects may be considered as a mitigation and compensatory measure for impacts to threatened species and communities protected under the EPBC Act.

Other MNES species

My assessment of other relevant MNES species under the controlling provisions (with a likelihood of occurrence in either project area of 'possible' or higher) is provided in Table A2. For all species in this table, project effects are considered to be unlikely, low or positive, and significant impacts under the Significant Impact Guidelines 1.1 are considered to be unlikely.

The ER also included an assessment of a number of EPBC-listed species that are unable to be considered under DCCEEW's assessment as they were not triggered as controlling provisions at the time of the referral decision (migratory species) or were listed after the referral decision was made (see EPBC Act s158(A)4). These included:

- Migratory species: including, but not limited to Australian Gull-billed Tern and Fork-tailed Swift; and
- Mallee Bird Community of the Murray Darling Depression Bioregion.

My assessment of migratory species is provided in Table A3 for those with a likelihood of occurrence in either project area of possible or higher. For all species in this table, impacts from both projects are considered to be unlikely and significant impacts under the Significant Impact Guidelines 1.1 are also considered to be unlikely.

For the Mallee Bird Community of the Murray Darling Depression Bioregion, the ER outlined that no adverse effects are expected as the community occurs in mallee vegetation which occurs within the broader project areas. Little, if any, of the associated mallee vegetation community occurs within the maximum inundation area for either project, and the community is considered unlikely to occur in the construction footprints and therefore is not expected to be impacted by construction. Species associated with community may experience benefits to foraging opportunities and improved habitat conditions when environmental water is present. I agree with this finding.

A number of species and communities which are either present or possibly present within the Vinifera and Nyah projects have been listed as threatened under the EPBC Act since the original referral decision for the projects. As the referral

decision pre-dated the listing of these species and communities, they will not be a consideration for the Australian Government Minister in making an approval decision under the EPBC Act. Relevant species and communities include:

- Major Mitchell's Cockatoo *Lophochroa leadbeateri* (endangered)*;*
- Diamond Firetail *Stagonopleura guttata* (vulnerable);
- Hooded Robin *Melanodryas cucullata cucullata* (endangered);
- Brown Treecreeper *Climacteris picumnus victoriae* (endangered);
- Murray Mallee Striated Grasswren *Amytornis striatus howei* (endangered);
- Southern Whiteface *Aphelocephala leucopsis* (endangered);
- Blue-winged Parrot *Neophema chrysostoma* (vulnerable);
- Grey Snake *Hemiaspis damelii* (endangered); and
- Threatened Ecological Community - Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (critically endangered).

As these species are also either listed under the FFG Act and/or belong to the FFG Act-listed Victorian Temperate Woodland Bird Community, they are discussed in Section 6.2 of this assessment.

Table A2 Summary of assessment of other MNES species (with a likelihood of occurrence in either project area of possible or higher)

Species	EPBC Status	Project	Potential impacts (ER assessment)	Potential positive effects (ER assessment)	Relevant EDSs	ER assessment of significant effects	Minister's assessment
Australian painted snipe	Endangered	Vinifera	Impacts unlikely	Project operation would result in increased habitat availability when environmental water is present.	EMF1; EMF2; EMF3; AQ1, CM1a; CM1b; CM1c; E1; E2a; E2b; E2c; E3; GS2; GW1; NV1; RU1; SW1, SW2	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.
		Nyah	Impacts unlikely	Project operation would result in increased habitat availability when environmental water is present.	EMF1; EMF2; EMF3; AQ1, CM1a; CM1b; CM1c; E1; E2a; E2b; E2c; E2e; E3; GS2; GW1; NV1; RU1; SW1, SW2	Impacts unlikely	
Growling grass frog	Vulnerable	Vinifera	Impacts unlikely	Project operation would result in increased habitat availability, encouraging recolonisation.	EMF1; EMF2; EMF3; AQ1; CM1a; CM1b; CM1c; E1, E2a; E2b; E2c; E2e; E3; GS2; GW1; NV1; RU1; SW1; SW2	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.
		Nyah	Impacts unlikely	Project operation would result in increased habitat availability, encouraging recolonisation.	EMF1; EMF2; EMF3; AQ1; CM1a; CM1b; CM1c; E1, E2a; E2b; E2c; E2e; E3; GS2; GW1; NV1; RU1; SW1; SW2	Impacts unlikely	
Painted Honeyeater	Vulnerable	Vinifera	Permanent and temporary loss of localised small areas of foraging and	Potential benefit from environmental watering.	EMF1; EMF2; EMF3; AQ1; CM1a; CM1b; CM1c; E1; E2a; E2b; E2c; E2d; E2e; E3; GS2; GW1; LV3; NV1; RU1; SW1; SW2	Impacts unlikely to be significant under the EPBC Act.	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.

Species	EPBC Status	Project	Potential impacts (ER assessment)	Potential positive effects (ER assessment)	Relevant EDSs	ER assessment of significant effects	Minister's assessment
			perching habitat from construction.				
		Nyah	Permanent and temporary loss of localised small areas of foraging and perching habitat from construction.	Potential benefit from environmental watering.	EMF1; EMF3; AQ1; CM2; E1; E2a; E2b; E2c; E2d; E2e; GS2; GWI; NV1; RU1; SW1	Impacts unlikely to be significant under the EPBC Act.	
White-throated Needletail	Vulnerable	Vinifera	No impact expected	Project operation may extend and improve the condition of wetland habitat and by increasing the abundance of invertebrate prey	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for this project.
Winged Peppercress	Vulnerable	Vinifera	No impact expected	Project operation is expected to promote growth and recruitment of the species by increasing the extent of suitable habitat available	EMF1; EMF2; EMF3; AQ1; CM1a; CM1b; CM1c; E1; E2a; 2d; E3; E4a, GS2; GW1; RU1; SW1; SW2	Impacts unlikely to be significant under the EPBC Act.	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.
		Nyah	No impact expected	Project operation is expected to promote growth and recruitment of the species by	EMF1; EMF2; EMF3; AQ1; CM1a; CM1b; CM1c; E1; E2a; E2d; E3; E4a GS2; GW1; RU1; SW1; SW2	Impacts unlikely to be significant	

Species	EPBC Status	Project	Potential impacts (ER assessment)	Potential positive effects (ER assessment)	Relevant EDSs	ER assessment of significant effects	Minister's assessment
				increasing the extent of suitable habitat available		under the EPBC Act.	

Table A3 Summary of assessment of EPBC-listed migratory species (with a likelihood of occurrence in either project area of possible or higher)

Species or community	EPBC Status	Project	Potential impacts (ER assessment)	Potential positive effects (ER assessment)	Relevant EDSs	ER assessment of significant effects	Minister's assessment
Australian Gull-billed Tern	Migratory	Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for this project.
Caspian Tern	Migratory	Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for this project.
Common Greenshank	Migratory	Vinifera	No impacts expected	Project operation may extend and improve the condition of wetland habitat and by increasing the abundance of invertebrate prey	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant

Species or community	EPBC Status	Project	Potential impacts (ER assessment)	Potential positive effects (ER assessment)	Relevant EDSs	ER assessment of significant effects	Minister's assessment
		Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	impacts are unlikely for both projects.
Fork-tailed Swift	Migratory	Vinifera	No impacts expected	Project operation may extend and improve the condition of wetland habitat and by increasing the abundance of invertebrate prey	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.
		Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	
Glossy Ibis	Migratory	Vinifera	No impacts expected	Project operation may extend and improve the condition of wetland habitat and by increasing the abundance of invertebrate prey	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.
		Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	
Latham's Snipe	Migratory	Vinifera	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for both projects.
		Nyah	No impacts expected	Project operation may extend and improve the condition of wetland habitat and by increasing the abundance of invertebrate prey	E2a; E2d; E3	Impacts unlikely	
Marsh Sandpiper	Migratory	Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant

Species or community	EPBC Status	Project	Potential impacts (ER assessment)	Potential positive effects (ER assessment)	Relevant EDSs	ER assessment of significant effects	Minister's assessment
							impacts are unlikely for this project.
Sharp-tailed Sandpiper	Migratory	Nyah	No impacts expected	Likely to benefit from environmental watering	E2a; E2d; E3	Impacts unlikely	Agree with ER that, with implementation of the proposed EDSs, significant impacts are unlikely for this project.

A.2 Assessment

It is my conclusion, taking account of the findings and recommendations of this assessment, that:

- With implementation of the proposed EDSs including amendments recommended by the SIAC and this assessment, both the Vinifera and Nyah projects are not expected to have a significant impact on any MNES, with the exception of likely significant impacts on the Regent Parrot.
- The project will likely have a significant residual impact on Regent Parrot for both projects due to the loss of 5 ha of potential breeding habitat and 13 ha of foraging habitat for Vinifera, and loss of 6 ha of potential breeding habitat and 14 ha of foraging habitat for Nyah. I have recommended further analysis and mapping of breeding sites, foraging habitat within the broader landscape and movement corridors which should be used to inform further avoidance and minimisation of direct impacts on habitat and help determine the likelihood of the habitat impacted by the projects to be used by the species for breeding in the future. Any habitat that cannot be avoided must be offset in accordance with federal offset requirements, where relevant. With implementation of the additional mitigation measures recommended by the SIAC and this assessment, I consider that the risks and potential impacts on Regent Parrot can be acceptably managed.
- Assessment of cumulative impacts on MNES for both the Vinifera and Nyah projects in conjunction with the seven other VMFRP projects has been undertaken and provide an understanding of potential cumulative impacts on MNES. Habitat loss for Regent Parrot from construction of Vinifera and Nyah will add cumulatively to the predicted adverse effects of construction from the two EES Central projects proposed as part of VMFRP (Hattah Lakes North and Belsar-Yungera), along with any impacts from the projects which are yet to be assessed. Cumulative impacts from water quality, hydrological changes and salinity on protected matters such as Murray Cod and Silver Perch remain a concern for the VMFRP projects. I consider these cumulative impacts acceptable with implementation of the proposed EDSs and monitoring measures. I have recommended further monitoring to help ensure these potential cumulative impacts can be effectively monitored and managed via the adaptive management processes proposed for the projects.
- Positive effects of both projects on floodplain vegetation within the inundation area during operations may be able to serve as EPBC offsets for any significant residual impact on Regent Parrot, if this is considered by DCCEEW to be appropriate, during the EPBC Act approval decision.
- Approval decisions under the EPBC Act should consider the outcomes of the additional analysis that I have recommended relating to floodplain hydraulics and relevant implications for floodplain vegetation, as described further in sections 6.1 and 6.2 of this assessment.

I also note further work is being progressed to understand cumulative impacts for five of the VMFRP projects that are still progressing through accredited environmental assessment processes. DCCEEW will need to determine the extent to which these are helpful in assisting with the understanding of cumulative impacts on key MNES from either the Vinifera and/ or Nyah projects.

Appendix B - Environmental delivery standards and monitoring requirements

The SIAC recommended specific changes to several proposed environmental delivery standards (EDSs) and monitoring requirements in response to submissions and through their analysis of the issues.

Tables B1 and B2 below contain the proponent's final day version of the EDSs and monitoring requirements (respectively), that were tabled at the SIAC hearing (Tabled Document 84). The below tables incorporate the recommended changes from the SIAC as shown in Appendix F of the SIAC report. These changes are denoted as either 'additions' and/or '~~deletions~~'. I generally support all changes recommended by the SIAC relevant to the Vinifera and Nyah projects except where qualified in Tables B1 and B2.

Further details regarding my findings and responses summarised in this table are contained in the relevant sections of this assessment and Appendix A regarding MNES.

Table B1 Recommended changes to environmental delivery standards.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Environmental Management Framework				
EMF1	**Environmental Management System** Develop, prepare and implement an Environmental Management System that is consistent with AS/NZS ISO 14001:2015 Environmental management systems – Requirements with guidance for use through the design and construction of the Projects.	Design, Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
EMF2	**Construction Environmental Management Plan** Prepare and implement a project specific Construction Environmental Management Plan and other relevant sub-plans as required by the Environmental Delivery Standards and in accordance with the Environmental Management Framework. The development of the Construction Environmental Management Plan and sub-plans must include consultation with relevant stakeholders as listed in the Environmental Management Framework and as required under any statutory approvals. ~~Allowance of sufficient review time in agreement with the relevant stakeholders is to be included in the development process timeline.~~ The Construction Environmental Management Plan and all sub-plans shall be prepared or approved by Lower Murray Water before construction commences. The Plan and all sub-plans will be audited for compliance by the Independent Environmental Auditor.	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
EMF3	**Operational management** Operate the Projects in accordance with the following documents (or equivalent) within the environmental watering framework in accordance with the Environmental Management Framework and as applicable to the relevant project: • Operation Environmental Management Plan • Environmental Water Management Plan • Seasonal Watering Plan • Operating Plan • Operations and Maintenance Plan. The development of the Operational management plans must include consultation with relevant stakeholders as listed in the Environmental Management Framework and as required under any statutory approvals. Allowance of sufficient review time in agreement with the relevant stakeholders is to be included in the development process timeline.	Operation	Mallee CMA LMW	Supported.
EMF4	**Operation performance management** Operation of the projects will be monitored, evaluated and reported on in accordance with: • Operation Environmental Management Plan • Ecological Monitoring, Evaluation and Reporting Plan • Socio-economic Monitoring, Evaluation and Reporting Plan • Environmental Watering Management Plans Annual Operational Environmental Performance Reports will be prepared to report on performance against the EDSs and other operational obligations. As part of this process the Plans will address the management of, and access to, baseline and monitoring data. Implement a process to ensure that the outcomes of the monitoring, evaluation and reporting inform adaptive management of environmental watering events as per the Environmental Watering Management Plans.	Operation	Mallee CMA	Supported. In addition to the current reporting commitments outlined in the exhibited EMF, I recommend amending the final EMF to state that the full operational environmental performance reports are provided to the Victorian Minister for Environment as well as the Minister for Planning and published on the DEECA website.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Aboriginal cultural heritage				
ACH1	**Cultural Heritage Management Plan** Comply with the Cultural Heritage Management Plans, No. 16900 (Nyah) and No.16901 (Vinifera) approved by First Peoples – State Relations under the *Aboriginal Heritage Act 2006*.	Design, ~~and~~ construction and operation	LMW Contractor	The EDS is supported. However, the amendment recommended by the SIAC is not supported given the CHMPs do not cover activities during the operations phase (see Section 3.3 of my assessment).
ACH2	**Connection to Country** Integrate Aboriginal knowledge, values, and aspirations into the planning, delivery and evaluation of the Burra Creek, Nyah and Vinifera projects. Create opportunities for enhancing and sharing cultural connection to Country.	Design, construction and operation ~~and construction~~	Mallee CMA Parks Victoria	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
ACH3	**Cultural Heritage Management – Operation** 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: • 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). 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).	Operation	Mallee CMA	Supported.
Air quality				
AQ1	**Construction air quality management: dust** 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 *Environment Protection Act 2017*, subordinate legislation and other relevant statutory requirements and guidelines. Measures to include: • A process for confirming all sensitive receptors within 350 metres of active construction sites	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah

	• 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 and recording of inspection results
	• Contractors will be required to ~~refer to and utilise the following three documents and~~ implement measures where appropriate during the construction phase of the project with reference to, and in accordance with, the following publications:
	  - 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.
	
	Reactive dust monitoring is required at these locations only while construction and/or haulage is being undertaken (i.e. not required outside of working hours). If fine dust particles are measured to exceed PM_{10} of 100 ug/m^3 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.			

AQ2	**Dust nuisance and complaints**	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	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.			
AQ3	**Pumping equipment** All pumping infrastructure involving diesel plant to be serviced within appropriate servicing frequencies and maintained to manufacturer specifications (where available).	Operation	LMW Mallee CMA	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Bushfire management				
BF1	**Bushfire management during construction** 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 - Forest Fire Management Victoria). The Bushfire Emergency Response Plan must include: • Training and equipment requirements for on-ground personnel • Site access/equipment restrictions and permits that apply according to the Fire Danger Rating • Pre work assessment (for example a Job Safety Analysis) to incorporate fire ignition risk assessment and controls • Monitoring of bushfire danger by using the Bureau of Meteorology and Victorian and NSW government recommended emergency information sources (e.g. VicEmergency app) • Emergency response actions (including evacuation routes or shelter in place locations) in the event that bushfire is detected on or off site. • Procedures for managing flammable material to prevent ignition, explosion or spread of fire from fuels such as: - Minimisation of storage quantities and use of mobile refuelling where feasible - Storage methods and locations for flammable materials such as fuels, with low radiant heat exposure • Setbacks and vegetation management procedures to provide suitable separation between fuels and combustible materials.	Construction	Contractor	Supported, with amendments to reflect my recommendations regarding consultation and approval of the Bushfire Emergency Response Plan as outlined in Section 5.1 of my assessment.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
BF2	**Bushfire management during operation** Activities associated with the operation and maintenance of project infrastructure with relevance to bushfire ignition, preparedness and management must be undertaken in accordance with existing relevant 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: • 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 to any relevant restrictions as applicable. Before a watering event notify landowners and managers, emergency management agencies and DEECA Forest Fire Management Victoria of the timing and type of event (confirm the watering scenario) regarding any changes to access/egress.	Operation	LMW Mallee CMA Parks Vic (as land manager)	Supported.
Contaminated land, soils and waste				
CM1a	**Contaminated land duties** The Construction Environmental Management Plan must include processes and procedures to manage contaminated land, spoil and waste in accordance with land manager processes, procedures and requirements and the requirements of the *Environment Protection Act 2017*, the Environment Protection Regulations 2021, and the following publications as appropriate and as amended or replaced from time to time: • EPA Victoria, 2022, Publication 2008 Notifiable contamination guideline – Duty to notify contaminated land • EPA Victoria, 2021, Publication 1827.2 Waste classification assessment protocol	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	• 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. Specifically, the Construction Environmental Management Plan must include: • A framework for managing contamination risks to achieve compliance with the contaminated land duties, including the General Environmental Duty, duty to manage contaminated land and duty to notify the EPA of contamination. • A framework for monitoring baseline and post-construction conditions to measure compliance with the duties and assess whether contamination has occurred as a result of the project • A framework for managing waste to achieve compliance with the Duties and regulatory requirements including classification, transportation and disposal at a lawful place. This will include minimisation of 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: - Creating and maintaining a dangerous goods register			

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	- 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. • 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 Work Health and Safety (WHS) Act and Regulations and Safe Work Australia.			

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
CM1b	**Water, Soils and Waste Management Sub-plan** A Water, Soils and Waste Management plan must be prepared as a sub-plan to the Construction Environmental Management Plan to: • Comply with the General Environmental Duty as per the Environment Protection Act 2017 • Identify spoil management options and / or off-site disposal in accordance with regulatory requirements including details of reuse options for all categories of spoil expected to be generated through 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: - 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
CM1c	**Soil characterisation** 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: • 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) This characterisation will include: • Review of desktop information (including the ER Central Geology, Soils and Contamination Specialist Assessment and any further information provided from land managers, through the design process and other information that may have changed, for example, publicly available information such as from EPA Victoria) • Site walkover across the locations identified above, with a particular focus on visual or olfactory signs of contamination such as staining, spills, dumped waste or stockpiles of soil • Depending on the outcomes of the tasks above, targeted soil sampling at locations identified as having potential to contain contaminated material. The outcomes of this characterisation will inform construction control measures, inform the re-use of soil, and/or to classify material in accordance with EPA waste guidelines. Soil will be managed in accordance with the Water, Soils and Waste Management Sub-plan as per EDS CM1b.	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
CM2	**Acid sulfate soils** The Construction Environmental Management Plan must include an Acid sulfate soil management plan (ASMP). The ASMP must be prepared in accordance with the following where relevant: • National Guidance for the Management of Acid Sulfate Soils in Inland Aquatic Ecosystems • Guidance for the dewatering of acid sulfate soils in shallow groundwater environments • Environment Protection Act 2017 General environmental duty • Environment Protection Regulations 2021 • National Acid Sulfate Soils Guidance – A synthesis • National acid sulfate soils sampling and identification methods manual • Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management • Land manager policies and requirements. The ASMP must include measures to: • Identify areas of acid sulfate soils and potential acid sulfate soils within the proposed construction footprint • Characterise and manage acid sulfate soils in accordance with: - 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.	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
CM3	**Contaminated land duties** The Operation Environmental Management Plan must include processes and procedures to manage contaminated land, spoil and waste in accordance with land manager processes, procedures and requirements, 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: • 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: - 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: ➢ 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
RU1	**Waste management** Develop and implement management measures for resource use and waste (excluding soils) minimisation during construction and operation in accordance with the EPA waste management hierarchy and management options, to address: • Litter management • Construction and demolition wastes • Organic wastes.	Operation and construction	LMW Mallee CMA	Supported.
Biodiversity, ecology and native vegetation				
E1	**Native vegetation and habitat design minimisation** Avoid and, where avoidance is not practicable, minimise native vegetation removal and ensure that the removal of native vegetation will not exceed 12.844 ha for the Vinifera project, 14.118 ha for the Nyah project, and 21.599 ha for the Burra Creek project. The following measures to avoid and minimise impacts to native vegetation (including habitat fragmentation) are to be implemented as part of detailed design and construction planning phases including: • Further assessment of relevant alternatives through the detailed design process and selection of construction methods with potential to further avoid and minimise impacts on native vegetation, large trees and habitats of threatened species, including within 30 metres of the top of the Murray River Bank. • 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	Design and construction	Contractor	Generally supported, with the following recommendations: • Adjust requirement for further avoidance and minimisation of vegetation clearance to encompass both identified alternatives and any others wherever possible, explored through detailed design, and then construction. • Amend EDS E1 to include a requirement that the further consideration of opportunities to reduce impacts on riparian areas (including within 30m of the top of the Murray River bank) ensures that trade-offs between environmental values are appropriately considered, in consultation with relevant stakeholders and experts, however it will need to be ensured that any changes to the footprint do not result in increased impacts to environmental values from those presented in the ER for each project.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah

	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.)
	
	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.
				• 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.
				• Add requirement to undertake further analysis and mapping to clarify the landscape context for Regent Parrot, and likelihood for potential breeding habitat to be used by the species in the future, such as whether the project areas include the breeding requirements outlined in the Recovery Plan including:
				  ○ Mallee woodlands within 20 km and ideally within 5 km of nest sites for foraging;
				  ○ Treed flight corridors between potential nesting habitat (i.e. large River Red Gums, generally within 120 m of water for nesting) and the Mallee woodland habitat; and
				  ○ Further identification of historic and potential nesting trees, with reference to potential nesting locations identified in Regent Parrot habitat maps in Appendix I to Specialist Appendix B of the ER.
				• Add requirement for submission of a report documenting the outcomes of the further analysis and mapping described above to DCCEEW and DEECA Loddon Mallee Region, to inform both related approvals and any necessary conditions for further mitigation as part of those (see below).

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				• Add requirement that, informed by findings of the further analysis described above, implement measures to avoid and minimise impacts on Regent Parrot including: o As part of the further assessment of relevant alternatives through the detailed design process to further avoid and minimise impacts on biodiversity values as recommended by the SIAC, consider opportunities for the projects to specifically reduce impacts on Regent Parrot habitat (particularly impacts on active or potential nesting trees and habitat in their vicinity); o Conduct removal/lopping/felling of potential and active nesting trees, if required, outside the breeding season; and o Schedule construction activities to avoid active construction within 350m of active nesting trees during the breeding season (spring/early summer). Active construction includes construction activities associated with track upgrades and new track construction, but does not include construction vehicle transit, where vehicles are using tracks for access to construction sites or routine track maintenance.
E2a	**Construction biodiversity administrative processes** Develop and implement a Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2). The Native Flora and	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	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: • The matters required by EDS E2b, E2c, E2d, E2e and E2f • 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: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DEECA as relevant - Notify a suitably qualified ecologist to determine the significance of any potential impacts - Seek any relevant approvals from the relevant authority if removal/impacts cannot be avoided. • Should works be required outside the approved Construction Footprint, follow the change process as detailed in the Construction Environmental Management Plan which includes consideration of biodiversity (e.g. native vegetation, threatened species) implications, including approval requirements, re-quantification of impacts.			
E2b	**Construction vegetation management** The Native Flora and Fauna Management Sub-Plan must include the following requirements for vegetation removal activities: • Clearly identify the trees to be removed. Trees that may be or are to be retained, must not be marked in any way • Delineate no-go zones incorporating Tree Protection Zones of Large Trees and threatened flora species populations to be retained to prevent access during construction	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	• 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: - 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.			
E2c	**Construction fauna management** The Native Flora and Fauna Management Sub-Plan must include the following requirements for terrestrial and aquatic fauna management during construction:	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	• 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: - 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: - 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			

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	- 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.			
E2d	**Construction weed and pest management** • The Native Flora and Fauna Management Sub-Plan must include the following requirements and measures to mitigate weed (terrestrial and aquatic) and pathogen introduction and spread: • Vehicle, personnel, material and equipment hygiene protocols (including measures required to prevent the spread or transmission of Chytrid Fungus as per Hygiene protocols for the control of diseases in Australian frogs (Murray et al. (2011)) • Weed, pest animal and pathogen management and monitoring and reporting requirements. • 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. These measures must be auditable and linked to management outcomes such as: • Identify CaLP Act listed weeds in the construction area and assess the risk of additional spread prior to relocating topsoil. Implement measures to manage this risk during clear and grade, and reinstatement • To a reasonable extent practicable during the clear and grade phase, ensure that vehicles and plant are free of soil (dust/clods) and vegetation prior to entry and exit from the construction area • Evaluate disturbed areas post-construction and implement rehabilitation in accordance with EDS E2e. • To avoid and prevent spread of pathogens, all vehicles and plant undertaking construction works directly in the watercourse must be cleaned and free of soil prior to entrance of each waterway and on exit if working between multiple waterways (excluding vehicles and plant using the constructed access route).	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah

E2e	**Construction rehabilitation management**
	
	The Native Flora and Fauna Management Plan must include the following requirements for rehabilitation following construction:
	
	• Development and implementation of a hollow replacement plan that is:
	  - to provide for nominated priority fauna species on the basis of suitable evidence of their habitat requirements
	  - to be implemented progressively over a ten-year period with appropriate monitoring to ensure its cost-effectiveness
	  - to the satisfaction of the Secretary of DEECA
	• 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
	
	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.
		Construction	Contractor	Generally supported, including additions to specify that the hollow replacement plan:
				
				• be prepared to the satisfaction of DEECA (specifically, the DEECA Regional Director, Loddon Mallee Region);
				• requires supplementary nesting sites/artificial hollows to be installed in adjacent areas prior to the removal of large hollow-bearing trees;
				• requires the number and type of artificial hollows to be installed to be commensurate with the number and type of utilised hollows estimated to be removed, as determined by a qualified zoologist, based on available scientific knowledge;
				• requires the agreed location and specification of artificial hollows to be incorporated into site maps and as a Project GIS layer prior to the commencement of works; and
				• requires monitoring and adaptive mitigation measures to determine and respond to the success/failures of artificial hollows.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
E2f	**Aquatic fauna management** In addition to the handling and salvage protocols for aquatic fauna as detailed in EDS E2c implement the following: • Where works in waterbodies require coffer-damming that completely blocks the waterway: - 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	Supported.
E3	**Pest Plant and Animal Monitoring and Management Plan** Prepare (prior to the commencement of operation) and implement a Pest Plant and Animal Monitoring and Management Plan to detect and manage terrestrial and aquatic pest presence and activity due to managed environmental watering events, including carp. The Plan may be prepared for multiple VMFRP projects, and will include: • 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.	Operation	Parks Victoria	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	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.			
E4a	**Overall biodiversity improvement – Vinifera** Operate the Vinifera project to better align the frequency, duration and timing of managed inundation events with the ecological needs of the floodplain, including to improve ecosystem function, threatened species' habitat and native vegetation. Operation of the projects, including the monitoring and reporting of outcomes, is to be undertaken in accordance with the principles of adaptive management through the following documents (or successors, as applicable): • 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
E4b	**Overall biodiversity improvement – Nyah** Operate the Nyah project to better align the frequency, duration and timing of managed inundation events with the ecological needs of the floodplain, including to improve ecosystem function, threatened species' habitat and native vegetation. Operation of the projects, including the monitoring and reporting of outcomes, is to be undertaken in accordance with the principles of adaptive management through the following documents (or successors, as applicable): • 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Groundwater				
GW1	**Construction groundwater management** The Construction Environmental Management Plan must include measures to manage groundwater impacts in accordance with the requirements under the *Environment Protection Act 2017,* subordinate legislation and other relevant statutory requirements and guidelines. Measures must include: • 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
GW2	**Operational groundwater management** 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 *Basin Salinity Management 2030* or its successor. The groundwater monitoring should include wells or bores within the Projects' areas, including parts of each Project's area that are expected to be the most sensitive to groundwater rise or salinity increase, with a sufficient number of monitoring wells or bores within each Water Management Area to adequately detect and interpret any changes in water levels and salinity. The operation of the Projects should be reviewed and, if necessary, modified through adaptive management, if a significant trend of increasing salinity or related effects is identified at any of the monitoring sites.	Operation	Mallee CMA	Supported, with the vegetation impact from the additional wells or bores to be considered in the updated impact figures for EDS E1.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Historic heritage				
HH1	**Management of Historical Heritage during construction** The Construction Environmental Management Plan must include: • An unexpected finds protocol that specifies measures to avoid and minimise impacts on any previously unidentified historical archaeological sites and values discovered during construction. The 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	Supported.
HH2	**Management of Historical Heritage during operation** In accordance with the *Heritage Act 2017*, manage historical heritage impacts including: • 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 Heritage Act 2017 where an archaeological site is to be disturbed, and comply with the conditions of that consent.	Operation	Mallee CMA Parks Victoria	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Landscape and visual				
LV1	**Avoid and minimise visual impacts through design** 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.	Design and construction	Contractor	Supported.
LV2	**Avoid and minimise visual impacts during construction** 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.	Construction	Contractor	Supported.
LV3	**Minimise construction and operation lighting impacts** 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). 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)).	Construction and operation	Contractor Mallee CMA	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Noise and vibration				
NV1	**Construction noise and vibration management** The Construction Environmental Management Plan must include process and measures to ensure the risk of harm from construction noise and vibration is minimised so far as reasonably practicable at all times in accordance with the obligations under the *Environment Protection Act 2017*, 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: • 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: - 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 - the justification for proposed out of-hours unavoidable works is consistent with the definition of unavoidable works in the CCBD guide	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	- the justification for proposed out of-hours managed impact works is consistent with the definition of managed impact works in the CCBD guide - all reasonably practicable measures will be implemented to mitigate noise and vibration and their impacts, including contingency measures wherever relevant. • Inform the community on work scheduling and working hours in accordance with EDS SB1 and advise local residents when unavoidable out-of-hours work would occur • Provide the opportunity for the community to raise issues / concerns and respond to these in accordance with EDS SB1 • Setting speed limits for construction vehicles (in accordance with EDS TT2) to minimise vibration and noise effects • Prior to the commencement of vibration intensive works (such as compaction, sheet piling, rock breaking), prepare a risk assessment to inform the need to undertake dilapidation survey(s).			
NV2	**Operational noise management** Noise and vibration from operation and commissioning (e.g. pumps) must be minimised as far as reasonably practicable and be within established limits as set by the Noise Limit and Assessment Protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (EPA Publication 1826).	Operation	Mallee CMA	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Social and business				
SB1	**Community and Stakeholder Engagement Management Plan** Prior to construction (other than preparatory buildings and works), develop and implement a Community and Stakeholder Engagement Management Plan to engage and consult the community and affected stakeholders and discuss progress and timing of construction activities. The Community and Stakeholder Engagement Management Plan must include measures to: • Provide advanced notification to relevant Councils and land managers to allow communication of upcoming construction activities, their timing and duration to direct visitors away from the construction footprint where appropriate. • Provide advanced notification to potentially affected stakeholders (i.e. private landowners and leaseholders) of the extent and timing of access disruptions associated with construction and commissioning activities. • Establish communication protocols to provide adequate notification to the local community, stakeholders, businesses, registered recreational users of the park/forest and emergency response organisations prior to access disruptions and communicate alternate access arrangements. • Notify relevant agencies (e.g. 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 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.	Construction	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
SB2	**Minimise social and business impacts – Construction** Where recreation facilities are displaced or potentially affected by access restrictions or amenity impacts, work in collaboration with land managers, relevant Councils and other relevant authorities to identify relocation opportunities with the objective to maintain the continuity of affected facilities and activities, as far as reasonably practicable.	Construction	Contractor	Supported.
SB3	**Communication and Stakeholder Engagement activities – Operation** Catchment Management Authorities to continue to deliver communication and stakeholder engagement activities in accordance with Victoria's Catchment Management Authorities Community Engagement and Partnership Framework and Toolkit. Communication and engagement during the operation of the project must include: • Advanced notification to relevant Councils and land managers to allow communication of upcoming operational activities, their timing and duration to direct visitors away from inundation areas where appropriate. • Advanced notification to potentially affected private landowners and leaseholders of the extent and timing of access disruptions associated with commissioning and operational activities. • Advanced notification to the local community, stakeholders, businesses and registered recreational users of the park/forest and emergency response organisations prior to access disruptions and communicate alternate access arrangements. • Advanced notification to relevant agencies (e.g. DEECA) so that they can engage with license holders (i.e. apiary and other) to provide information on the timing of watering events. • A process to receive queries or complaints and respond to these. • A protocol for how community expectations regarding potential adverse effects, in particular adverse anoxic (blackwater) events, will be managed at identified stages of inundation events. Timing and type of notification to potentially affected stakeholders will be agreed prior to the commencement of operation, and may be amended from time to time, subject to agreement	Operation	Mallee CMA	Supported, with the recommendation to include a commitment to prepare and implement an overarching communication and engagement plan (or similar) for the operation phase for the projects. The scope and requirements for review and approval of the plan should be specified in the EMF, as per the other environmental management documentation.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Surface water				
SW1	**Surface water management – Construction** The Construction Environmental Management Plan must include processes and measures to manage surface water in accordance with the relevant requirements of the *Environment Protection Act 2017*, 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: • 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. * Designated waterways are named or unnamed, permanent or seasonal, and range in size from a river to a natural depression.	Construction	Contractor	Supported.

SW2	**Surface water management – Operation** In accordance with the Water Act 1989, operate the project within the Victorian annual environmental water management cycle and, at the local level, be guided by site specific Operating Plans developed to outline the operational arrangements including identification of overarching operating risks and mitigation measures associated with the delivery of environmental water. The Catchment Management Authority is to develop the Operating Plan in consultation with relevant stakeholders prior to the first watering event. Operation of the project to consider and seek to avoid, minimise and manage where practicable risks of producing adverse water quality, or ecological or erosion outcomes from managed inundation events, and in particular: • Protracted hypoxic or anoxic water quality conditions or excessive algal growth • Constraining the breeding and movement of native fish, including stranding of native fish on the floodplain during drawdown events • Stimulating the proliferation of introduced or pest plants or animals (including Carp) • Excessive erosion during inundation filling and drawdown. Relevant measures will include but not be limited to the following: • Factor seasonal implications in the timing of filling and drawdown for managed inundations, where practicable timing filling to occur in winter with drawdown prior to the onset of warmer conditions to reduce the likelihood of creating suitable breeding conditions for Carp and to reduce the risk of hypoxic or anoxic blackwater events and algal blooms. • Maintain throughflow during managed inundation if appropriate and possible to mitigate hypoxic/anoxic conditions • Assess accumulated organic material loads and adjust inundation timing, duration and extent to reduce the risk of a protracted hypoxic or anoxic blackwater event (if larger litter loads are present then consider short inundation with throughflow or consider staged inundation) • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow to reduce the impacts of low dissolved oxygen discharges from the Project areas on the Murray River • Develop and evaluate a native fish exit strategy to allow native fish to migrate from the floodplain	Operation	Mallee CMA	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	• 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 • Develop and evaluate a drawdown strategy to retain Carp on the floodplain • Manage drawdown rates by slowly opening regulators to minimise erosion risks by minimising rapid increases in velocity and shear stress downstream of regulators.			
SW3	**Surface water – Monitoring** 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 *Operating Arrangements for the Environmental Water Holdings of the Murray System* and the Ecological Monitoring, Evaluation and Reporting Plans).	Operation	Mallee CMA	Supported.

SW4	**Surface water – further hydraulic assessment of operational impacts on floodplain vegetation** In addition to the assessment in GS1, undertake hydraulic analysis and assessment of operational impacts on floodplain vegetation to: • better understand the existing distribution of Ecological Vegetation Communities (EVCs) within the maximum inundation area • identify optimal inundation regimes to achieve specific outcomes for EVCs • assess potential losses of vegetation that could result from managed inundation regimes. This assessment is to include measures to: • determine the frequency and duration of flood events that would inundate each EVC under relevant flow scenarios • analyse the location, maximum extent, durations and depths of inundation of different EVCs for representative flood events, using both mapped and tabular presentations as appropriate • assess the preferred frequencies, durations and depth ranges of inundation for each EVC based on the hydraulic analysis of existing patterns • map the extent of appropriate watering in the preferred depth range, "over-" and "under-watering" of each EVC within the MIAs, relative to the preferred EVC inundation depths, for representative flood events. The hydraulic analysis is to use a suitably refined and calibrated hydraulic model, and to apply scenarios for future flows reflecting the Basin Plan (with SDLAM projects) and reasonable climate change outcomes. The outcomes of this hydraulic analysis and vegetation assessment are to be used to inform: • development and implementation of the OEMP, including any necessary operational changes • relevant requirements under the Incorporated Document for the projects under the Swan Hill Planning Scheme.	Design	LWM	Supported, including additions to specify that the hydraulic analysis should: • be undertaken prior to detailed design; • inform the minimisation of erosion and sedimentation through design (EDS GS1) and operation (EDS GS3 and EDS SW2); • include mapping of key hydraulic parameters (depth, velocity and shear stress) for each operating scenario (including managed inundation events and comparable natural and existing flooding events) at key stages of managed inundation events (including filling, holding and releasing with regulators closed and open); and • include using 'difference maps' 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.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
SW5	**Surface water design – regulators, containment banks and spillways** The design of the regulators should ensure that suitable flow velocities are provided to enable the passage of all target species of native fish to the extent reasonably practicable. The design of the containment banks and spillways should facilitate turtle passage.	Design	LMW	Supported.
GS1	**Minimising erosion and sedimentation through design** Design the projects having regard to: • soil characterisation, for example dispersive, saline, reactive and/or soft soils, with the objective of dispersing water flows and minimising water velocities to minimise the potential for erosion and 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 borrow pit site • risks to the stability of the Murray River banks resulting from seepage of water ponded by the Project In addition to the assessment in SW4, undertake a hydraulic assessment of floodplain erosion risks to inform the project design and implementation: • By using a hydraulic model that has been calibrated to reflect local conditions and that is suitably scaled to inform the detailed project design • 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 construction and operation and provide for their mitigation.	Design	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
GS2	**Erosion and Sediment Control Plan** The Construction Environmental Management Plan must include an Erosion and Sediment Control Plan which details measures to: • 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
GS3	**Soils and landform stability** The Operation and Maintenance Plan must identify infrastructure locations (including but not limited to, regulators and containment banks) to be monitored for erosion risk. This monitoring is to inform adaptive management and/or any measures to ensure structural integrity of infrastructure. 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. Monitoring of the stability of the Murray River bank: • in all areas where seepage erosion risks have been identified through investigations for EDS GS1 • in all areas where riparian vegetation removal or other works are undertaken adjacent to the riverbank	Operation	LMW	Supported.
Traffic and transport				
TT1	**Safety in road design** 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.	Design	Contractor	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
TT2	**Traffic Management Plan** Prepare and implement a Traffic Management Plan to minimise disruption during construction in consultation with relevant road management authorities and the land manager. The Traffic Management Plan must clearly outline measures to: • Identify routes for construction haulage and construction vehicles travelling to and from the projects (including within the park(s) and outside) and identify any specific requirements for those routes • Minimise road closures, access restrictions and disruption to all road users and active users • Provide for safe construction practices in accordance with road authority requirements • Specify vehicle speed limits considering safety, 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	Supported.

#	Environmental Delivery Standard	Project phase	Responsibility	Minister's response and recommendation for Vinifera and Nyah
TT3	**Safety during operation – recovery equipment** 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.	Operation	LMW	Supported.
TT4	**Safety during operation – signage** During operation, the land manager is to provide: • Advisory signage on closed or inaccessible tracks • Public advice regarding changes in-park/forest conditions (eg. Via websites).	Operation	Parks Victoria (as Land manager)	Supported.
TT5	**Track maintenance program** Land managers to continue implementing a track maintenance program (according to regional priorities) to facilitate continued safe access for park users and emergency services, consistent with the Fire Access Road Plan required in the Incorporated Document.	Operation	Parks Victoria (as Land manager)	Supported.

Table B2 Recommended changes to monitoring requirements.

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	Minister's response and recommendation for Vinifera and Nyah
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/m3 for a 15 minute average and/or the trigger level identified in EPA Publication 1961 Guideline for assessing and minimising air pollution in Victoria and following an investigation which determines that the dust is attributed to the project construction, then the contractor must temporarily modify or suspend dust generating activities	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				until controls are put in place to avoid and reduce dust.				
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	Supported, with recommendation to require monitoring for medium- and large-bodied native fish within the Murray River and in any sites within the project areas which may support the species.
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.	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	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			Relative numbers of Carp and small-bodied native fish stranded during drawdown phase of managed inundations.			watering is established		
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	Supported.
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	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)	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	connecting the Project areas to the Murray River.							
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.	**Nyah:** WRK119931 WRK119928 WRK119926 **Vinifera:** WRK119926 WRK119930 26271 26182 26155 26156 119389 119388 New groundwater monitoring sites: Establish new groundwater monitoring sites within the Maximum Inundation Areas of both Projects, including at the tree condition monitoring sites for	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	Mallee CMA	Generally supported, with SIAC recommended text be moved to EDS GW1 and M GW1 be updated with bore numbers once the new groundwater monitoring sites are established.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
					M TE9 and in targeted areas that are predicted to be most sensitive to groundwater rise, particularly where there is high groundwater salinity.	confirm the expected effects.		
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	**Nyah:** WRK119931 WRK119928 WRK119926 **Vinifera Forest:** WRK119926 WRK119930 26271 26182 26155 26156 119389 119388 New groundwater monitoring sites: The new monitoring sites established to	~~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	Mallee CMA	Supported, noting that the SIAC recommended changes should be updated with bore numbers once the new groundwater monitoring sites are established.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
					meet the requirements of M GW1	identify appropriate adjustments to the monitoring program. Including re-assessment of performance against modelling results to confirm the expected effects.		
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.	Nyah: North Bank Regulator Vinifera: V1 Regulator	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	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
						identify appropriate adjustments to the monitoring program. Including re-assessment of performance against modelling results to confirm the expected effects.		
M SW1 Surface water	Assess the effect of the project's construction on surface water quality.	C	<u>Routine field based monitoring</u>: 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	Specific monitoring programs for each construction location to be developed and documented in the CEMP prior to project commencement. This will include: Routine monitoring: Assess whether the project's construction is adversely effecting surface water quality and if relevant EDS are being implemented and effective. Thresholds for acceptable levels of change in indicators are provided in Table 16-4	Specific monitoring programs for each construction location to be developed and documented in the CEMP prior to project commencement. This will include: Routine monitoring: For floodplain creeks and the Murray River – Where there is potential for runoff from the active construction sites to a watercourse,	<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. <u>Contingency</u>	Construction contractor	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			be collected for laboratory analysis of nutrients (total nitrogen and total phosphorus), chlorophyll and identification of algal species. <u>Contingency monitoring:</u> 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.	of the ER Central Surface Water Assessment. If monitoring downstream of a construction site shows water quality exceeds values in Table 16-4 and the exceedance is due to construction activities (i.e. a comparison between water quality upstream and downstream of the construction shows compliance upstream but non-compliance downstream) implement contingency actions. Contingency monitoring: Assess whether the project's construction is adversely effecting surface water. The determination of effect should be based on water quality exceeding thresholds in	monitor upstream and downstream of the active area of construction in both immediate receiving waters (floodplain creeks) and the Murray River. Where construction blocks a waterway, monitor within the watercourse both upstream and downstream of that blockage. **For wetlands** – wetlands that receive surface water inflows from the active area of construction and a reference site (if relevant to individual construction locations). Contingency monitoring Upstream and	<u>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.		

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				Table 16-4 of the ER Central Surface Water Assessment that can be attributed to construction activities.	downstream of affected areas, including multiple downstream sites to detect extent of potential impact.			
M SW2 Surface water	Assess the effect of environmental watering on surface water quality on the floodplain and within the Murray River.	O^	Indicators are derived from the VMFRP Ecological MER plan (Sparrow et al. 2020) as covariates for enabling assessment of effects on floodplain biota such as fish during inundation events: Flow In-situ (field based) physico-chemical parameters Electrical conductivity (salinity) Turbidity Dissolved oxygen pH	Specific monitoring programs for each project area and the process for evaluation and reporting against EDS to be developed and documented in the Operation Environmental Management Plan (EDS SW2, SW3) prior to project commencement. This will include: Monitor flow at outlet regulators Monitor changes in surface water quality across the floodplain during a managed inundation event to maximise beneficial	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	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	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			Temperature Visual observations for signs of severe blackwater or excessive algal growth. Parameters requiring laboratory analysis (as needs basis): • Total nitrogen • Total phosphorus • Organic carbon (dissolved and particulate) • Chlorophyll • Algal species identification and quantification (if an algal bloom occurs).	effects and minimise adverse effects to environmental values supported by surface water in areas where sensitive environmental values exist (e.g. native fish and where throughflow to the Murray River occurs). Assess if relevant EDS are being implemented and are effective. Rates of through flow (discharge to the Murray River during the managed inundation event) should be adjusted based on the monitoring results to minimise effects of low dissolved oxygen on the Murray River. Results from managed inundation events should also be used to inform subsequent managed inundation events.	within the return flow prior to entering the Murray River). * immediately downstream of the floodplain return flow and further downstream if adverse effects are detected after floodplain outflows and the Murray River are mixed.	laboratory analysis if in-situ monitoring indicates degraded water quality that could affect sensitive values. The specific site locations will change as the event progresses and may depend on access limitations. Within the Murray River – immediately prior to drawdown from a managed inundation event then weekly during floodplain return flows for in-situ parameters in the Murray River. Spot monitoring for parameters requiring laboratory analysis if in-situ monitoring indicates degraded water quality that could affect sensitive values.		

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
						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 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	Construction footprint with specific focus on waterways	First 12 months following construction unless specified otherwise in the Section 27 consent the under *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 (i.e through section 27 consent)	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				Significance, weeds listed under the CaLP 1994 and those listed as FFG Act threatening processes.				
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 the Pest Plant and Animal Monitoring and Management Plan (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: • 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	Supported.
		O^		Surveillance monitoring of weed infestation occurrence using a	Rapid surveillance at high risk locations as	Annual for at least 15 years, with continued need to	Parks Victoria	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				rapid search at specified search areas. Any other observed significant weed infestations should be added to the surveillance program search areas.	specified in Pest Plant and Animal Management Plan. Report on effectiveness of pest plant control through surveillance program.	be reviewed thereafter every 3 years		
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 will be determined	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
					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	Supported.
M TAE1	To determine the level, duration and extent of the	O*	Inundation of water management areas as described in the ER	Monitor the: - level - duration; and	Within Maximum Inundation Area	At an appropriate interval during the event.	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Terrestrial and aquatic	inundation during each event		Chapter 6 Project description. This includes: • Vinifera: Vinifera WMA – 335 ha. • Nyah: Nyah WMA – 475 ha. • Burra Creek: Burra North WMA - 331 ha, Burra South WMA – 74 ha.	- extent of managed environmental watering events.		CMA/PV to advise on frequency, consistent with current practices.		
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 Plant Functional Groups (PFG) species richness meets target* characteristic PFG cover meets target * For dry wetlands, characteristic PFG species richness meets target*	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	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	Annual quadrat sampling for at least 15 years, with continued need to be reviewed thereafter every 3 years.	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			characteristic PFG cover meets target* **Targets to be defined in the Environmental Water Management Plan*	adjoining the inundated area.	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	Transect sampling within six months of each inundation event for at least 10 years.		
M TE6 Terrestrial ecology	To assess improvement in the understorey of River Red-gum forest and woodland, Black Box woodland and Lignum shrubland in response to environmental watering	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,	10x10 m vegetation quadrats to document species occurrence (including PFGs) and cover- abundance. Saplings counted also.	Sufficient quadrats must be sampled to evaluate the significance of watering effects. The number of quadrats should be weighted according to the extent of EVCs.	Annual for at least 15 years, with continued need to be reviewed thereafter every 3 years	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			characteristic PFG species cover meets target* **Targets to be defined in the Environmental Water Management Plan*		The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP sites. Quadrats should include areas where Black Box and/or Acacia stenophylla (Eumong) canopy have died.			
		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	Supported.
M TE7	To assess the response of native fauna species	O*	Species richness, relative abundance, recruitment, presence of threatened/notable	Wetland birds – complete counts at wetlands, monitoring of breeding events	Wetland birds, woodland birds and frogs at sites established	Wetland birds – during and after every managed	Mallee CMA	Generally supported, with recommendation to update the

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Terrestrial ecology	over time to environmental watering.		species is meets targets* for: Wetland birds Woodland birds Species richness, relative abundance, recruitment, extent of distribution, presence of threatened/notable species meets targets* for frogs * *Targets to be defined in the Environmental Water Management Plan*	(multiple counts required) Woodland birds – 20 min 2 ha counts (multiple counts required) Frogs – acoustic detectors with sufficient sampling to detect a significant effect of watering	through the MER within the MIA The effect of watering is to be determined through comparison with contrasting water regimes at other VMFRP sites.	inundation event (up to 6 trips). Woodland birds – twice annually (spring, autumn) Frogs – acoustic detectors during and after each watering event Monitoring to occur for at least 15 years, with continued need to be reviewed thereafter every 3 years.		requirements to specify that they are reviewed annually to ensure the scope of the monitoring includes all relevant species, and considers new and updated information on species presence.
M TE9 Terrestrial ecology	River Red-gum and Black Box condition does not deteriorate over time in areas susceptible to rising saline groundwater in response to environmental watering	O^	For River Red Gum trees, crown extent and/or stand condition score is the same or greater than baseline.* For Black Box trees, crown extent and/or stand condition score is the same or greater than baseline.*	Tree condition assessment, including crown condition score either a) based on The Living Murray (TLM) method or b) crown condition index (Crome 2004). Note: location,	• Margins of the Vinifera and Nyah Maximum Inundation Area dominated by EVC 295 Riverine Grassy Woodland and EVC 816 Sedgy Riverine Forest (as mapped	Every three years for at least 15 years, with continued need to be reviewed thereafter every 3 years.	Mallee CMA	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			*Baseline quadrat data collected prior to commencement of environmental watering.	frequency of sampling and specific parameters may be adjusted by the relevant water manager in response to adaptive management and existing programs.	in the ER Central Terrestrial Ecology Specialist Assessment) • EVC 104 Lignum Swamp within the Burra Creek channel (as mapped in the ER Central Terrestrial Ecology Specialist Assessment)			
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.	The locations selected for baseline assessment will be determined in the Environmental Water Management Plan (EWMP) EWMP (or similar mechanism) process using a risk-based approach that considers locations of registered Ancestral Remains	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
					and earth mound sites and Ancestral Remains predictive mapping results overlaid with areas of proposed inundation. In addition to these sites control sites will be selected in comparable locations where environmental watering is not likely to have an effect. Exact locations to be identified by the Land Manager in consultation with the Traditional Owners and interested parties (as applicable).		Interested Parties (as applicable).	
M ACH2	Identify potential adverse effects to specific Aboriginal cultural heritage values (Ancestral	O	N/A – determining baseline condition to	Baseline assessment to be undertaken at Ancestral Remains sites prior to	The selection of locations for baseline assessment will be	Baseline assessment prior to each environmental watering event at	Land manager The baseline assessment must	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Aboriginal Cultural Heritage	Remains) as a result of increased visitation as a result of VMFRP environmental watering		inform contingency measures, if required.	environmental watering events.	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. In addition to these sites control sites will be selected in comparable locations where environmental watering is not likely to have an effect. Exact locations to be identified by the Land Manager in consultation with the Registered Aboriginal	applicable locations. Subsequent monitoring events to be undertaken as per risk-based approach outlined in EDS ACH3.	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	Minister's response and recommendation for Vinifera and Nyah
					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.	This will include inspection of locations to identify effectiveness of implemented management measures (if applicable) and any change in site condition as a result of pest or overabundant native species activity in response to VMFRP environmental watering. Reporting will include a review of the causes of any change and provide recommendations for management if justified.	As necessary at sites assessed under the baseline monitoring –	Monitoring 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).	Supported.
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	O	If land managers identify locations that have been accessed and shouldn't have been (due to the restrictions), additional monitoring under this	This monitoring will include inspection of areas potentially containing Ancestral Remains to determine if there has been	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	Land manager The monitoring program must be implemented by a person	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	result of environmental watering		contingency measure will apply.	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.		Registered Aboriginal Parties/Traditional Owners and interested parties (as applicable) and documented in EWMP (or similar mechanism).	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	Supported.
AI ACH2	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	Construction contractor	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
Aboriginal Cultural Heritage						per the program detailed in the EMF.		
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	Supported.
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	Supported.
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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
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	Supported.
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 specific location, to be determined in the CEMP.	During construction: Inspections of spill controls and bundings, plant and equipment	Lay down areas and compounds Other areas where soil or materials are handled, chemicals stored or used	Weekly inspections during construction	Construction contractor	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
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	Supported.
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	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				destination tracking and sampling results.				
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	Supported.
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	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			categories – characteristics and thresholds (2021).					
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	Supported.
AI HH2 Historic heritage	Verify compliance with EDS HH1.	C	Compliance with *Heritage Act 2017* 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	Supported.
AI HH3 Historic heritage	Verify compliance with EDS HH2.	O	Compliance with *Heritage Act 2017* for discovery of archaeological sites	Check compliance with EDS HH2 and specifically requirements for implementation of an unexpected	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				archaeological finds protocol during operation.				
AI HH4 Historic heritage	Minimise risk of harm to historical heritage values at Takasuka Levee	C & O	Compliance with the Incorporated Document for the Project introduced through the Planning Scheme Amendment.	As required in EDS HH1 and HH2, comply with the Incorporated Document for the Project introduced through the Planning Scheme Amendment where a Heritage Overlay place is to be disturbed. Detailed recording and reporting requirements will be documented in the Incorporated Document. Inspect to check compliance with the Incorporated Document.	Takasuka Levee Bank (HO186/NT B6238)	Compliance audits to be undertaken as per the program detailed in the Environmental Management Framework.	Project partners to advise	Supported.
AI HH5 Historic heritage	Minimise risk of harm to historical heritage values at Takasuka Levee	C & O	Compliance with the Incorporated Document for the Project introduced through the Planning Scheme Amendment.	As required in EDS HH1 and HH2, comply with the Incorporated Document for the Project introduced through the Planning Scheme Amendment where a Heritage	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	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				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.				
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	Supported.
AI NV2 Noise and vibration	All pumping infrastructure to be serviced prior to installation and maintained to	O	Pumping infrastructure has not been serviced prior to installation and/or are not maintained to	A register is kept outlining the details of maintenance associated service information. If this has not occurred	Pumping infrastructure locations	Compliance audits to be undertaken as per the program detailed in the EMF.	Mallee CMA or LMW	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
	manufacturer specifications		manufacturer specifications	then pump infrastructure to be serviced as soon as reasonably practicable to allow ongoing performance evaluation to be undertaken in line with the GED.				
AI SB1 Social and business	Minimise the impact of the project on businesses and the community	C & O	Complaints, feedback and enquiries	Review of the implementation of EDS SB1 and SB3: The nature of complaints, feedback and enquiries received Time taken to close out complaints and enquiries Whether additional actions can be taken to address persistent complaint types Where there are opportunities identified to better communicate	All	Construction: as specified in the Community and Stakeholder Engagement Management Plan. Operation: in accordance with CMA and land managers processes and procedures and Victoria's Catchment Management Authorities Community Engagement and Partnership Framework and Toolkit	Construction: LMW Operation: Mallee CMA, Land managers (DEECA and Parks Victoria), LMW	Generally supported, with recommendation to include monitoring/ verification of the implementation of EDS SB2 during the construction phase, given that the areas affected by construction will change as construction activities progress.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				with or engage stakeholders. Communication processes to identify whether there are opportunities to improve.				
AI TE1 Terrestrial ecology	To confirm that construction has been undertaken in accordance with EDS E1 and no unapproved vegetation is removed	C	Confirmation that no-go zones have been delineated and maintained around significant ecological values to be retained including populations of EPBC Act listed flora (if previously unidentified populations are found), FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.	The performance of EDSs would be evaluated by development and implementation of an auditing program (as detailed in the Native Flora and Fauna Construction Management Plan (EDS E2)) that would: Verify that vegetation removal is consistent with the extent of vegetation approved for removal at each site. Verify that no-go zones have been delineated and maintained to protect significant	Construction footprint	Weekly during environmental inspections	Construction contractor	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
				ecological values as listed in the indicator column.				
AI TE2 Terrestrial ecology	To avoid and minimise increased weed cover during construction	C	Weed species of management concern do not increase in abundance within the construction footprint. This includes Weeds of National Significance, weeds listed under the CaLP 1994 and those listed as FFG Act threatening processes.	Pre-construction inspections of construction sites and control of high threat weeds undertaken a minimum four weeks prior to construction. Biosecurity check/inspections for plant material, seeds and soils containing organic matter in accordance with EDS E2d.	Construction footprint	Inspections of weeds undertaken weekly during environmental inspections	Construction contractor	Supported.
AI TE3 Terrestrial ecology	To avoid and minimise increased presence of pests during construction	C	Presence of pests (i.e black rats, cats and foxes) does not increase in abundance within the construction footprint - evident through sightings (or motion sensing cameras near food disposal areas) or damage/ disturbance to construction	All food to be disposed of in secured/locked bins and regularly cleared offsite. Sightings or damage observed.	Construction footprint, focused on laydown/office areas.	Food waste disposal locations checked during weekly during environmental inspections. Sightings observed.	Construction contractor	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			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 Traffic Management Plan (TMP) (EDS TT2)	Audit of compliance with EDS TT2 (TMP).	Road networks within project areas including haulage routes as detailed in the TMP	Compliance audits to be undertaken as per the program detailed in the EMF.	Construction contractor	Supported.
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 TMP).	Prior to, during and at completion of construction as detailed in the TMP	Construction contractor	Supported.
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	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,	Borrow sites and other material source sites (if any).	Characterisation: prior to commencing construction (once off if investigation sufficient)	Construction contractor	Supported.

ID & Discipline	Performance objective	Phase	Indicator	Monitoring requirement and parameters	Locations	Frequency	Responsibility	Minister's response and recommendation for Vinifera and Nyah
			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.	soils and wastes and EPA Publication 655.1 Acid sulfate soil and rock or equivalent as updated EPA publications are forthcoming.				
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	Supported.