VICTORIAN MURRAY FLOODPLAIN RESTORATION PROJECT

HEALTHY LANDSCAPES, STRONG COMMUNITIES

Ecology Monitoring and Reporting Program

Hattah Lakes North Floodplain Restoration Project
Nyah Floodplain Restoration Project
Vinifera Floodplain Restoration Project

Australian Government | VICTORIA State Government | LOWER MURRAY WATER | Goulburn-Murray WATER | mallee catchment management authority | North Central CMA | Parks VICTORIA

Approved Action

Person to whom the approval is granted	Lower Murray Urban and Rural Water Corporation
ABN of Approval Holder	18 475 808 826

Declaration of accuracy

In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: 

Full name (please print): ASHER SUTTON

Organisation (please print): LOWER MURRAY URBAN AND RURAL WATER CORPORATION

Date 17/03/2026

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Quality Information

Version	Date	Prepared by	Qualification/s and Years of Experience	Approved for submission	Qualification/s and Years of Experience
A – VMFRP and stakeholder review	22 September 2025	K Petersen L Brown D Lim	PhD, BSc. (Hons), 12 years BEnvSc, MUP, 8 years BAppSc, MSc, 11 years	S Brown	BSc(Hons), MEnv St, 29 years
B – DCCEEW preliminary review	14 October 2025	D Lim	BAppSc, MSc, 11 years	S Brown	
C – for stakeholder acceptance	27 February 2026	D Lim		S Brown	
D – for issue to DCCEEW	3 March 2026	D Lim		S Brown	
0 – for issue to DCCEEW for approval	17 March 2026	D Lim		S Brown	

Glossary

Term	Definition
Adaptive management	An iterative process of developing a conceptual model and management hypothesis and then implementing management actions and monitoring to identify which management actions are most effective at achieving specified objectives. Adaptive management incorporates planning, management, monitoring and evaluation mechanisms to allow waterway managers to adjust their approach in response to current climatic conditions, new information and local knowledge when planning for the future. Adaptive management would be implemented during operation to ensure changes in management actions are most effective at achieving the identified benefits of the projects.
Area of Investigation	The area which includes the proposed Construction Footprint plus a variable buffer width beyond the Construction Footprint. Greater buffer widths have been included for larger structures such as pump stations, culverts and regulators. The Area of Investigation defines the area within which physical site information (existing conditions) has been collected to: • Determine the potential direct adverse effects of construction activity for applicable specialist assessments • Ensure that sufficient data is collected to enable refinements to project footprints to be made to further avoid or reduce adverse effects.
Basin Plan	Passed into law in November 2012 under the *Water Act 2007* (Cth), the Murray-Darling Basin Plan ('the Basin Plan') aims to restore the Murray-Darling Basin back to a healthier and more sustainable state while continuing to support farms and other industries that benefit local communities. The Basin Plan is managed by the Murray-Darling Basin Authority, which was established by the *Water Act 2007* to coordinate water resources within the Basin.
Construction Environmental Management Plan	The Construction Environmental Management Plan details the roles, responsibilities, procedures and actions to be implemented during construction of the projects to ensure compliance with (at a minimum) the requirements of all relevant environmental laws, approvals, approval conditions and the Environmental Delivery Standards. This plan incorporates appropriate sub-plans to manage aspects with higher environmental risks (such as a Native Flora and Fauna Management sub-plan).
Dewatering	Dewatering is the action of removing groundwater or surface water during construction. Normally dewatering occurs by pumping or otherwise removing water from a construction site to lower the water level to facilitate excavation or other construction activities.
Ecological Vegetation Class (EVC)	EVCs are the standard unit for classifying native vegetation types in Victoria. An EVC is described through a combination of floristics, lifeforms and ecological characteristics and through an inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities that occurs across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.

Term	Definition
Environmental Delivery Standard (EDS)	Environmental Delivery Standards set out the environmental management measures and standards that will apply to enable the benefits of the projects to be achieved whilst avoiding, minimising and appropriately managing potential impacts. This includes mitigation measures, consultation requirements and performance management to minimise potential impacts and risk of harm to human health and the environment, so far as reasonably practicable having regard to delivery of project benefits.
Environmental water	Water sourced through environmental entitlements that is used or managed to improve or maintain the health of rivers, wetlands and floodplains.
Infrastructure	General term to collectively describe all works and physical structures to be delivered as part of the projects. Infrastructure may include new regulators and modification of existing regulators, raised tracks and banks, culverts, spillways and drop structures, pump stations (temporary or permanent), hardstands, and pipelines and channels designed to deliver and retain water on the floodplain, along with construction works for new and upgraded access tracks required to facilitate construction of the VMFRP.
Inundation	The deliberate flooding of land as part of the projects.
Managed watering event	Inundation of a specific location using environmental water to achieve pre-determined ecological objectives. Delivery of environmental water may occur before or in addition to a natural flood event, taking advantage of the naturally wetted conditions to extend the duration or extent of inundation.
Maximum Inundation Area	The maximum area that is able to be inundated by the proposed works based on the design of the project. Inundation of private land will only occur subject to private flood agreements being established for the relevant land
Monitoring, Evaluation and Reporting Plan	A plan which provides the framework, variables and triggers for monitoring and evaluating the delivery and outcomes of environmental water across the projects.
Murray River floodplain	An area of low-lying ground adjacent to the Murray River, which is subject to flooding.
Natural flood	A flood event resulting from natural rainfall.
Pest animal	Under the *Catchment and Land Protection Act 1994* (Part 8; Section 64), the Minister for Agriculture declares certain animals as pest animals in Victoria. Invasive pest animals threaten and impact Victorian farms, parks, forests, waterways, biodiversity, and catchment assets.
Project area	The project area includes the Maximum Inundation Area and Construction Footprint required for the projects.

Term	Definition
Regulator	A structure used to deliver, move or retain water on the floodplain to facilitate the environmental watering regime (e.g., volume and duration of flood water). The various regulator sizes include: *Very large* – major regulator structures on large waterways that will require individual design. They typically are multi-bay structures of more than 3-4m height with bridge crossings for access and will be designed as cast in situ concrete structures with sheet pile cut offs for seepage control. Some will require piled foundations for structural support and some will have fishways *Large* – intermediate sized regulator structures nominally 2-3m in height with some degree of individual design of the structure required. They will typically have box culverts for the road crossing but the remainder will be cast in situ concrete, typically with sheet pile cut offs for seepage control *Small* – control regulators that retain water less than 2m deep. The small regulators generally comprise box culvert style regulators with box culvert units up to 1.8m high, and variations of these. Non-standard small regulators consist of small irrigation type flow control structures. Some regulators will be operated so that fish passage (targeting small bodied fish) can occur both in managed release and natural flood scenarios and flow velocities are also appropriate for fish passage.
Threshold	For water – A water height, or flow that defines a critical limit for transition in operational conditions. For ecology – A time or ecological health condition that defines a critical limit for transition in ecological conditions.
The Living Murray (TLM) program	An environmental works project established in 2002 in response to concerns about the environmental health of the Murray River and its floodplains. The TLM program aims to improve the environmental health of six icon sites that were chosen for their significant values. The six icon sites include the Barmah–Millewa Forest, Gunbower–Koondrook–Perricoota Forests, Hattah Lakes, Chowilla Floodplains and Lindsay–Wallpolla–Mulcra Islands, Lower Lakes, Coorong and Murray Mouth and River Murray Channel. The TLM program has recovered 500 GL of environmental water and has constructed water management structures to enable the efficient and effective use of environmental water.
Water regime	The prevailing pattern of flows in a waterway, floodplain or wetland over time that will influence the response and persistence of plants, animals and their ecosystems environmental values. The key components of the water regime include timing, frequency, duration, magnitude and depth and salinity of inundation.

Abbreviations

Abbreviation	Definition
ARI	Arthur Rylah Institute
CEMP	Construction Environmental Management Plan
CEV	Crown Extent and Vigour
CMA	Catchment Management Authority
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EcoMRP	Ecology Monitoring and Reporting Program
EDS	Environmental Delivery Standard
EES	Environment Effects Statement under the *Environment Effects Act 1978*
EMF	Environmental Management Framework
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EVI	Enhanced Vegetation Index
EVC	Ecological Vegetation Class
EWMP	Environmental Water Management Plan
ha	Hectares
GWMRP	Groundwater Monitoring Plan
HyWaq	Hydrology and Water Quality
LBA	Live (over bark) basal Area
Mallee CMA	Mallee Catchment Management Authority
MDBA	Murray-Darling Basin Authority
MERP	Mallee CMA VMFRP Ecology Monitoring, Evaluation and Reporting Plan
MNES	Matters of National Environmental Significance
NDVI	Normalised Difference Vegetation Index
NDMI	Normalised Difference Moisture Index
NBR	Normalised Burn Ratio
NDWI	Normalised Difference Water Index
OEMP	Operation Environmental Management Plan
PAI	Total Plant Area
REMRP	Receiving Environment Monitoring and Reporting Program
SLAVI	Specific Leaf Area Vegetation Index
SATVI	Soil-adjusted Total Vegetation Index
TLM	The Living Murray
VMFRP	Victorian Murray Floodplain Restoration Project

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1 Introduction

1.1 Project Description

The Victorian Murray Floodplain Restoration Project (VMFRP) is an environmental watering project undertaken by the Victorian Government in partnership with the Australian Government under the Murray-Darling Basin Plan (Basin Plan).

The Basin Plan was adopted in 2012 by the Commonwealth, state and territory governments of the Murray Darling Basin. Implementation of the Basin Plan was originally scheduled over twelve years to 2024. The aim of the plan is to bring the basin back to a healthier and sustainable level, while continuing to support farming and other industries for the benefit of the Australian community.

The Basin Plan ensures that a proportion of water in the system is preserved for the environment. Sustainable diversion limits (SDLs) specify how much water, on average, can be consumed from the basin to leave enough to keep rivers and the environment healthy. The Basin Plan allows the SDL to be reduced (SDL Adjustment Mechanism) using measures that improve environmental outcomes using less water.

VMFRP is an SDLAM project to manage environmental water at eight floodplain ecosystems of high conservation significance in northern Victoria (Figure 1). The projects all aim to protect and restore floodplain ecosystem biodiversity values, function, and habitat components, including for key species and communities by:

- Better aligning the frequency, duration, and timing of managed watering events with the ecological needs of the floodplain
- Improving resilience to threats such as climate change.

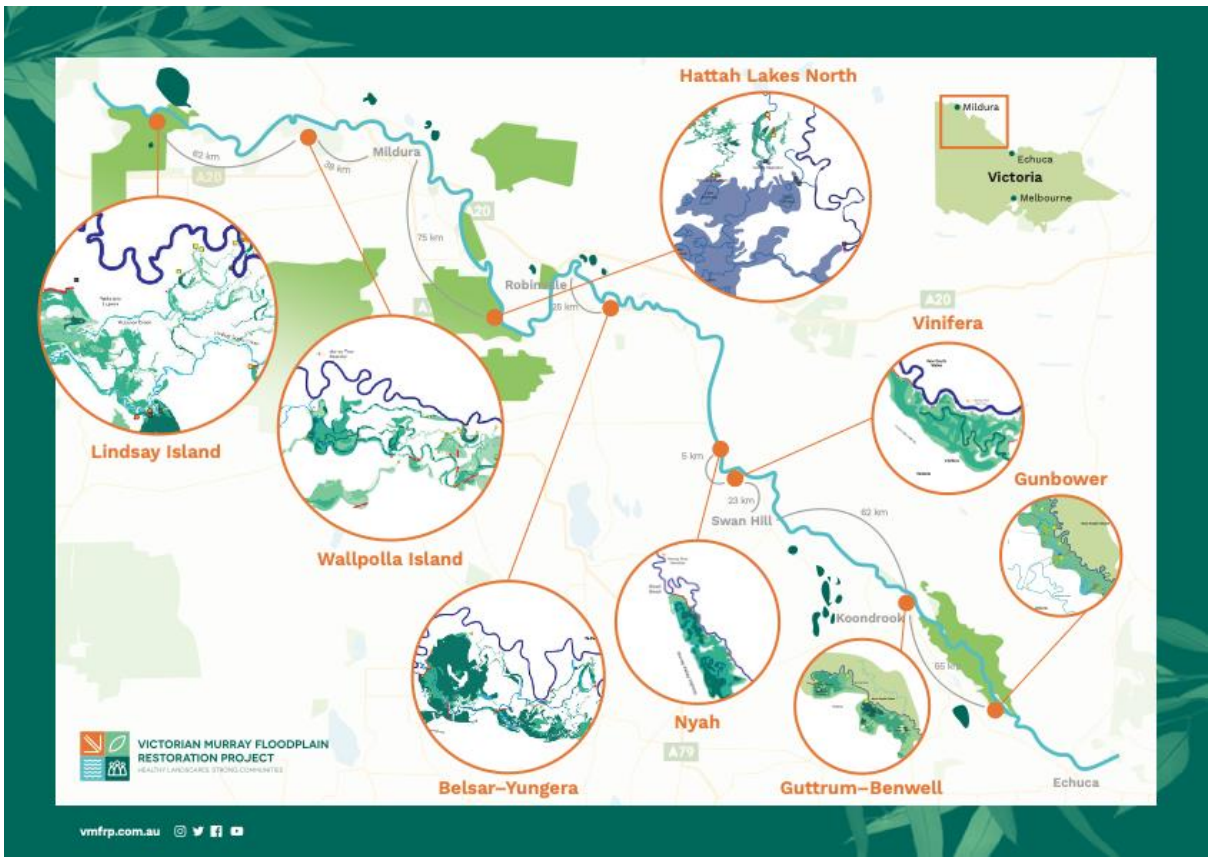

Figure 1 VMFRP sites

The VMFRP comprises eight sites listed below:

- Guttrum-Benwell
- Gunbower
- Vinifera
- Nyah
- Belsar-Yungera
- Hattah Lakes North
- Wallpolla Island
- Lindsay Island.

This Ecology Monitoring and Reporting Plan (EcoMRP) relates to the Hattah Lakes North, Nyah, and Vinifera projects. For a more detailed description of operational project activities for Hattah Lakes North, Nyah, and Vinifera, please see the relevant addendum.

1.2 Purpose

The purpose of this EcoMRP is to provide a framework to accurately characterise the environmental impacts to receiving environments before, during and after an environmental watering event for the Hattah Lakes North, Nyah and Vinifera projects. Specifically, this Plan will satisfy the relevant Conditions of the EPBC Act Approvals, ensure project objectives are realised, and sustain stakeholder confidence in delivery of the projects.

1.3 Objectives

The objectives of the EcoMRP are to meet the EPBC Act approval conditions as follows:

- Include and utilise baseline data of the general ecological indicators, as required under the EcoMRP, for both the receiving environment and floodplain environment
- Specify how, when and where all of the following characteristics will be monitored, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur:
    - Bank stability at outflow points
    - Erosion impacts in the receiving environment
    - The condition of Ecological Vegetation Classes (EVCs) (as a proxy for MNES) within the Maximum Inundation Area in particular, but not limited to, those that are at a medium to high risk of salinisation impacts
    - The species diversity, weight, length, condition, life stage cohort, habitat availability of protected fishes and any harm to protected fishes.
- Detail a monitoring program that includes:
    - A map or maps showing the locations and types of all monitoring locations
    - Measurable performance indicators to monitor attainment of the environmental outcomes required under condition 1
    - Measurable condition indicators to monitor attainment of the ecological outcomes
    - Site-specific water quality limits for key parameters including, but not limited to, dissolved oxygen and salinity, if ecological monitoring sites are not the same as the REMRP monitoring sites
    - Ecological trigger values for corrective measures, such as fish kills and tree dieback
    - The timing and frequency of monitoring, ensuring monitoring is capable of detecting ecological trigger values, limits and changes in the performance indicators
- Propose corrective and mitigation measures which will be undertaken, and the timing of those measures, if trigger values are reached
- Specify a reporting program including:
    - Publication on the website of data collected in accordance with the EcoMRP
    - Notification of the commencement and cessation of managed watering events
    - Publication of the inundation extent of managed watering events as a shapefile
    - Publication of the date(s), location, parameter(s) and level(s) of event based monitoring in the floodplain environment undertaken during the reporting period, including presentation as a table
    - Notification of any detection of trigger values
    - Publication of the trigger action response plan identifying the corrective, mitigation and any adaptive management measures proposed or undertaken to investigate, to undertake corrective actions and/or

to implement procedural changes to prevent the recurrence of the adverse level and/or to remedy any actual or potential harm to protected matters

- Include links to other relevant plans or conditions of approval, including state agency and Murray-Darling Basin Authority (MDBA) approval conditions
- Include a schedule of reporting and review mechanisms to demonstrate compliance with the commitments made in the EcoMRP.

A review of the Plan against the conditions of the EPBC Act approval is provided at Addendum A.

1.4 Project delivery framework

As the Waterway Manager, the Mallee Catchment Management Authority (CMA) is responsible for the planning and identification of environmental water needs at the VMFRP sites.

The CMA approves and manages the delivery of environmental water and the monitoring and reporting of outcomes in accordance with the ecological objectives.

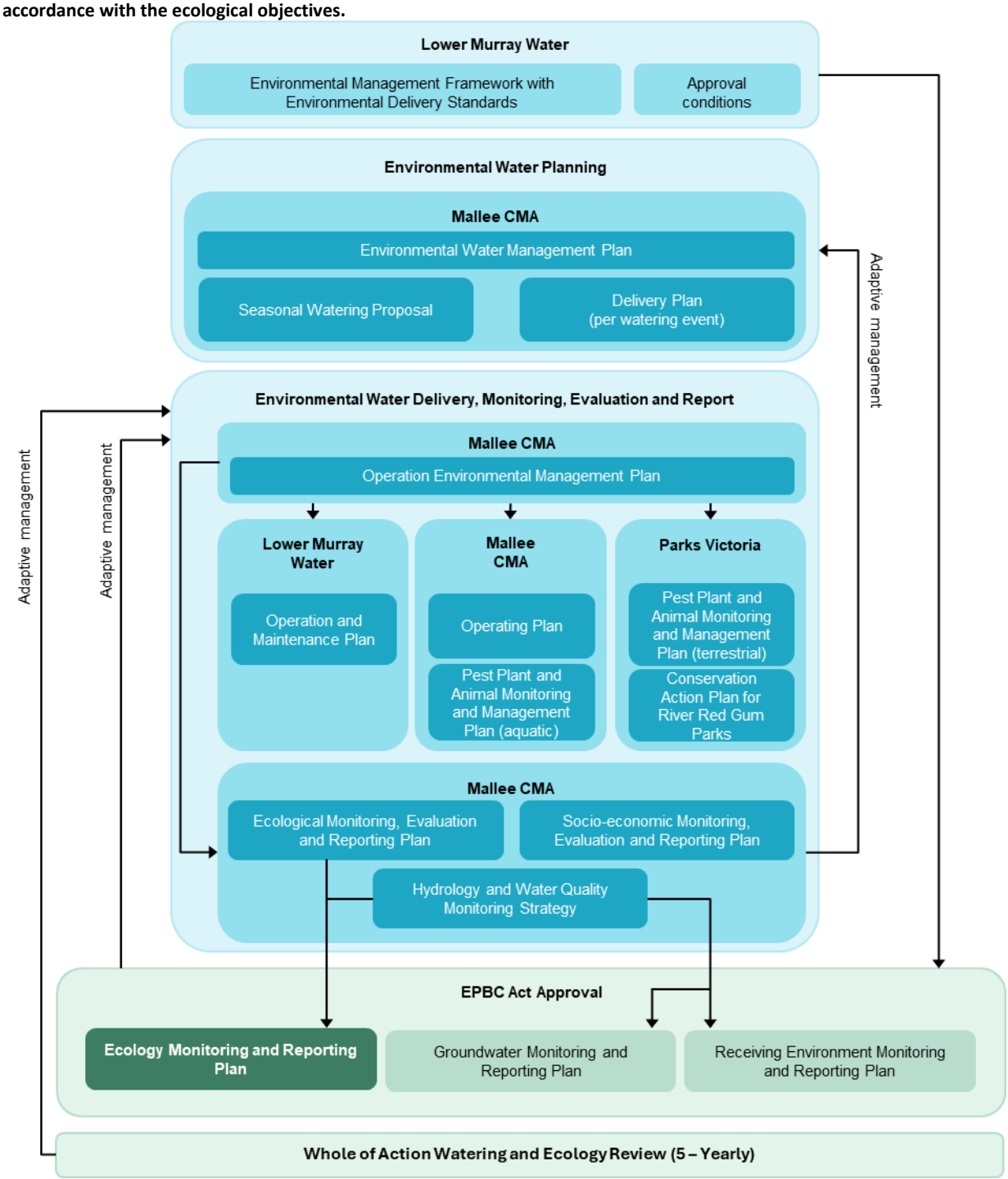

Figure 2 below outlines the environmental management document framework required for the VMFRP projects.

The CMA has prepared Environmental Water Management Plans (EWMPs) that set ecological objectives and hydrological targets for each VMFRP site. The Operational Environmental Management Plans (OEMPs) guide the management of the Projects operation to meet these targets and objectives.

The Ecological Monitoring Evaluation and Reporting Plan (MERP), prepared by ARI and Ecological Associates[4], supports the EWMPs and OEMPs by reporting progress towards a broad array of ecological objectives and advising on adaptive management to optimise ecological outcomes. The Hydrology and Water Quality Monitoring Strategy[5] (HyWaq Monitoring Strategy) supports the EWMPs and OEMPs by outlining a water monitoring program to facilitate the planning, implementation, operation, monitoring, evaluation and reporting of managed watering events.

The VMFRP projects are Controlled Actions under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EBPC Act) due to the potential for the projects to impact Matters of National Environmental Significance (MNES). The Controlled Actions (the projects) therefore need approval under the EPBC Act.

The EPBC Act Approvals require the projects to demonstrate effectiveness of measures to avoid, minimise and mitigate impacts to MNES. This includes the development of a Receiving Environment Monitoring and Report Plan (REMRP), Groundwater Monitoring and Reporting Plan (GWMRP), and EcoMRP.

The monitoring strategy specified in the MERP and the HyWaq Monitoring Strategy have informed the development of the REMRP, EcoMRP, and GWMRP. Development of the plans in-line with these monitoring strategies, ensures alignment with the requirements of the CMA's EWMPs.

While the EcoMRP has been developed to transparently monitor and manage any residual environmental impacts, the positive ecological outcomes of the projects are anticipated to significantly outweigh these impacts. The projects are expected to deliver a substantial net improvement to biodiversity and ecosystem function across the floodplain. By restoring more natural water regimes, better aligning the frequency, duration, and timing of inundation with ecological needs, the projects aim to enhance habitat quality for threatened species, improve the health and diversity of native vegetation, and strengthen resilience to climate change.

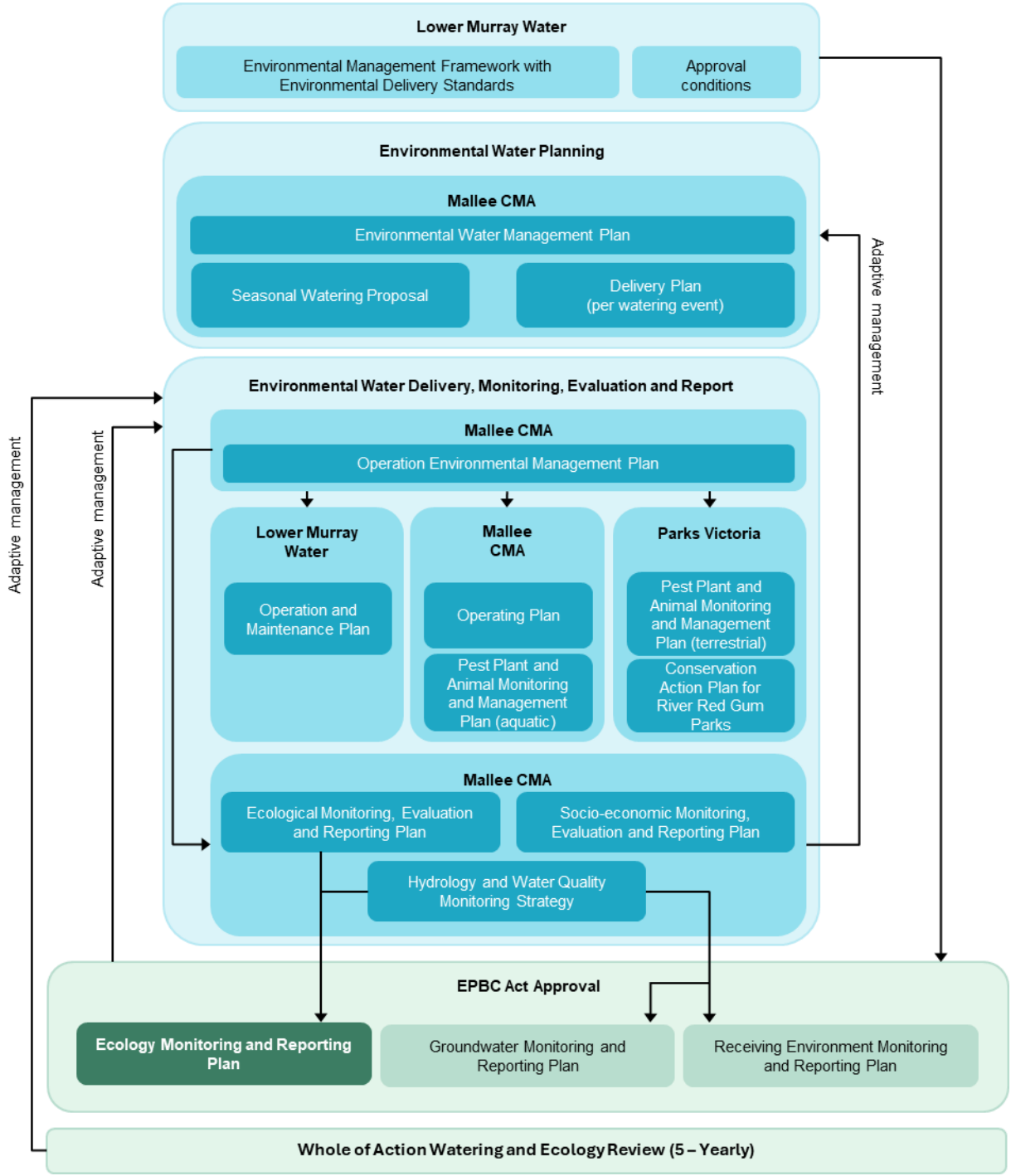

Figure 2 Environmental Management Documents (diagram adapted from the EMF[10])

This Plan provides an overview of the projects monitoring and reporting program and will be supported by project-specific addendum reports (Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera)). This Plan has been developed in line with the EPBC Act Approvals and the Environmental Management Plan Guidelines[6] and includes the following sections:

- Project objectives
- Roles and responsibilities
- Environmental impacts and risks
- Monitoring program and methods
- Trigger values and corrective actions
- Plan implementation
- Assessment against the relevant EPBC Act Approval Conditions.

1.5 Primary potential impacts

The key potential terrestrial ecology impacts relating to MNES at Hattah Lakes North, Nyah and Vinifera during the operation phase are as follows:

- Impact to EVC 102 Low Chenopod Shrubland due to re-inundation
- Impact to abundance of terrestrial dry flora and transition to more flood-tolerant vegetation types
- Spread of weeds, pests, and pathogens potentially exacerbated by flooding
- Minor impacts from erosion, sedimentation, salinity, noise, vibration, and lighting.

The key potential aquatic ecology impacts relating to MNES at Hattah Lakes North, Nyah and Vinifera during the operation phase are as follows:

- Potential impact from regulators impeding fish movement
- Proliferation of Carp
- Risks from changes in water quality including blackwater events, salinity, erosion, and sedimentation
- Spread of aquatic weeds and pathogens.

1.6 Documents reviewed

The following documents have been reviewed in preparing this plan:

- Environmental Management Plan Guidelines[6]
- Environment Effects Statement / Environment Report[7][8]
- EPBC Act approval conditions and Minister's Assessment under the *Environment Effects Act 1978*
- VMFRP Ecological Thresholds and Ecological Triggers – Summary Report[9]
- Environmental Management Framework for the Hattah Lakes North Floodplain Restoration Project and Belsar-Yungera Floodplain Restoration Project[10]
- Environmental Management Framework for the Nyah Floodplain Restoration Project and Vinifera Floodplain Restoration Project[11]
- Hydrology and Water Quality Strategy[5]
- Mallee CMA VMFRP Ecology Monitoring, Evaluation and Reporting Plan[4]
- Hattah Lakes Environmental Water Management Plan[1]
- Nyah Environmental Water Management Plan[2]
- Vinifera Environmental Water Management Plan[3].

2 Roles and responsibilities

Table 1 provides a summary of the roles and responsibilities to carry out the EcoMRP.

Table 1 Roles and responsibilities

Role	Responsibility
Approval of the EcoMRP	Minister for the Environment[1] (Cwlth)
Implementation of EcoMRP	Mallee CMA
Monitoring and reporting	Mallee CMA
Management of operational impacts	Mallee CMA

[1]Defined in the EPBC approval as "*Minister means the Australian Government Minister administering the EPBC Act, including any delegate thereof*"

3 Environmental training

The Operational Environmental Management Plan (OEMP) will include procedures and responsibilities for environmental training. The training will be tailored to the roles of individuals involved in the Project and will cover all activities and operations. Records of training conducted will also be maintained.

4 Emergency contacts and procedures

The OEMP will include procedures and responsibilities for emergency preparedness and response, including arrangements for containing environmental damage and attendance on-site in the event of an emergency. The plans will also include details of incidents and emergency management during operation, including reporting and recording processes.

5 Potential environmental impacts and risks

This section provides a summary of the existing conditions, environmental threats and impacts by the Project on matters protected under the EPBC Act in relation to receiving environments.

5.1 Existing conditions

Existing ecological conditions are presented in the specialist biodiversity assessments for the respective projects. Summaries of existing ecological conditions are presented in this section.

5.1.1 Hattah Lakes North

The following summary of existing ecological conditions has been adapted from the specialist biodiversity assessments for the Hattah Lakes North project[7]:

- The floodplain supports a diverse range of habitats including floodplain lakes, River Red Gum *Eucalyptus camaldulensis* woodlands, and Buloke *Allocasuarina luehmannii* woodlands, providing critical habitat for wetland-dependent and terrestrial fauna
- Surveys identified patches of EPBC Act-listed Buloke Woodlands and FFG Act-listed Semi-arid Shrubby Pine-Buloke Woodland within the Area of Investigation
- Two FFG Act-listed fauna communities are considered present: the Victorian Temperate Woodland Bird Community and the Lowland Riverine Fish Community of the Southern Murray-Darling Basin
- Several threatened species may occur in the area, including one EPBC Act-listed flora species (Winged Peppercress *Lepidium monoplocoides*), four EPBC Act-listed fauna species, and 33 FFG Act-listed fauna species
- Seven migratory species may visit the Maximum Inundation Area during inundation, and one may forage aerially over the Area of Investigation
- Twelve native and five non-native fish species are known or considered possible to occur, along with three turtle species, one aquatic mammal, and one large aquatic invertebrate
- The assessment identified confirmed records of EPBC Act-listed Murray Cod, Southern Pygmy Perch, and Silver Perch in nearby waterways.

5.1.2 Nyah

The following summary of existing ecological conditions has been adapted from the specialist biodiversity assessments for the Nyah project[8]:

- The floodplain supports a range of habitats including River Red Gum forests, Black Box *Eucalyptus largiflorens* woodlands, and freshwater wetlands, providing critical resources for terrestrial and wetland-dependent fauna
- Nine EVCs have been identified across the area, representing a mix of vegetation types, with River Red Gum and spike-sedge dominated wetlands being prominent
- No EPBC Act- or FFG Act-listed flora communities were found

- Two FFG Act-listed fauna communities are considered present: the Victorian Temperate Woodland Bird Community within suitable woodland habitats and Lowland Riverine Fish Community of the Southern Murray-Darling Basin
- Several threatened species may occur in the area, including one EPBC Act-listed flora species (Winged Peppercress), five EPBC Act-listed fauna species, and 27 FFG Act-listed fauna species
- Eight migratory species may visit the Maximum Inundation Area during inundation, and one may forage aerially over the Area of Investigation
- Eleven native and four non-native fish species are known or considered possible to occur, along with three turtle species.

5.1.3 Vinifera

The following summary of existing ecological conditions has been adapted from the specialist biodiversity assessments for the Vinifera project[8]:

- The floodplain supports a variety of habitats from open water and treeless wetlands to River Red Gum forests, Lignum swamps, and Black Box woodlands, each providing critical habitat for a range of terrestrial and wetland-dependent fauna
- Nine EVCs have been identified across the area, including endangered, vulnerable, and depleted vegetation types, with Riverine Swamp Forest and Floodway Pond Herbland being the most extensive
- No EPBC Act- or FFG Act-listed flora communities were found
- One FFG Act-listed fauna community is considered present: the Victorian Temperate Woodland Bird Community. Victorian Mallee Bird Community is considered unlikely to occur due to the absence of mallee vegetation
- Several threatened species may occur in the area, including one EPBC Act-listed flora species (Winged Peppercress), six EPBC Act-listed fauna species, and 25 FFG Act-listed fauna species
- Five migratory species may visit the Maximum Inundation Area during inundation, and two may fly over the Area of Investigation
- No fish species of conservation significance were recorded, but 11 native and four non-native fish species are known or considered possible to occur, along with one turtle species.

5.2 Threats to MNES protected under the EPBC Act

MNES assessments were also prepared for Hattah Lakes North, Nyah, and Vinifera of the Belsar-Yungera and Hattah Lakes North Environment Effects Statement[9] and the Vinifera, Nyah and Burra Creek Environment Report[10]. Table 2 provides a summary of the MNES that were considered at each site.

Table 2 MNES considered at each project during the EES/ER stage

MNES Species	Hattah Lakes North	Vinifera	Nyah
Murray Cod *Maccullochella peelii* (Vulnerable)	X*	X*	X*
Silver Perch *Bidyanus bidyanus* (Critically endangered)	X*	X*	X*
Regent Parrot *Polytelis anthopeplus* (Vulnerable)	X*	X*	X*
South-eastern Long-eared Bat *Nyctophilus corbeni* (Vulnerable)		X	
Hattah-Kulkyne Lakes Ramsar Wetland	X		
Southern Pygmy Perch *Nannoperca australis* (Vulnerable)	X		
Flathead Galaxias *Galaxias rostratus* (Critically endangered)	X		
Winged Peppercress *Lepidium monoplocoides* (Endangered)	X		
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Endangered)	X		

**Denotes MNES relevant to the EcoMRP as per the EPBC Act approval conditions*

Potential operational impacts have been documented in the MNES assessments for the projects[13][14]. Those relating specifically to the MNES included in the EPBC Act approval conditions include:

- Regent Parrot:
  - Temporary removal or damage to habitat
  - Spread of pests
  - Hypersaline groundwater
  - Increased vegetation growth and bushfire risk.
- Murray Cod and Silver Perch:
  - Altered fish passage
  - Spread of pest species
  - Degradation of aquatic habitat through water quality or regime changes.

The MNES assessments have determined that, after implementation of the Environmental Delivery Standards (EDS), no significant residual impacts on MNES are likely to occur for the Hattah Lakes North, Nyah and Vinifera Floodplain Restoration Projects. The basis for this conclusion for each project is summarised in the site-specific addenda to this report (Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera)). Auditing, monitoring, and inspection activities will be undertaken during operation to verify the efficacy of mitigation measures and support adaptive management.

6 Risk assessment

As part of the EES and ER phase of the projects, an environmental risk report was developed, containing results from the environmental risk assessment completed for Hattah Lakes North, Nyah and Vinifera. A risk register was developed that provides the rationale behind risk ratings and highlights those risks which require greater consideration, as outlined within the specialist assessments. This risk assessment also informed the assessment of effects and identification of avoidance and mitigation measures, in the form of EDS.

A summary of the risk assessment process is shown in Figure 3.

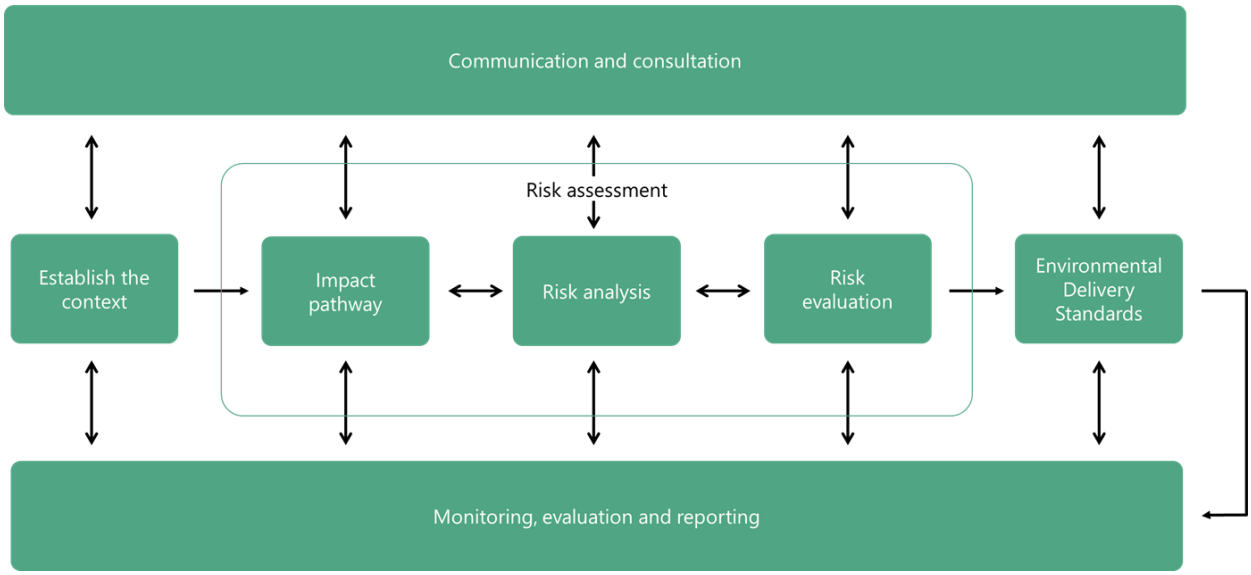

Figure 3 Risk assessment process

6.1 Risk analysis

The assignment of an initial level of likelihood and consequence for each of the impact pathways took into account standard construction practices and management measures. Project representatives and specialists used their professional judgment and experience to assign the appropriate consequence levels.

The VMFRP risk matrix (shown in Table 3) shows the risk rating as determined by the corresponding likelihood and consequence levels assigned to each risk item. Likelihood and consequence criteria, informed by the VMFRP risk matrix, are shown in Table 4 and Table 5.

The risk register including both initial and residual risk ratings for each site are documented in Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera). The potential residual risks relevant to the EcoMRP range from low to high consequence level and include (but are not limited to) the following:

- Potential introduction or spread of weeds, pest species or pathogens
- Potential direct or indirect impacts on native vegetation (including patches of native vegetation and scattered trees) during the operating phase of the project
- Potential impact on aquatic species or their habitat
- Potential changes to fluvial processes as a result of managed inundation events, leading to adverse impacts on environmental values including waterway health and listed Wetlands.

The development of corrective actions and management measures are discussed below in Section 7.4.

Table 3: Risk matrix

Likelihood	**Consequence level**				
	Insignificant	**Minor**	**Moderate**	**Major**	**Severe**
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Low	Medium

Table 4: Likelihood criteria

Likelihood	**Description**
Almost certain	The event is expected to occur in most circumstances
Likely	The event will probably occur in most circumstances
Possible	The event could occur
Unlikely	The event could occur but not expected
Rare	The event may occur only in exceptional circumstances

Table 5: Consequence criteria

Consequence	**Description**
Severe	A critical degree of impact on an environmental asset, value or use of moderate or higher significance

Major	A high degree of impact on an environmental asset, value or use of moderate or higher significance
Moderate	A moderate degree of impact on an environmental asset, value or use of moderate or higher significance
Minor	A low degree of impact on an environmental asset, value or use
Insignificant	A very low degree of impact on an environmental asset, value or use

7 Monitoring plan

The proposed monitoring methods have been identified to meet the requirements of the EPBC approval conditions and have been mapped to the most appropriate methods within the MERP[4], where available, following discussions with Mallee CMA and the Arthur Rylah Institute (ARI) (Table 6). The intention of matching the EcoMRP and MERP methods is to ensure that data collection/baselining is consistent with past monitoring effort, scientifically robust, and practical.

The monitoring methods described in this section relate to all three projects. For any site-specific information, such as monitoring locations, please see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).

Table 6 Existing MERP monitoring methods matched to EPBC approval requirements

Approval condition number	Condition requirement	Matched MERP[4] method	MNES addressed
25 e) (Nyah and Vinifera) 26 e) (Hattah Lakes North)	I. Bank stability at outflow points	Monitoring locations will be adopted from the REMRP and the HyWaq Strategy. Method discussed in Section 7.1.	Murray Cod Silver Perch
	II. Erosion impacts in the receiving environment	Monitoring locations will be adopted from the REMRP and the HyWaq Strategy. Method discussed in Section 7.1.	Murray Cod Silver Perch
	III. The condition of EVCs (as a proxy for MNES) within the Maximum Inundation Area, in particular but not limited to those that are at a medium to high risk of salinisation impacts	For condition of EVCs (as a proxy for MNES), 'Stand Condition'. For salinisation impacts, 'Tree Health'.	Regent Parrot
	IV. The species, diversity, weight, length, condition, life stage, habitat availability of protected fishes and any harm to protected fishes	For fish species, diversity, weight, length, condition, life stage, habitat availability of protected fishes, 'Fish Population'. For any harm to protected fishes, the Ecological Thresholds and Ecological Triggers Summary Report[9] notes that Carp *Cyprinus carpio* presence is a potential ecological trigger that can be	Murray Cod Silver Perch

Approval condition number	Condition requirement	Matched MERP[4] method	MNES addressed
		assessed to determine potential harm to protected fishes. Carp population is captured in the 'Fish Population' method.	

The monitoring methods and associated trigger values and corrective actions are described in the sub-sections below.

7.1 Bank stability at outflow points and erosion impacts in the receiving environment

The EPBC Act approval conditions require that the EcoMRP specifies how, when and where '*bank stability at outflow points'* and '*erosion impacts in the receiving environment'* will be monitored, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur.

There are no similar methods in the MERP that align with the requirements of this EPBC Act approval condition. Therefore, the monitoring method to address these approval conditions has been developed with reference to the HyWaq Strategy[5].

7.1.1 Purpose of monitoring

Monitoring bank stability at outflow points and erosion impacts in the receiving environment is critical for VMFRP to ensure the long-term sustainability and ecological integrity of floodplain restoration works. Outflow structures can alter hydraulic conditions, increasing shear stress and potentially destabilising banks, leading to sediment mobilisation and downstream habitat degradation. Without targeted monitoring, these changes may go undetected until they cause significant geomorphic and/or ecological harm. Regular assessment enables early detection of erosion hotspots, supports monitoring against trigger values (Section 7.4), and informs the adaptive management approach (Section 8.6), ensuring compliance with EPBC Act approval conditions. It also ensures that restoration benefits are not undermined by unintended impacts on adjacent waterways and floodplain systems.

7.1.2 Monitoring method

The EPBC Act approval provides the following definitions relating to this requirement:

- **Receiving environment** means the upstream and downstream riverine environment, within the **receiving environment monitoring locations,** where return flows from the floodplains will be released through the operation of the Action
- **Release point** means a location where surface water will be discharged to the **receiving environment** as part of a **managed watering event** or a **return flow**.

Monitoring locations have been identified at the outflow points (new infrastructure only) and in the receiving environment (Table 7), with figures showing monitoring plot locations provided in Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).

Table 7 Monitoring locations at outflow points and the receiving environment

Floodplain Restoration Project	No. of monitoring locations at outflow points (new infrastructure only)	No. of monitoring locations in the receiving environment
Hattah Lakes North	1	1
Nyah	1	1
Vinifera	1	1

Erosion monitoring will be undertaken upstream, downstream (within the Murray River) and also at the final point of discharge prior to, during and following applicable managed environmental watering events. A combination of

qualitative methods (such as visual inspections) and quantitative methods (such as turbidity sensors) will be utilised, these include:

- Prior to a watering event: Settlement markers and accompanying photo points will be installed in key discharge locations to enable collection of benchmark bank positions.
- During a watering event: Turbidity sensors will be installed upstream, downstream (within the Murray River) and also at final point of discharge that will collect turbidity readings during managed environmental watering events.
- Following a watering event: Visual observations/ inspections will be carried out immediately following the completion of environmental watering events.

If monitoring identifies an exceedance of a trigger value, an investigation will be undertaken to:

- Verify the exceedance
- Evaluate the potential cause of the exceedance
- Potential corrective measures, required as a result of the investigation, are detailed in Section 7.4.

No baseline data has been collected to date for this method; however, it will be collected **prior** to the first managed watering event. A placeholder for baseline data for bank stability at outflow points and erosion impacts in the receiving environment monitoring is provided in Addendum E.

7.2 EVC condition (as a proxy for MNES)

The EPBC Act approval conditions require that the EcoMRP specifies how, when and where '*the condition of EVCs (as a proxy for MNES) within the maximum inundation area, in particular but not limited to those that are at a medium to high risk of salinisation impacts*' will be monitored, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur.

To address this condition, the 'Stand Condition' and 'Tree Health' methods from the MERP were considered the most relevant.

7.2.1 Stand condition

7.2.1.1 Purpose of monitoring

River Red Gum and Black Box are among the most extensive vegetation communities across the Murray River floodplain. River Red Gum has been described a keystone species for the importance of this ecosystem in providing and influencing the habitat for a wide range of plants and animals. The health of the forest and woodlands is central to the ecological function of the floodplains including the diversity and structure of plant communities and habitat for fauna.

These tree species are highly dependent on periodic flooding. The depletion of flow through river regulation and water diversions has resulted in declining tree health and poor recruitment over much of the floodplain. VMFRP is expected to restore tree health and the structure of tree communities through better alignment of the frequency, duration, and timing of managed watering events with the ecological needs of the floodplain. This improved hydrological regime is expected to enhance the habitat value of the floodplain.

Tree health and stand condition can deteriorate when trees are exposed to shallow saline groundwater. Stand condition and tree health monitoring, outlined in the MERP[4], has been identified as the most appropriate method to detect exceedances of the trigger values.

7.2.1.2 Monitoring method

Stand condition modelling will be used to report average stand condition scores for forest and woodland. Stand condition will be assessed annually based on Landsat data collected in autumn when the understorey signal is lowest and the canopy signal is clearest.

The model uses satellite imagery parameterised using field data of stand structure and tree health as per Cunningham et al. (2018)[16]. Three variables are measured and comprise the dependent variables for subsequent modelling, as follows:

- Measured percentage live (over bark) basal area (LBA) of all trees within 50 m x 50 m plots
- Measure of total plant area (PAI) using hemispherical photos, one photo in the centre of each LBA plot

- Visual estimation of crown extent and vigour (CEV) of a representative selection of 10-20 trees within LBA plots.

The three field measured variables are combined to formulate a 'stand condition score' or index which is now the standard metric used across the Murray Darling Basin. Each of these dependent variables (including the overall index index) is used along with independent reflectance variables to create a model that can predict the 'condition' of the floodplain forests and woodlands. The independent variables in the model are obtained from the 'closest' and antecedent, cloud-free Landsat satellite reflectance data using Digital Earth Australia's analysis 'sandbox'. Both the raw bands and various derived indices are extracted from the field locations prior to the relevant field observation dates (Table 8). The resultant model is capable of making regular, repeated and spatially explicit (mapped) predictions at a 25 m resolution across the project area (where these regions are cloud free on the date of any Landsat fly-over).

Modelling is formulated using regression trees which involves the construction of an ensemble of trees that relate values of a response (dependent variables) to its predictors (independent variable) through a series of bifurcations. The multi-objective predictive clustering tree method is used with the open source CLUS software package.

Table 8 Independent variables and indices derived from the Landsat satellite platform

Abbreviation	Index	Derivation from Landsat Bands*
NDVI	Normalised Difference Vegetation Index	= (NIR-RED)/(NIR+RED)
NDMI	Normalised Difference Moisture Index	= (NIR-SWIR)/(NIR+SWIR)
NDSI	Normalised Difference Snow Index	= (RED-SWIR)/(RED+SWIR)
SLAVI	Specific Leaf Area Vegetation Index	= (((SWIR-RED)/(SWIR-RED+0.5))*1.5)-(LWIR/2) (raw values scaled to 1 prior)
SATVI	Soil-adjusted Total Vegetation Index	= NIR/(RED+SWIR)
EVI	Enhanced Vegetation Index	= (NIR-RED)/(NIR+(6*RED) -(7.5*BLUE) + 1)
NDWI	Normalised Difference Water Index	= (NIR-GREEN)/(NIR+GREEN)
NBR	Normalised Burn Ratio	= (NIR-LWIR)/(NIR+LWIR)

*Landsat Band	Spectral domain	Band 4	Near Infrared (NIR)
Band 1	*Blue*	Band 5	Shortwave Infrared (SWIR - short)
Band 2	Green	Band 7	Shortwave Infrared (LWIR - long)
Band 3	Red		

This method can be applied across the entire project site allowing for a comparison of modelled Stand Condition for any location or pixel against a pre-intervention baseline (collected between 2014 to 2024). Specific monitoring plot locations have not yet been identified; however, they will inform monitoring against the trigger values outlined in Section 7.4.

Further detail for how this method will be applied is contained in the MERP[4]. Baseline data will be collected **prior** to the first managed watering event. A placeholder for Stand Condition baseline data is provided in Addendum F.

7.2.2 Tree health

7.2.2.1 Purpose of monitoring

In north-western Victoria, the Murray River floodplain is underlain by shallow saline groundwater. The floodplain is exposed to high soil salinities from the direct discharge of saline groundwater and the evaporative concentration of salts in the soil. At various locations floodplain salinisation has been intensified by the operation of the Murray River weirs which raise the water table and by land clearance and irrigation which increase groundwater recharge and the flow of groundwater towards the river. River regulation and flow depletion have further contributed to floodplain

salinisation by reducing the flood events that contribute fresh water to floodplain soils and export accumulated surface salts.

Shallow saline groundwater degrades floodplain vegetation by salinising the soil or directly exposing plant roots to saline groundwater. VMFRP projects have the potential to increase the exposure of River Red Gum and Black Box trees to harmful levels of salinity. By increasing the frequency and duration of inundation, the projects will increase groundwater recharge which will raise the water table in the vicinity.

Groundwater assessments undertaken for the EESs and ERs have identified trees at high risk of salinisation at Hattah Lakes North. While a high risk of salinisation was not identified at Nyah and Vinifera during the ER, monitoring for groundwater effects on tree health will also be undertaken as a precaution. Tree Health monitoring, outlined in the MERP[4], has been identified as the most appropriate method to detect exceedances of the trigger values.

7.2.2.2 Monitoring method

Tree health will be monitored by visually assessing the condition of individual trees at high/medium risk of salinity impacts at Hattah Lakes North and at groundwater monitoring locations at Nyah and Vinifera. Tree health is monitored using visual assessments following the methodology of Souter et al. (2009)[20]. The methodology involves measurements of:

- Crown extent and density
- New tip growth
- Epicormic growth
- Leaf die-off
- Extent of bark cracking
- Trunk diameter
- Tree dominance class
- Extent of reproduction
- mistletoe load.

Baseline monitoring undertaken for the EES and ER process involved plots of four replicate trees, with each plot identified by a unique number and coordinates. These were assessed using The Living Murray (TLM) tree health protocol[20]. Baseline monitoring was undertaken for Hattah Lakes North during the EES. Monitoring plots at Nyah and Vinifera have now been established by Mallee CMA and ARI, and baseline data has been collected to inform the assessment prior to commencement of operation.

Further detail for how this method will be applied is contained in the MERP[4], which specifies that condition monitoring will be repeated every three years for 15 years with the need for continued monitoring to be reviewed at that point. Baseline data will be included **prior** to the first managed watering event. A placeholder for Tree Health baseline data is provided in Addendum G.

7.3 Protected fishes

The EPBC Act approval requires that the EcoMRP specifies how, when and where '*the species diversity, weight, length, condition, life stage cohort, habitat availability of protected fishes and any harm to protected fishes*' will be monitored, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur.

To address this approval condition, the 'Fish Population' methods from the MERP[4] were considered the most relevant as they capture both the population data required and can be used to determine 'harm' to protected fishes.

7.3.1 Fish population

7.3.1.1 Purpose of monitoring

Fish population monitoring reports the abundance and age structure of native and exotic fish.

The floodplains at Hattah Lakes North provide intermittent channel habitats that potentially support channel-specialist fish including Murray Cod and Silver Perch. Environmental water management may benefit channel-specialist fish by increasing the productivity of floodplain habitats and the supply of prey species. Silver Perch, while typically associated with deeper channel habitats, may also utilise shallow inundated areas during juvenile life stages and foraging. These habitats can support growth and dispersal, particularly when connected to permanent waterways.

Monitoring is required to identify any exceedances of trigger values as a result of managed watering events and confirm that habitat for these species is not degraded through managed watering events and that populations are maintained.

Pest species, i.e., Carp, potentially proliferate in wetland and channel habitats. The Fish Population method will also monitor Carp populations to determine whether increases in population have the potential to 'harm' protected native fish.

7.3.1.2 Monitoring method

Shallow water and deep-water habitats will be monitored at the three project sites to determine the potential for exceedances of trigger values for both protected fish species and pest species (Carp). This will be done using fyke nets in shallow environments and with electrofishing in deep water. Monitoring is undertaken in late summer/early autumn.

Fyke netting follows the TLM and WetMAP methodology. Four fine and four coarse fyke nets are set overnight at three locations per wetland (24 nets), but fewer at small wetlands.

Electrofishing follows TLM monitoring protocols. Fish are sampled by boat electrofishing (or backpack where shallow habitat is present) using 12 electrofishing shots of 90 seconds each (i.e., 1080 total electrofishing seconds). All species are identified and enumerated, total / fork length and mass of the first 20/5 individuals are measured per shot. Catch per unit effort is defined as the number of individuals per unit on-time for each shot.

The Fish Population monitoring method also collects environmental data including habitat values, which is a requirement of the EPBC Act approval conditions. The study design uses long-term monitoring that involves end-of-season surveys to assess annual changes in demographics (i.e., abundance, size and distribution) of long-lived native fish species. Baseline data has been collected annually.

Further detail for how this method will be applied is contained in the MERP[4]. Baseline data will be collected **prior** to the first managed watering event. A placeholder for Fish Population baseline data is provided in Addendum H.

7.4 Ecological trigger values and corrective measures

The general trigger values and corrective measures to address the EPBC Act approval requirements for all three sites are outlined in Table 9.

When reviewing trigger level exceedances, it is important to remember that trigger level exceedances are not conclusive evidence that project activities have caused adverse impacts. Exceedances can occur for a variety of reasons, one of which is due to project activities. Other reasons can be due to impacts from other water users, and/or changes to climatic conditions which are not represented by the baseline data set, etc.

For this reason, the first actions will be to:

- Verify the exceedance
- Evaluate the potential cause of the exceedance.

If there is sufficient evidence that the cause of the exceedance is due (or partially due) to project activities, a corrective action plan will need to be developed.

Table 9 Trigger values and corrective measures

EPBC Act approval condition	Matched MERP method	Trigger value/s	Corrective measure
Bank stability at outflow points Erosion impacts in the receiving environment	Not monitored in the MERP	Erosion monitoring will be undertaken upstream, downstream (within the Murray River) and also at the final point of discharge prior to, during and following managed environmental watering events. Prior to: Settlement markers and accompanying photo points will be installed in key discharge locations to enable collection of benchmark bank positions. During: Turbidity sensors will be installed upstream, downstream (within the Murray River) and also at final point of discharge that will collect turbidity readings during managed environmental watering events. Following: Visual observations/ inspections will be carried out immediately following the completion of environmental watering events.	If monitoring identifies an exceedance of a trigger value, an investigation will be undertaken to: • Verify the exceedance • Evaluate the potential cause of the exceedance. If increased turbidity is being experienced (at discharge location or downstream within the Murray River) compared to upstream turbidity readings undertake the following: • Review of external influences that may be contributing to the increased turbidity • Ensure increased turbidity is not a result of damage or failure of other structures within the system • Addition of rock protection around banks, trees etc where erosion is being observed • Consider stopping or changing discharge rates[1] to bring parameters back above trigger values (or acceptable range) of the receiving environment[1].
The condition of EVCs (as a proxy for MNES) within the Maximum Inundation Area, in particular but not limited to those that are at a medium to high risk of salinisation impacts	Stand Condition	If stand condition drops below the 10th percentile compared to baseline data in the Maximum Inundation Area.	If monitoring identifies an exceedance of a trigger value, an investigation will be undertaken to: • Verify the exceedance • Evaluate the potential cause of the exceedance. If there is sufficient evidence that the cause of the exceedance is due (or partially due) to project activities, a corrective action plan will be developed that includes: • Analysis of trends such as groundwater changes, flooding regimes experienced by EVCs against published flood tolerances, etc • Specific actions, such as changes to operating arrangements (i.e., stop or change discharge rates[1]), to address the cause of the exceedance • Review of the EWMP and/or OEMP to improve environmental outcomes from future managed watering events.
	Tree Health (monitoring will be repeated every three years for 15 years).	Average tree health in a high/medium salinity risk area falls to less than 25% of baseline values.	

EPBC Act approval condition	Matched MERP method	Trigger value/s	Corrective measure
The species diversity, weight, length, condition, life stage, habitat availability of protected fishes. And any harm to protected fishes.	Protected Fishes	Receiving Environment[2] • [Must occur] Diversity: Protected fish species that were observed in the receiving environment in the baseline period are observed at least once every three years of annual sampling • [Must not occur] The average number of fish (CPUE) in three consecutive annual samples after a watering event falls to less than 25% of baseline values • [Must not occur] Harm: Incidental observations by fish ecologists during survey of signs of poor health in Protected fish species. Floodplain Environment • [Must occur] Diversity: Protected fish species that were observed in the floodplain environment in the baseline period are observed at least once in every three managed watering events • [Must not occur] The average number of fish (CPUE) falls to less than 50% of baseline values, measured in the first late summer/autumn after an environmental watering event. • [Must not occur] Harm: Incidental observations by fish ecologists during survey of signs of poor health in Protected fish species.	If monitoring identifies an exceedance of a trigger value, an investigation will be undertaken to: • Verify the exceedance • Evaluate the potential cause of the exceedance. If there is sufficient evidence that the cause of the exceedance is due (or partially due) to project activities, a corrective action plan will be developed that includes: • Review of fish exit strategies • Specific actions, such as modification to Project infrastructure and/or changes to operating arrangements (i.e., stop or change discharge rates[1]), to address the cause of the exceedance • Review of the EWMP and/or OEMP to improve environmental outcomes from future managed watering event.

NOTES:
1 Stopping or changing the discharge rates will require consideration of a range of factors in the context of current and future watering events. This includes consideration of the operational ability to stop or limit discharge rates (e.g. impacts on broader system and floodplain management requirements), timing of watering events, and impacts on other environmental and cultural values, community safety and overall improvements to biodiversity. In practice, stopping or changing discharge rates will most likely apply to future watering events.
2 A clarification has been included for each trigger value for the receiving environment about whether it *must* occur or *must not* occur

7.5 Water quality limits

The EPBC Act approval conditions require that the EcoMRP '*includes site specific water quality limits for key parameters including, but not limited to, dissolved oxygen and salinity, if ecological monitoring sites are not the same as the REMRP monitoring sites*'.

A detailed monitoring program for site-specific water quality limits for key parameters is detailed in the REMRP and no additional water quality monitoring is proposed in the EcoMRP. For further detail on the monitoring program, please see the REMRP[15].

8 Implementation

8.1 Commencement and duration

This Plan will be implemented from the commencement of the Action, until the expiry dates of the approvals, 30 June 2049.

8.2 Reporting

The reporting program for the EcoMRP is designed to meet the requirements of condition of the EPBC Approvals (Addendum A) including:

- Publication on the website of data collected in accordance with the EcoMRP
- Notification of the commencement and cessation of managed watering events
- Publication of the inundation extent of managed watering events as a shapefile
- Publication of the inundation event of managed watering events as a shapefile publication of the date(s), location, parameter(s), and level(s) of event-based monitoring in the floodplain environment undertaking during the reporting period, including presentation as a table
- Notification of any detection of trigger values
- Publication of the trigger action response plan identifying the corrective, mitigation and any adaptive management measures proposed or undertaken to investigate, to undertake corrective actions and/or to implement procedural changes to prevent the recurrence of the adverse level and/or to remedy any actual or potential harm to protected matters
- Links to other relevant plans or conditions of approval, including state agency and MDBA approval conditions
- A schedule of reporting and review mechanisms to demonstrate compliance with the commitments made in the EcoMRP.

Annual Compliance Report: An annual compliance report is required detailing compliance and non-compliance with the conditions and Plans of the Approval. The compliance reports must be published on a website and the department must be notified.

Trigger Action Response Plan: If monitoring identifies an exceedance of a trigger value, a trigger action response plan will be prepared that outlines actions taken or proposed to investigate the issue, corrective actions and/or procedural changes to prevent the recurrence of the adverse level and/or to remedy any actual or potential harm to protected matters. This may also result in an update to the trigger values should a different value be considered to be more suitable for the site.

A schedule of reporting and review mechanisms to demonstrate compliance with commitments made in the EcoMRP is provided in Section 8.5.

8.3 Publication of data

Data collected as part of the monitoring programs for the project sites must be published on the project website. This includes:

- Shapefile data of the inundation extent of managed watering events
- Details of event-based monitoring in the floodplain environment including the data, location, parameters and levels undertaken during the reporting period
- Trigger action response plan identifying the corrective, mitigation and any adaptive management measures proposed or undertaken to investigate, to undertake corrective actions and/or to implement procedural

changes to prevent the recurrence of the adverse level and/or to remedy any actual or potential harm to protected matters
- Each audit report (Section 8.2) must be submitted to the Department for review and published on the website.

8.4 Notifications and non-compliances

As per the EPBC Act approval conditions, notification needs to be provided:

- At the commencement and cessation of managed watering events
- When any trigger values, receiving environment water quality thresholds and limits are detected.

- Any incident (i.e., an event which has the potential to, or does, impact on EPBC Act protected matters), non-compliance with the EPBC Act approval conditions or non-compliance with the commitments made in this Plan must be reported to the DCCEEW within two business days of becoming aware of the incident or non-compliance.
- The details of the incident and/or potential non-compliance and/or actual non-compliance with the conditions or commitments made in the Plan must be provided in writing to DCCEEW within 12 business days of becoming aware of the incident or non-compliance.

Recipient details:	Branch Head, Environment Assessments (Vic, Tas) and Post Approvals Branch Environment Regulation Division (DCCEEW) ***epbcmonitoring@dcceew.gov.au***

8.5 Auditing and review

The Plan will be reviewed annually. The Plan will be reviewed sooner if implementation of the Plan identifies updates that need to be made or if new information becomes available that relates to the Plan. The Plan will also be reviewed following significant environmental incidents and/or when there is a need to improve performance in an area of environmental impact.

Any revisions to this Plan must be made in accordance with conditions of EPBC approvals, which state '*The approval holder may, at any time, apply to the **Minister** for a variation to a **plan**, program or strategy approved by the **Minister**, by submitting an application in accordance with the requirements of section 143A of the **EPBC Act**. If the **Minister** approves a revised **plan** then, from the date specified, the approval holder must implement the plan in place of the previous **plan**.*'

An independent audit of compliance with the conditions of the EPBC Act Approval must be conducted every 5 years following the commencement of the Action. Each audit report must be submitted to the Department for review and published on the website.

Table 10 provides a summary schedule of reporting (Section 8.2) and review (this Section) mechanisms to demonstrate compliance with commitments made in the EcoMRP.

Table 10 Schedule of reporting and review mechanisms

Reporting/Review mechanism	Timeframe
Annual Compliance Report	Annually from commencement of the Action
Trigger Action Response Plan	Within 12 business days of becoming aware of the exceedance of the trigger value
Review of EcoMRP	Annually from commencement of Action or sooner if: • Implementation of the Plan identifies updates that need to be made • If new information becomes available that relates to the Plan • Following significant environmental incidents • There is a need to improve performance in an area of environmental impact.

Reporting/Review mechanism	Timeframe
Independent audit of compliance with the conditions of the EPBC Act approval	Every five years following commencement of the Action.

8.6 Adaptive management

The EcoMRP forms a core component of the adaptive management cycle for environmental water outlined in the Environmental Management Frameworks for the project sites[10][11] and shown in Figure 4. It facilitates the monitoring, reporting, and evaluation of project performance relative to project objectives and trigger values and incorporates new scientific and operational information into the implementation of the project.

An adaptive management approach is essential as it recognises the inherent uncertainties and risks associated with the complex relationships between changes to hydrology and ecological responses, and the potential for a managed watering event to provide both positive and adverse outcomes. Adaptive management is informed by three main pathways:

- Monitoring to detect exceedances of the trigger values
- Incidental observations by managers, operators or other observers that identify opportunities to reduce risk or improve outcomes
- Research or investigations into hydraulic or ecological management practices that could improve the conceptual models on which operations are based.

Should one of the three main pathways identify a need for an adaptive management response, corrective actions may include (but are not limited to) development or revision of a trigger action response plan, revision of trigger values, and/or modifying/introducing new procedural controls. All updates will be documented and incorporated into future versions of the EcoMRP as per the requirements of Section 8.2.

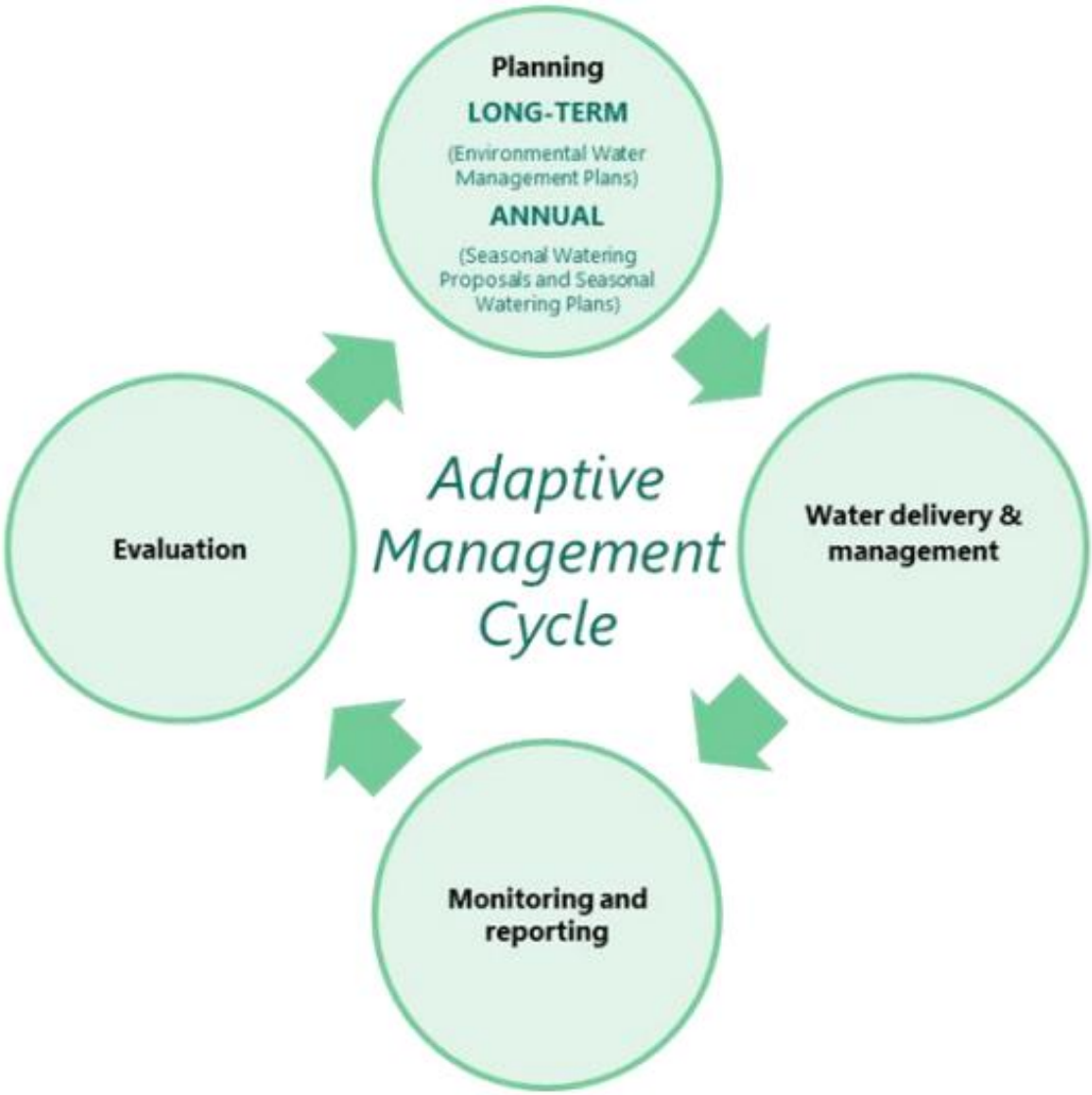

Figure 4 Adaptive management cycle for environmental water[10][8]

References

[1] Mallee Catchment Management Authority (2023a). *Hattah Lakes Environmental Water Management Plan.* Mallee CMA. Irymple, Victoria

[2] Mallee Catchment Management Authority (2023b). *Nyah Environmental Water Management Plan.* Mallee CMA. Irymple, Victoria

[3] Mallee Catchment Management Authority (2023c). *Vinifera Lakes Environmental Water Management Plan.* Mallee CMA. Irymple, Victoria

[4] Arthur Rylah Institute (ARI) and Ecological Associates (2024). *Mallee CMA VMFRP Ecology Monitoring, Evaluation and Reporting Plan – DRAFT (Version E)*. Ecological Associates report AL061-2-E prepared for Mallee Catchment Management Authority, Mildura.

[5] Water Technology (2024). *Updated HyWaQ Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.

[6] Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2024). *Environmental Management Plan Guidelines*. Department of Climate Change, Energy, the Environment and Water, Canberra, March. CC BY 4.0.

[7] Victorian Murray Floodplain Restoration Project (VMFRP) (2023a). *Environmental Effects Statement: Belsar-Yungera and Hattah Lakes North Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

[8] VMFRP (2023b). *Environmental Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

[9] Arup (2024). *VMFRP Ecological Thresholds and Ecological Triggers – Summary Report.* Report prepared for the Mallee Catchment Management Authority.

[10] VMFRP (2025a). *Environmental Management Framework: Hattah Lakes North Floodplain Restoration Project and Belsar-Yungera Floodplain Restoration Project.* Victorian Murray Floodplain Restoration Project, Mildura.

[11] VMFRP (2025b). *Environmental Management Framework: Vinifera Restoration Project and Nyah Floodplain Restoration Project*. Victorian Murray Floodplain Restoration Project, Mildura.

[12] VMFRP (2023a). *Attachment X – Hattah Lakes North Matters of National Environmental Significance assessment*. Victorian Murray Floodplain Restoration Project, Mildura.

[13] VMFRP (2023b). *Attachment 10 – Vinifera Matters of National Environmental Significance assessment.* Victorian Murray Floodplain Restoration Project, Mildura.

[14] VMFRP (2023c). *Attachment 11 – Nyah Matters of National Environmental Significance assessment.* Victorian Murray Floodplain Restoration Project, Mildura.

[15] VMFRP (2025c). *Receiving Environment Monitoring and Reporting Program.* Victorian Murray Floodplain Restoration Project, Mildura.

[16] Cunningham, White, Bowen, Dillewaard, Butler, Ryan & Driver (2018). *Field protocol for assessing the 'stand condition' of floodplain forests and woodlands in the Murray–Darling Basin*. Murray–Darling Basin Authority, Canberra.

[17] Rokach, L. & Maimon, O. (2008). *Data mining with decision trees: theory and applications*. World Scientific Publishing, Singapore.

[18] Breiman, L., Friedman, J.H., Olshen, R.A. & Stone, C.J. (1984). *Classification and Regression Trees*. Wadsworth International Group, Belmont, CA, USA.

[19] Kocev, D., Vens, C., Struyf, J. & Džeroski, S. (2007). *Ensembles of multi-objective decision trees*. Machine Learning: ECML 2007. Proceedings of the 18th European Conference on Machine Learning, Warsaw, Poland, September 17-21, 2007 (ed. by J. Kok, J. Koronacki, R. De Mántaras, S. Matwin, D. Mladenić and A. Skowron), pp. 624-631. Springer, Berlin.

[20] Souter, N.J., Watts, R.A., White, M.G., George, A.K. and McNicol, K.J. (2009). *'Method manual for the visual assessment of Lower River Murray floodplain trees: River Red Gum* (Eucalyptus camaldulensis).' Department of Water, Land and Biodiversity Conservation, South Australia.

[21] R8 Joint Venture (2022). *Specialist Assessment B1 Ecology - Terrestrial. EES Central: Belsar-Yungera and Hattah Lakes North.* Report prepared for Victorian Murray Floodplain Restoration Project. Jacobs Group Pty Ltd and GHD Pty Ltd as R8 Joint Venture, Melbourne

Addendum A: EPBC Act approval conditions

The EPBC Act approval conditions relating to the production and implementation of an Ecology Monitoring and Reporting Program are identical across all three central site actions.

Table 11 EPBC Act approval conditions

Ref	Condition No. (Vinifera & Nyah)	Condition No. (Hattah)	Condition requirement	Plan reference	Demonstration of how the Plan addresses condition requirements and commitments made in the Plan to address condition requirements
1	23	24	The approval holder must submit a Ecology Monitoring Program (EcoMRP) to the department prior to the commencement of the action for the Minister's approval.	This document	N/A
2	24	25	The environmental outcome of implementing the EMP is to ensure and demonstrate through scientific evidence that the requirements of condition 1 are met.	This document	The monitoring actions, trigger values, and corrective measures included in this Plan will be implemented to ensure and demonstrate through scientific evidence that the requirements of condition 1 are met.
3	25(a)	26(a)	Be prepared by a suitably qualified person.	Quality Information	Arup is a global consultancy with expertise in developing Ecology Monitoring and Reporting Plans. The report has been authored by competent ecologists and peer reviewed for quality assurance.
4	25(b)	26(b)	Be prepared in accordance with the Environmental Management Plan Guidelines.	Addendum A	This table evidences the relevant GWMRP sections for each of the EMP guidelines.
5	25(c)	26(c)	Reference the EPBC Act approval conditions to which the EcoMRP refers.	Addendum A	This table can be used as an index, highlighting relevant sections in the GWMRP which relate to the EPBC Act conditions.
6	26(d)	26(d)	Include and utilise baseline data of the general ecological indicators required of the EcoMRP requirements of the receiving environment and floodplain environment.	Section 6, Addenda E, F, G, and H	In consultation with Mallee CMA and ARI, the monitoring methods and trigger values have been determined using the MERP as a basis to ensure that baseline data for the general ecological indicators is utilised.

Ref	Condition No. (Vinifera & Nyah)	Condition No. (Hattah)	Condition requirement	Plan reference	Demonstration of how the Plan addresses condition requirements and commitments made in the Plan to address condition requirements
7	27(e)	26(e)	Specify how, when and where all of the following characteristics will be monitored, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur:	Section 6, Addenda B, C and D	General monitoring method is included in Section 6. For site specific method, see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).
8	27(e)i	26(e)i	Bank stability at outflow points	Section 6, Addenda B, C and D	General monitoring method is included in Section 6. For site specific method, see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).
9	27(e)ii	26(e)ii	Erosion impacts in the receiving environment	Section 6, Addenda B, C and D	General monitoring method is included in Section 6. For site specific method, see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).
10	27(e)iii	26(e)iii	The condition of EVCs (as a proxy for MNES) within the Maximum Inundation Area, in particular but not limited to those that are at a medium to high risk of salinisation impacts, and	Section 6, Addenda B, C and D	General monitoring method is included in Section 6. For site specific method, see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).
11	27(e)iv	26(e)iv	The species diversity, weight, length, condition, life stage cohort, habitat availability of protected fishes and any harm to protected fishes.	Section 6, Addenda B, C and D	General monitoring method is included in Section 6. For site specific method, see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).
12	27(f)i	26(f)i	Detail a monitoring program that includes: i) A map or maps showing the locations and types of all monitoring locations.	Addenda B, C and D	Maps showing locations, where available, and types of monitoring are provided in Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).

Ref	Condition No. (Vinifera & Nyah)	Condition No. (Hattah)	Condition requirement	Plan reference	Demonstration of how the Plan addresses condition requirements and commitments made in the Plan to address condition requirements
13	27(f)ii	26(f)ii	ii. measurable performance indicators that monitor demonstrate attainment of the environmental outcomes required under condition 1.	MERP[4]	The MERP[4] outlines the measurable performance and condition indicators (targets) that demonstrate attainment of the environmental and ecological outcomes required of the EPBC Act approvals.
14	27(f)iii	26(f)iii	iii. measurable condition indicators to monitor attainment of the ecological outcomes.	MERP[4]	The MERP[4] outlines the measurable performance and condition indicators (targets) that demonstrate attainment of the environmental and ecological outcomes required of the EPBC Act approvals.
15	27(f)iv	26(f)iv	iv. site specific water quality limits for key parameters including, but not limited to, dissolved oxygen and salinity, if ecological monitoring sites are not the same as the REMRP monitoring sites.	Section 7.5 and REMRP Section 7.5 and REMRP	Site specific water quality limits are summarised in Section 7.5. For further information about limits, see Section 6.4 of the REMRP[15].
16	27(f)v	26(f)v	v. ecological trigger values for corrective measures, such as fish kills and tree dieback.	Section 7.4, Addenda B, C and D	Ecological trigger values for the sites are presented in Section 7.4, Addenda B, C and D.
17	27(f)vi	26(f)vi	vi. the timing and frequency of monitoring, ensuring monitoring is capable of detecting ecological trigger values, limits and changes in the performance indicators.	Section 6, Addenda B, C and D	Timing and frequency of monitoring has been adapted from the MERP to ensure consistency with baseline data and allow for appropriate detection of ecological trigger values. General monitoring method is included in Section 6. For site specific method, see Addendum B (Hattah Lakes North), Addendum C (Nyah), and Addendum D (Vinifera).
18	27(f)vii	26(f)vii	vii. proposed corrective and mitigation measures which will be undertaken, and the timing of those measures, if trigger values are reached.	Section 7.4 and 8.6	Corrective measures are presented in Section 7.4. Section 8.6 documents the EcoMRP's adaptive management strategy.

Ref	Condition No. (Vinifera & Nyah)	Condition No. (Hattah)	Condition requirement	Plan reference	Demonstration of how the Plan addresses condition requirements and commitments made in the Plan to address condition requirements
19	27(g)i	26(g)i	Specify a reporting program including: Publication on the website of data collected in accordance with the EcoMRP	Section 8.3	Detail provided in Section 8.3
20	27(g)ii	26(g)ii	Notification of the commencement and cessation of managed watering events	Section 8.4	Detail provided in Section 8.4
21	27(g)iii	26(g)iii	Publication of the inundation extent of managed watering events as a shapefile	Section 8.3	Detail provided in Section 8.3
22	27(g)iv	26(g)iv	Publication of the date(s), location, parameter(s) and level(s) of event based monitoring in the floodplain environment undertaken during the reporting period, including presentation as a table.	Section 8.3	Detail provided in Section 8.3
23	27(g)v	26(g)v	Notification of any detection of trigger values	Section 8.4	Detail provided in Section 8.4
24	27(g)vi	26(g)vi	Publication of the trigger action response plan identifying the corrective, mitigation and any adaptive management measures proposed or undertaken to investigate, to undertake corrective actions and/or to implement procedural changes to prevent the recurrence of the adverse level and/or to remedy any actual or potential harm to protected matters.	Section 8.3	Detail provided in Section 8.3
25	27(h)	26(h)	Include links to other relevant plans or conditions of approval, including state agency and MDBA approval conditions.	Section 1.2	Detail provided in Section 1.2

Ref	Condition No. (Vinifera & Nyah)	Condition No. (Hattah)	Condition requirement	Plan reference	Demonstration of how the Plan addresses condition requirements and commitments made in the Plan to address condition requirements
26	27(i)	26(i)	Include a schedule of reporting and review mechanisms to demonstrate compliance with the commitments made in the EcoMRP.	Section 8.2	Details provided in Sections 8.2 and 8.5
27	28	27	The approval holder must not commence the Action until the EcoMRP has been approved in writing by the Minister. The approval holder must implement the approved EcoMRP from the commencement of the Action until the expiry date of this approval.	N/A	N/A

Addendum B: Hattah Lakes North Floodplain Restoration Project

VICTORIAN MURRAY FLOODPLAIN RESTORATION PROJECT

HEALTHY LANDSCAPES, STRONG COMMUNITIES

Ecology Monitoring and Reporting Program – Addendum B

Hattah Lakes North Floodplain Restoration Project

Australian Government

VICTORIA State Government

LOWER MURRAY WATER

Goulburn-Murray WATER

mallee catchment management authority

North Central CMA

Parks VICTORIA

Approved Action

Person to whom the approval is granted	Lower Murray Urban and Rural Water Corporation
ABN of Approval Holder	18 475 808 826
Action	
Hattah Lakes North Floodplain Restoration Project (EPBC: 2020/8632)	To build and operate four regulating structures (K10 Regulator, K10 Causeway Regulator, Bitterang Containment Bank Regulator, Dry Creek Regulator), 1.8km of raised access tracks (containment banks/levees), and maintenance of 16.9km of existing access tracks to allow extra inundation of Chalka North Area and Lake Boolca Area: See EPBC Act referral 2020/8632 subject to the variation of the Action accepted by the Minister under section 156B on 27 September 2022.

Declaration of accuracy

In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: 

Full name (please print): ASHER SUTTON

Organisation (please print): LOWER MURRAY URBAN AND RURAL WATER CORPORATION

Date 17/03/2026

Table of contents

Quality Information

Version	Date	Prepared by	Approved for submission
A – VMFRP and stakeholder review	22 September 2025	K Petersen, D Lim	S Brown
B – DCCEEW preliminary review	14 October 2025	D Lim	S Brown
C – DCCEEW comments for stakeholder acceptance	27 February 2026	D Lim	S Brown
D – For issue to DCCEEW	3 March 2026	D Lim	S Brown
0 – For issue to DCCEEW for approval	17 March 2026	D Lim	S Brown

Abbreviations

Abbreviation	Definition
ARI	Arthur Rylah Institute
CMA	Catchment Management Authority
EcoMRP	Ecology Monitoring and Reporting Program
EDS	Environmental Delivery Standard
EES	Environment Effects Statement under the *Environment Effects Act 1978*
EMF	Environmental Management Framework
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EVC	Ecological Vegetation Class
ha	Hectares
HyWaq	Hydrology and Water Quality Monitoring Strategy
Mallee CMA	Mallee Catchment Management Authority
MER	Monitoring, Evaluating and Reporting
MIA	Maximum Inundation Area
MNES	Matters of National Environmental Significance
TLM	The Living Murray
VMFRP	Victorian Murray Floodplain Restoration Project

1 Introduction

The purpose of this addendum report is to provide the site-specific monitoring requirements for the Ecology Monitoring and Reporting Plan (EcoMRP) for the Hattah Lakes North Floodplain Restoration Project (the site).

The Hattah Lakes North Floodplain Restoration Project will build and operate the K10 Regulator, K10 Causeway Regulator, Bitterang Containment Bank Regulator, along with 1.8 km of raised access tracks functioning as containment banks/levees and the maintenance of 16.9 km of existing access tracks, as shown in Figure 1. The works are to facilitate managed inundation across two Water Management Areas (Chalka North and Lake Boolca).

The Hattah Lakes North project has been designed to replicate key components of the natural hydrology of the system, provide maximum operational flexibility and complement basin river flows to achieve environmental outcomes. The infrastructure has been designed to operate under several flow regimes to achieve environmental watering targets and support improved biodiversity.

Figure 1 depicts the indicative inundation areas (depicted as the Maximum Inundation Area) and flow paths (watercourses). Environmental watering events will occur in response to seasonal triggers, ecological need, water availability and operational risks, with timing generally aligned to late-winter and spring flow cues and adjusted through adaptive management. Additional details are provided in Section 1.1 and Section 1.2 below.

Chalka North Water Management Area

The project builds on existing infrastructure to create a second tier of inundation using water released via the existing Oatey's Regulator. Water will be delivered either through natural flood capture or by capitalising on existing The Living Murray (TLM) infrastructure release events, enabling inundation of up to 420 ha of floodplain. The new infrastructure to be constructed and operated within the Chalka North Water Management Area include the K10 Regulator and K10 Causeway Regulator (shown in Figure 1). Operating scenarios vary depending on seasonal conditions, flow availability and ecological priorities. Three potential operating scenarios have been developed:

- **Flood operation**: regulators remain open during natural floods to maintain connectivity between the Murray River and the floodplain
- **Flood plus intervention**: infrastructure to retain water within the floodplain to the inundation extent
- **Retention in Hattah North area**: water pumped from the existing TLM infrastructure into the floodplain.

The indicative flow thresholds below show how different Murray River flow events influence inundation frequency, duration and the operating scenarios:

- 80,000 ML/day flow event – inundation approximately six times every 10 years, median duration 1.6 months, environmental objectives can be achieved under flood operation, flood plus intervention, or retention within the Hattah North area.
- 120,000 ML/day flow event – inundation approximately 1.5 times every 10 years, median duration one month, environmental objectives can be achieved under flood operation, flood plus intervention, or retention within the Hattah North.

Lake Boolca Water Management Area

The project seeks to restore the flooding regime to the Lake Boolca Water Management Area by increasing the frequency and duration of inflows via the Bitterang floodway. Water will be delivered primarily by gravity, supported by temporary pumping when required. The works, reliant on high Murray River flow events, will enable inundation of up to 710 ha of floodplain north of the Bitterang containment bank through to Lake Boolca. The new infrastructure to be constructed and operated within the Lake Boolca Water Management Area include the Bitterang Containment Bank Regulator and Dry Lakes Regulator (shown in Figure 1). Four potential operating scenarios have been developed:

- **Flood operation:** regulators remain open during natural floods to maintain connectivity between the Murray River and the floodplain
- **Flood plus intervention:** water detained in the Lake Boolca area by closing the Bitterang Containment Bank Regulator
- **Managed inundation – gravity release**: Bitterang Containment Bank Regulator opened to allow water to naturally flow (via gravity release) from the Bitterang containment bank into the Lake Boolca area

- **Managed inundation – pumped:** water pumped from the Bitterang containment bank into the Lake Boolca area.

The indicative flow thresholds below show how different Murray River flow events influence inundation frequency, duration and the operating scenarios:

- 120,000 ML/day flow event – inundation approximately 2.5 times every 10 years, median duration 1 month, and the environmental objectives achieved under flood operation, flood plus intervention, managed inundation – gravity release, managed inundation – pumped
- 140,000 ML/day flow event – inundation approximately 1.5 times every 10 years, median duration of one month, and the environmental objectives achieved under flood operation, flood plus intervention, managed inundation – gravity release, managed inundation – pumped.

1.1 Hattah Lakes North Project Description

The Hattah Lakes North project is on the western side of the Murray River in north-west Victoria, between Robinvale and Red Cliffs, approximately 75km south of Mildura. It involves works to facilitate inundation of approximately 1,130ha of high ecological value Murray River floodplain, including the Chalka North area and Lake Boolca Water Management Areas. The Hattah Lakes North project area is shown in Figure 1.

The Hattah Lakes North project has been designed to build on the benefits of The Living Murray (TLM) initiative, constructed in 2013, which allows watering of approximately 6,000ha of the central and southern Hattah Lakes floodplain. The project is expected to deliver a substantial net improvement to biodiversity and ecosystem function across the floodplain. By restoring more natural water regimes, better aligning the frequency, duration, and timing of inundation with ecological needs, the project aims to enhance habitat quality for threatened species, improve the health and diversity of native vegetation, and strengthen resilience to climate change.

The infrastructure works to enable the operation of the Hattah Lakes North project would include:

- One large regulator (K10)
- One small regulator (Bitterang Regulator)
- One sheet pile regulator (Dry Lake Regulator and Containment Bank)
- One containment bank (K10 River Track Containment Bank)
- 1.8km of containment banks with access tracks on top
- Use of existing access tracks (approximately 16.9km).

Existing TLM infrastructure would be used, including Oatey's Regulator and Bitterang Regulator. There are no permanent pumps proposed as part of the project.

1.2 Operation

The Hattah Lakes North project aims to respond to the declining health of degraded floodplain habitats due to river regulation and the future effects of climate change. The proposed Maximum Inundation Area includes mostly Crown land within the Hattah-Kulkyne National Park, some private land including Kulkyne Station to the east, and a parcel of private land adjoining the northern boundary of the Hattah-Kulkyne National Park. Inundation of private land can be avoided through operation of the proposed works (for example, close K10 Containment Bank Regulator or limit pumping from the Bitterang Regulator) and would only be undertaken subject to agreement with the relevant private landowners.

The Mallee CMA manages the operation of the environmental watering, and the project infrastructure provides a high degree of operational flexibility to enable the implementation of adaptive management principles. Adaptability and flexibility of project operations is critical to the successful operation of the Hattah Lakes North project enabling the project to respond to varying seasonal conditions and take account of lessons learned from each operation event.

The adaptive management process for the Hattah Lakes North project is incorporated into the existing operational management documentation, including the Environmental Water Management Plan for the Hattah Lakes project. Monitoring undertaken in accordance with this EcoMRP is used to provide the data required to guide adaptive management.

The decision to initiate an environmental watering event as part of the project are based on:

- Water availability (based on seasonal water allocations determined by storage operators)

- The floodplain water requirements, to ensure consistency with the watering regime, ecological objectives and targets
- Operational risks (such as risks associated with blackwater, algae and salinity – as detailed in the Environmental Water Management Plan for the project and seasonal watering proposals)
- The regional context (such as the need for survival watering, recruitment watering and maintenance watering) and other river operations that may occur within the river reach.

Timing of each environmental watering event considers late winter and spring flow triggers, such as upstream rainfall or the need for environmental watering to facilitate ecological events. The extent of inundation is managed according to the equivalent flow rate in the Murray River. For further detail about operations and environmental watering scenarios, please see Chapter 6 Project description of the Environment Effects Statement[1].

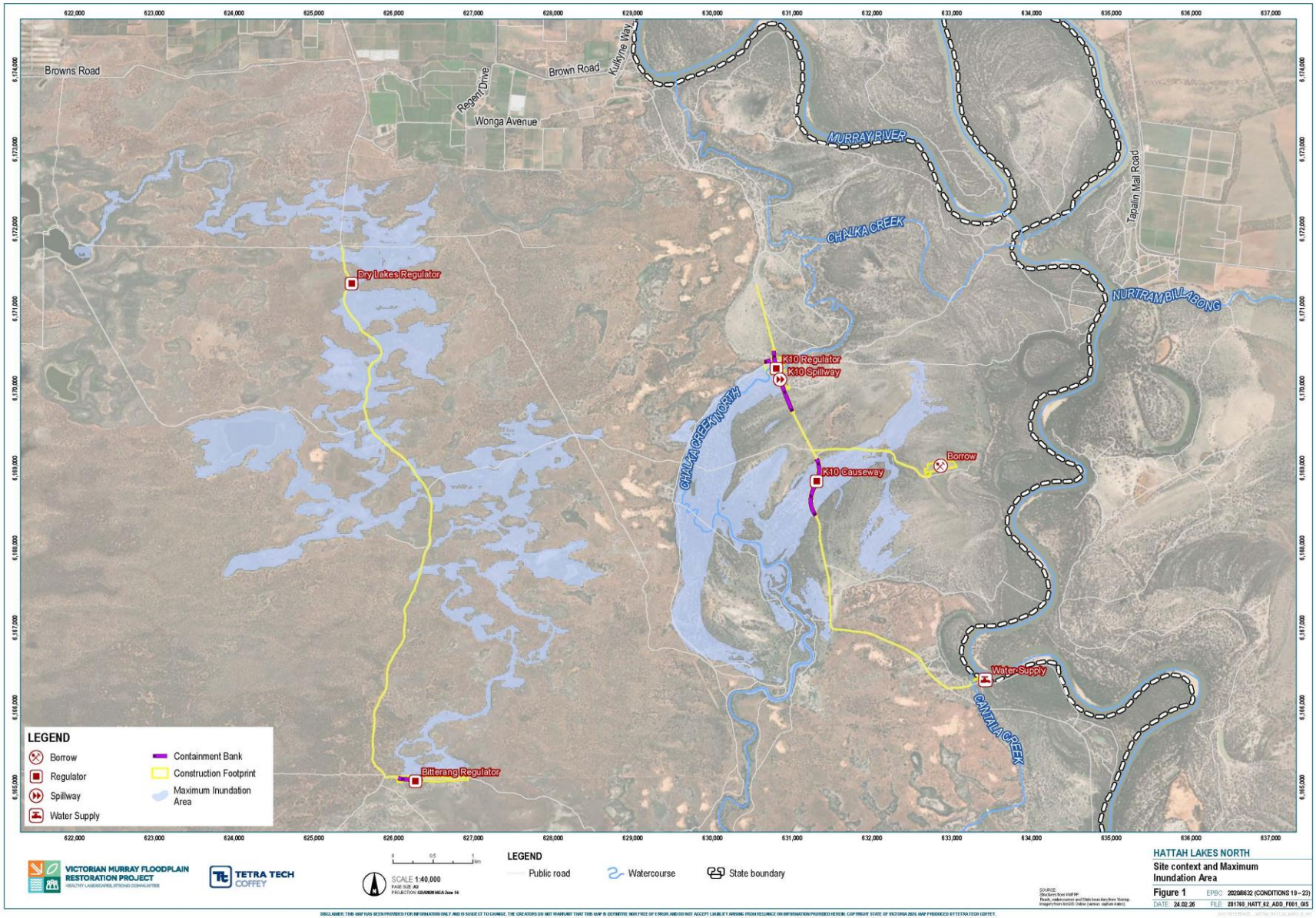

Figure 1: Hattah Lakes North site context and MIA

2 Potential environmental impacts

The Matters of National Environment Significance (MNES) assessment was prepared for Hattah Lakes North as part of the Belar-Yungera and Hattah Lakes North Environment Effects Statement (Attachment X MNES Hattah lakes North[2]).

The MNES considered for the Hattah Lakes North project and their conservation status were:

- Hattah-Kulkyne Lakes Ramsar Wetland
- Murray Cod *Maccullochella peelii* – Vulnerable
- Southern Pygmy Perch *Nannoperca australis* – Vulnerable
- Silver Perch *Bidyanus bidyanus* – Critically endangered
- Flathead Galaxias *Galaxias rostratus* – Critically endangered
- Regent Parrot *Polytelis anthopeplus* – Vulnerable
- Winged Peppercress *Lepidium monoplocoides* – Endangered
- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions – Endangered.

The MNES assessment determined that, after implementation of the Environmental Delivery Standards (EDS), no significant residual adverse impacts on MNES are likely to occur for the Hattah Lakes North project. As noted in Section 1.1, the key aim of the Project is to build on the benefits of the TLM initiative, and deliver an overall improvement in biodiversity as a result of better aligning the frequency, duration, and timing of inundation with the ecological needs of the floodplain.

A summary of the findings and mitigation measures for each MNES is provided below. EPBC Act approval 2020/8632 requires consideration of Murray Cod, Silver Perch, and Regent Parrot, and as such, only these MNES will be considered in this section.

2.1 Summary of findings for Murray Cod and Silver Perch

Murray Cod, Southern Pygmy Perch and Silver Perch were all identified as being present in the study area. The study area adopted for the aquatic ecology assessment included all land and waterways within 10 km of the project area.

During operation, key impact pathways and relevant mitigation measures that were considered for Murray Cod, Southern Pygmy Perch, and Silver Perch are summarised in the Table 1.

Table 1 Murray Cod, Southern Pygmy Perch and Silver Perch operation impact pathways and mitigation measures

Key impact pathways	Mitigation measures
Altered fish passage and connectivity	It is unlikely that large numbers of Murray Cod, Silver Perch or Southern Pygmy Perch would colonise inundated habitat. If these species do enter the floodplain during a managed inundation event, it is possible that they may become stranded, especially if the drawdown is too rapid. In accordance with EDS SW2, during operation a native fish exit strategy to allow native fish to migrate from the floodplain would be developed and tested. Fish inhabiting Lake Boolca and the Dry Lakes are likely to be stranded as no drawdown of this area is proposed. These areas will be left to dry out through evaporation and seepage.
Spread of pest species	Inundation of the floodplain habitat has a high likelihood of increasing Carp populations within wetland habitat and in aquatic habitat that remains following inundation events due to its ability to exploit wetland habitat. In accordance with EDS SW2, during operation a strategy would be developed and tested to allow native fish to migrate from the floodplain while stranding Carp.

Key impact pathways	Mitigation measures
Degradation of aquatic habitat through water quality or regime changes	Degradation of aquatic habitat would be avoided, minimised and managed through implementation of industry standard management measures that manage commonly occurring environmental impacts and have been demonstrated to be effective in addressing these impacts.

A significant impact assessment for Murray Cod, Southern Pygmy Perch, and Silver Perch was undertaken considering these impacts pathways and mitigation measures and no residual impacts were considered significant. Monitoring of trigger values, as outlined in this EcoMRP, has been recommended to ensure that potential negative impacts are minimised.

2.2 Summary of findings for Regent Parrot (eastern)

During operation, key impact pathways and relevant mitigation measures that were considered for Regent Parrot are summarised in Table 2.

Table 2 Regent Parrot operation impact pathways and mitigation measures

Key impact pathways	Mitigation measures
Temporary removal or damage to habitat	During inundation events, the species would not be able to forage on the ground in some or all of the Maximum Inundation Area (MIA). However, the Regent Parrot would still be able to forage in the trees adjacent to the MIA. This temporary loss of relatively small areas of potential foraging habitat is expected to be very minor and ecologically inconsequential.
Spread of pests	Weed and pest species already exist in the MIA and more frequent inundation may increase the number of pest plants and animals present due to the creation of more favourable conditions. Through EDS E3, monitoring and active management of weeds and pest animals during project operation would be undertaken. In accordance with EDS RU1, management measures for resource use and waste would be developed and implemented.
Hypersaline groundwater	Saline intrusion in fringing terrestrial habitats is expected to be very localised and small in extent, with minor impacts to terrestrial ecology. Monitoring would be undertaken at locations identified as being of 'high/medium' risk of hypersaline groundwater impacting Black Box *Eucalyptus largiflorens* and River Red Gum *Eucalyptus camaldulensis*.
Increased vegetation growth and bushfire risk	Inundation aims to improve habitat condition, which is likely to be accompanied by a general increase in biomass. This could increase the risk of intense bushfire, potentially threatening flora and fauna. With appropriate management of fire, increased biomass is expected to have a positive effect on ecology. EDS BF2 sets out the requirements for bushfire preparedness and management to reduce the likelihood and impact of an unplanned fire.

3 Risk assessment

The outcomes of the environmental risk assessment have directly informed the monitoring requirements for Hattah Lakes North. In particular, ecological risks identified as having medium or higher residual risk, following the application of Environmental Delivery Standards, have guided the selection of monitoring parameters, locations and frequencies. The monitoring program is intended to assess the effectiveness of mitigation measures, detect any

unanticipated ecological impacts, and provide information to support adaptive management of environmental watering operations.

An extract of the relevant risks associated with the Hattah Lakes North project, from the Environment Risk Report[6], are included in Appendix A.

4 Monitoring

This section outlines the site-specific monitoring requirements for the Hattah Lakes North Floodplain Restoration Project. As discussed in the EcoMRP, monitoring is required for:

- Bank stability at outflow points
- Erosion impacts in the receiving environment
- The condition of EVCs (as a proxy for MNES) with the maximum inundation area, in particular but not limited to those that are at a medium to high risk of salinisation impacts
- The species, diversity, weight, length, condition, life stage, habitat availability of protected fishes and any harm to protected fishes.

4.1 Bank stability at outflow points and erosion impacts in the receiving environment

Monitoring locations for bank stability at outflow points and erosion impacts in the receiving environment have been adopted from the Hydrology and Water Quality Monitoring Strategy (HyWaq). Bank stability will be monitored at one release point and erosion impacts will be monitored at one point in the downstream receiving environment. These monitoring locations are shown in Figure 2.

4.2 EVC condition (as a proxy for MNES)

4.2.1 Stand condition

As discussed in EcoMRP Section 7.2.1, stand condition will be reported for Black Box and River Red-gum communities across the MIA.

4.2.2 Tree health

As discussed in EcoMRP Section 7.2.2, the plot location and four replicate trees per plot measured during the EES process for Hattah Lakes North are detailed in Appendix V (survey locations) and Appendix X (tree data) of the EES Specialist Assessment B1 Ecology - terrestrial[4] respectively. Figure 3 identifies the monitoring plot locations of the tree health methodology and Table 3 identifies the plot IDs of the sites to be monitored as part of the EcoMRP. It is noted that, only those plots/trees deemed to be at high risk of salinity impacts are included in ongoing monitoring.

Table 3 Tree condition monitoring plots (from the MER[5])

Species	High Risk Inside MIA (Plot ID)	High Risk Outside MIA (Plot ID)	Total number of plots
Black Box	1, 2	6, 8, 5, 7, 8a, 13, 16, 17	10

4.3 Protected fishes

4.3.1 Fish population

Fish population will be monitored at Hattah Lakes North in two shallow water monitoring plots and three deep water plots. The locations of these monitoring plots are provided in Figure 3.

4.4 Trigger values and corrective actions

The trigger values and corrective actions set to address the EPBC Act approval conditions are outlined in Section 7.4 of the EcoMRP.

References

[1] Victorian Murray Floodplain Restoration Project (VMFRP) (2025). *Restoration projects*. Available at: https://www.vmfrp.com.au/projects/ (Accessed: 11 September 2025).

[2] VMFRP (2023a). *Environmental Effects Statement: Belsar-Yungera and Hattah Lakes North Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

[3] Water Technology (2024). *Updated HyWaQ Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.

[4] R8 Joint Venture (2022). Specialist Assessment B1 Ecology - Terrestrial. EES Central: Belsar-Yungera and Hattah Lakes North. Report prepared for Victorian Murray Floodplain Restoration Project. Jacobs Group Pty Ltd and GHD Pty Ltd as R8 Joint Venture, Melbourne

[5] Arthur Rylah Institute (ARI) and Ecological Associates (2024). *Mallee CMA VMFRP Ecology Monitoring, Evaluation and Reporting Plan – DRAFT (Version E)*. Ecological Associates report AL061-2-E prepared for Mallee Catchment Management Authority, Mildura.

[6] VMFRP (2023b). *Attachment II – Environmental Risk Report. Environment Report: Belsar-Yungera and Hattah Lakes North Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

Appendix A: Risk register

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Aquatic species	Likely	Major	High	**Pest Plant and Animal Monitoring and Management** Prepare (prior to the commencement of operation) and implement a Pest Plants and Animals Monitoring and Management Plan to detect and manage pest presence and activity due to managed environmental watering events. The Plan may be prepared for multiple VMFRP projects, and will include: • A monitoring program to understand any such increase in pest presence and activity, which will inform adaptive management and treatment measures • Thresholds for implementation of contingency management measures. • Contingency measures, which may refer to existing policies, practices and procedures. The monitoring program must include monitoring objectives, indicators and requirements (e.g. parameters, locations, frequency) appropriate to identify success of the program. Locations must include culturally sensitive locations relevant to EDS ACH3. In addition to the EDS above, the risk is also controlled by: GW2 – Operational groundwater management, SW2 – Surface water - Operation, SW3 – Surface water – Monitoring	Possible	Moderate	Medium
Ecology – Arboriculture / Potential impact on Large Trees such as from holding water on the floodplain for longer than required during managed inundation events	Possible	Minor	Medium	**Native vegetation and habitat design minimisation** Removal of native vegetation will be up to 68.80 ha for the Belsar-Yungera project and up to 19.41 ha for the Hattah Lakes North projects. 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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (eg native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones as specified by VMFRP 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.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Pest Plant and Animal Monitoring and Management** Prepare (prior to the commencement of operation) and implement a Pest Plants and Animals Monitoring and Management Plan to detect and manage pest presence and activity due to managed environmental watering events. 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In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management	Unlikely	Minor	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Native species / Potential impact on terrestrial native species, or their habitat such as from anoxic (blackwater) events during managed inundation events	Possible	Moderate	Medium	**Native vegetation and habitat design minimisation** Removal of native vegetation will be up to 68.80 ha for the Belsar-Yungera project and up to 19.41 ha for the Hattah Lakes North projects. 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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (eg native and exotic vegetation, hollows, logs, soil and water). 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In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management, NV2 – Operational noise management, SW2 – Surface water - Operation	Possible	Minor	Medium
Ecology – Native vegetation / Potential direct or indirect impacts on native vegetation (including patches of native vegetation and scattered trees) during the operating phase of the project	Likely	Moderate	High	**Native vegetation and habitat design minimisation** Removal of native vegetation will be up to 68.80 ha for the Belsar-Yungera project and up to 19.41 ha for the Hattah Lakes North projects. 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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (eg native and exotic vegetation, hollows, logs, soil and water). 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In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational management, EMF4 – Operation performance management	Likely	Moderate	High

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Threatened ecological communities and their habitat / Potential impacts on Commonwealth and/or Victorian listed threatened ecological communities, or their habitat, as a result of the operating phase, including from changes to natural flooding and drainage regimes during managed inundation events	Unlikely	Minor	Low	**Native vegetation and habitat design minimisation** Removal of native vegetation will be up to 68.80 ha for the Belsar-Yungera project and up to 19.41 ha for the Hattah Lakes North projects. 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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (eg native and exotic vegetation, hollows, logs, soil and water). 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It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Pest Plant and Animal Monitoring and Management** Prepare (prior to the commencement of operation) and implement a Pest Plants and Animals Monitoring and Management Plan to detect and manage pest presence and activity due to managed environmental watering events. 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In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational management, EMF4 – Operation performance management, SW2 – Surface water - Operation	Unlikely	Minor	Low
Ecology – Threatened species and their habitat / Potential impact on Commonwealth and/or Victorian listed threatened species, or their habitat such as from anoxic (blackwater) events, stranding or isolation during drawdown events, increased Carp population, changes to water quality and reduced hydraulic variability during managed inundation events	Unlikely	Moderate	Medium	**Native vegetation and habitat design minimisation** Removal of native vegetation will be up to 68.80 ha for the Belsar-Yungera project and up to 19.41 ha for the Hattah Lakes North projects. 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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (eg native and exotic vegetation, hollows, logs, soil and water). 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In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management, NV2 – Operational noise management, SW2 – Surface water - Operation	Possible	Minor	Medium

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Weeds, pest species and pathogens / Potential introduction or spread of weeds, pest species or pathogens	Likely	Moderate	High	**Pest Plant and Animal Monitoring and Management** Prepare (prior to the commencement of operation) and implement a Pest Plants and Animals Monitoring and Management Plan to detect and manage pest presence and activity due to managed environmental watering events. The Plan may be prepared for multiple VMFRP projects, and will include: • A monitoring program to understand any such increase in pest presence and activity, which will inform adaptive management and treatment measures • Thresholds for implementation of contingency management measures. • Contingency measures, which may refer to existing policies, practices and procedures. The monitoring program must include monitoring objectives, indicators and requirements (e.g. parameters, locations, frequency) appropriate to identify success of the program. Locations must include culturally sensitive locations relevant to EDS ACH3. In addition to the EDS above, the risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational management, EMF4 – Operation performance management, SW2 – Surface water - Operation	Likely	Minor	Medium
Groundwater – Flow / Potential changes to groundwater levels or flows during managed inundation events on environmental values	Rare	Minor	Low	**Operational groundwater management** Monitor and manage the risk of salinity in accordance with the relevant Catchment Management Authority's salinity management program.	Rare	Minor	Low
Groundwater – Quality / Potential impacts on groundwater quality resulting from managed inundation impacting on environmental values including groundwater-dependent ecosystems	Rare	Minor	Low	**Operational groundwater management** Monitor and manage the risk of salinity in accordance with the relevant Catchment Management Authority's salinity management program.	Rare	Minor	Low
Surface Water – Flow / Potential changes to fluvial processes as a result of managed inundation events, leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Possible	Moderate	Medium	**Surface water – 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 Operating Plan is developed by the CMA prior to the first operation in consultation with relevant stakeholders. Operation of the project to consider and seek to avoid, minimise and manage where practicable: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are pressent then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Implement measures to allow native fish to migrate from the floodplain while stranding Carp (e.g. providing cues, maintaining passage). • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. " **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 Environmental Water Management Plan and Seasonal Watering Proposals).	Rare	Moderate	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Surface Water Quality / Potential changes to water quality (e.g. water salinity, suspension of sediments) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Possible	Moderate	Medium	**Surface water – 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 Operating Plan is developed by the CMA prior to the first operation in consultation with relevant stakeholders. Operation of the project to consider and seek to avoid, minimise and manage where practicable: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are pressent then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Implement measures to allow native fish to migrate from the floodplain while stranding Carp (e.g. providing cues, maintaining passage). • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. " **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 Environmental Water Management Plan and Seasonal Watering Proposals).	Rare	Moderate	Low

Appendix B: Figures

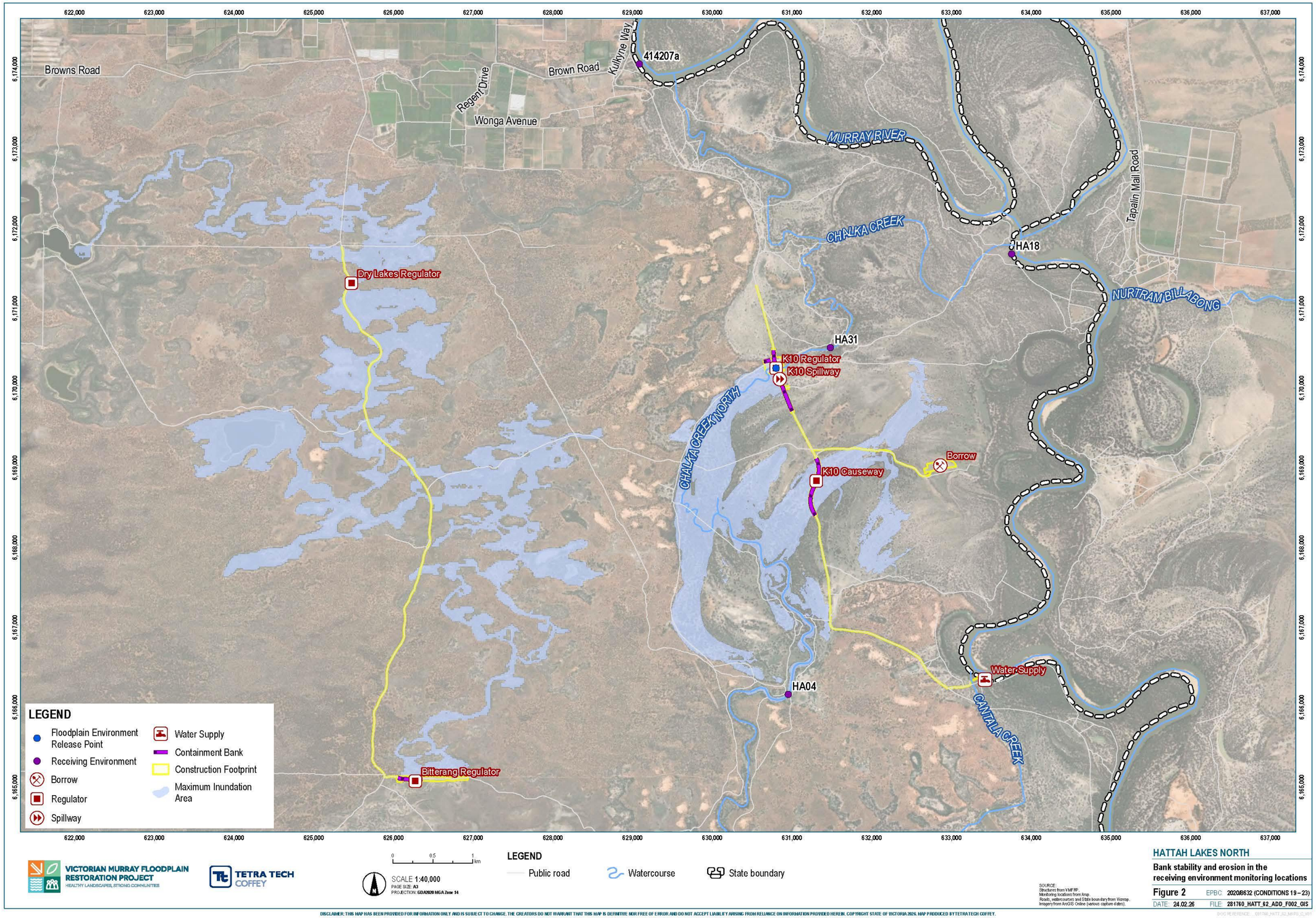

Figure 2 Bank stability and erosion in the receiving environment monitoring locations

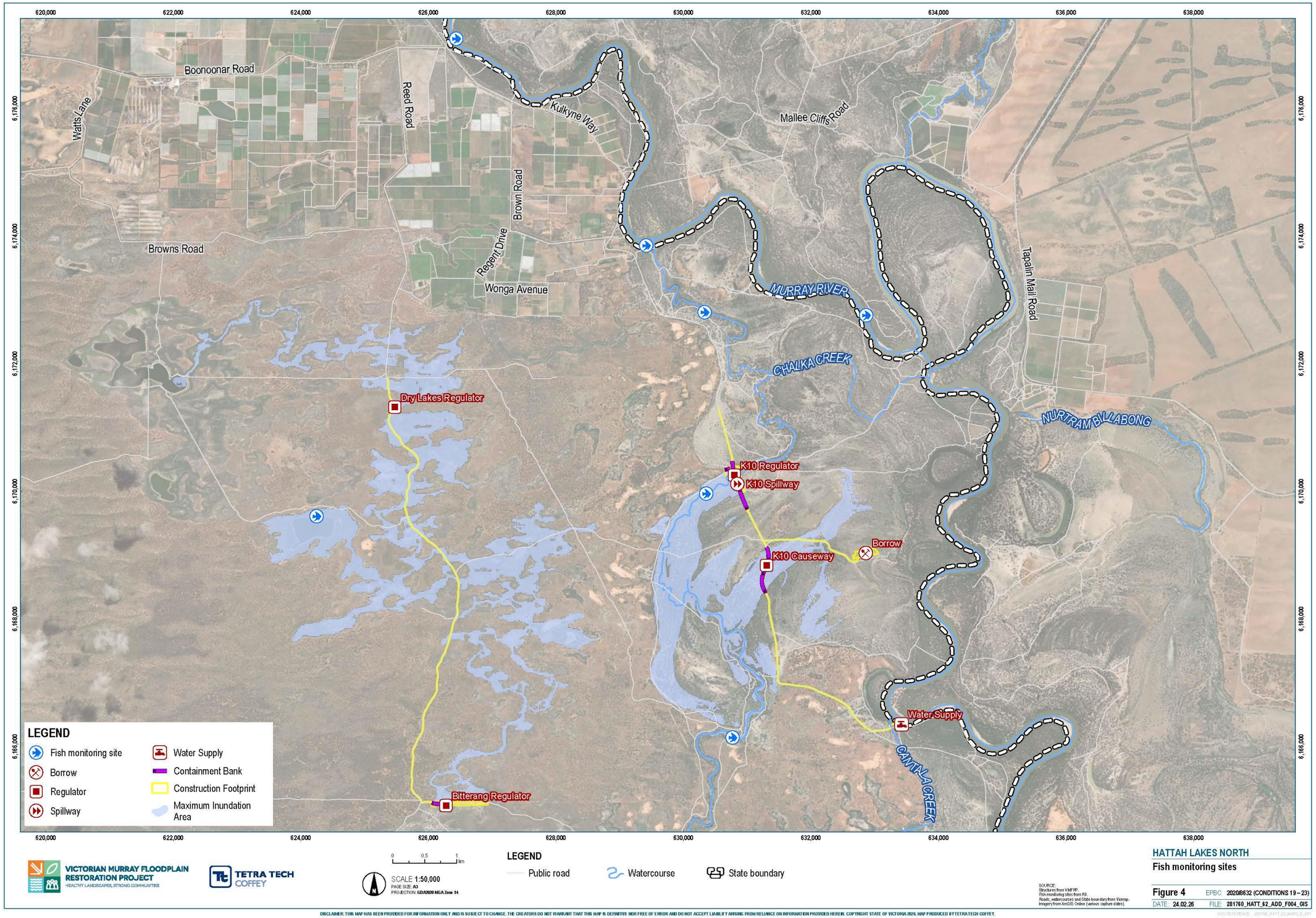

Figure 3 Fish monitoring sites

Addendum C: Nyah Floodplain Restoration Project

VICTORIAN MURRAY FLOODPLAIN RESTORATION PROJECT

HEALTHY LANDSCAPES, STRONG COMMUNITIES

Ecology Monitoring and Reporting Program – Addendum C

Nyah Floodplain Restoration Project

Australian Government

VICTORIA State Government

LOWER MURRAY WATER

Goulburn-Murray WATER

mallee catchment management authority

North Central CMA

Parks VICTORIA

Approved Action

Person to whom the approval is granted	Lower Murray Urban and Rural Water Corporation
ABN of Approval Holder	18 475 808 826
Action	
Nyah Floodplain Restoration Project (EPBC: 2020/8648)	To construct and operate water regulating structures, construct a borrow pit, and decommission two existing structures to facilitate managed inundation of approximately 475 ha of the Nyah floodplain at Nyah-Vinifera Park, Victoria. [See EPBC Act referral 2020/8648 and variation request dated 21 September 2022].

Declaration of accuracy

In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: 

Full name (please print): ASHER SUTTON

Organisation (please print): LOWER MURRAY URBAN AND RURAL WATER CORPORATION

Date 17/03/2026

Table of contents

Quality Information

Version	Date	Prepared by	Approved for submission
A – VMFRP and stakeholder review	22 September 2025	K Petersen, D Lim	S Brown
B – DCCEEW preliminary review	14 October 2025	D Lim	S Brown
C – DCCEEW comments for stakeholder acceptance	27 February 2026	D Lim	S Brown
D – for issue to DCCEEW	3 March 2026	D Lim	S Brown
0 – for issue to DCCEEW for approval	17 March 2026	D Lim	S Brown

Abbreviations

Abbreviation	Definition
ARI	Arthur Rylah Institute
CMA	Catchment Management Authority
EcoMRP	Ecology Monitoring and Reporting Program
EDS	Environmental Delivery Standard
EES	Environment Effects Statement under the *Environment Effects Act 1978*
EMF	Environmental Management Framework
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EVC	Ecological Vegetation Class
ha	Hectares
HyWaq	Hydrology and Water Quality Monitoring Strategy
Mallee CMA	Mallee Catchment Management Authority
MER	Monitoring, Evaluating and Reporting
MIA	Maximum Inundation Area
MNES	Matters of National Environmental Significance
TLM	The Living Murray
VMFRP	Victorian Murray Floodplain Restoration Project

1 Introduction

The purpose of this addendum report is to provide the site-specific monitoring requirements for the Ecology Monitoring and Reporting Plan (EcoMRP) for the Nyah Floodplain Restoration Project (the site).

The Nyah Floodplain Restoration Project will construct and operate water regulating structures, construct a borrow pit, and decommission two existing structures (as shown in Figure 1) to facilitate managed inundation of approximately 475 ha of the Nyah floodplain at Nyah-Vinifera Park, Victoria, which is across the Nyah Water Management Area.

The Nyah project has been designed to replicate key components of the natural hydrology of the system, to provide maximum operational flexibility and to complement basin river flows to deliver environmental outcomes. Figure 1 depicts the indicative inundation areas (depicted as the Maximum Inundation Area) and flow paths (watercourses) and regulating structures. Environmental watering events will occur in response to seasonal triggers, ecological need, water availability and operational risks, with timing generally aligned to late winter and spring flow cues and adjusted through adaptive management. Additional details are provided in Section 1.1 and Section 1.2 below.

The infrastructure has been designed to be operated in several possible flow regimes. Five potential scenarios have been developed to illustrate how the structures can be used to achieve environmental watering targets, which would contribute to an overall improvement for biodiversity:

- **Default:** this scenario is the default configuration for Nyah water management structures, in normal regulated river conditions when environmental watering is not required. All regulating structures will be open
- **Seasonal Fresh**: this scenario allows high river flow to generate through-flow in Parnee Malloo Creek. All regulating structures will be open
- **Vinifera Intermediate**: this scenario increases the frequency and duration of Seasonal Wetland inundation. Close N1a, N1b, N2, N5, N7 Regulators. Structures set to the height required to achieve operational objectives, (between open and 63.2 m AHD)
- **Vinifera Maximum:** this scenario increases the frequency and duration of Red Gum Swamp Forest inundation. N1a, N1b, N2, N5, N7 – set maximum level 63.2 m AHD
- **Natural Inundation / Flood Operation.**

The operating scenarios would rely on high Murray River flow events and temporary pumps to deliver water to the Nyah project. Under the Seasonal Fresh, Nyah Intermediate and Nyah Maximum scenarios temporary pumps may be used to augment inflows or provide flows entirely in the absence of inundation directly from the Murray River, to achieve environmental watering targets. Pump infrastructure would not be permanent; pumps would be brought in on a temporary basis for watering events.

The indicative flow thresholds below show how different Murray River flow events influence inundation frequency, duration and the operating scenarios:

- 19,000 ML/day flow event – inundation approximately 9.4 times every 10 years, median duration 4 months, environmental objectives can be achieved under Seasonal Fresh operating scenario
- 22,500 ML/day flow event – inundation approximately 9.5 times every 10 years, median duration 3.6 months, environmental objectives can be achieved under Nyah Intermediate operating scenario
- 27,500 ML/day flow event – inundation approximately 6 times every 10 years, median duration 1.3 months, environmental objectives can be achieved under Nyah Maximum operating scenario.

1.1 Nyah Project Description

The Nyah project is on the western side of the Murray River in the Nyah-Vinifera Park (managed by Parks Victoria), approximately 30 km north of Swan Hill in the north-west region of Victoria, between Nyah and Wood Wood. The Nyah project area is shown in Figure 1.

The Nyah project will involve works to facilitate inundation of approximately 475 ha of high ecological value Murray River floodplain. The project is expected to deliver a substantial net improvement to biodiversity and ecosystem function across the floodplain. By restoring more natural water regimes, better aligning the frequency, duration, and timing of inundation with ecological needs, the project aims to enhance habitat quality for threatened species, improve the health and diversity of native vegetation, and strengthen resilience to climate change.

The infrastructure works to enable the operation of the Nyah project would include:

- One large regulator (N2 Regulator)
- Four small regulators (N1a Regulator, N1b Regulator, N5 Regulator and N7 Regulator)
- 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 area, for temporary pumps to transfer environmental water, as required
- Upgrades to existing access track (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)
- Decommissioning and removal of two redundant structures (N4 Bank and Pipe) and a block bank (N6 Regulator) in Parnee Malloo Creek.

The project is almost entirely in the Rural City of Swan Hill, the Mallee CMA region, and Crown land within the Nyah-Vinifera Park, except for the drop structure. The drop structure would extend into the banks and bed of the Murray River within New South Wales, in the Murray River Council local government area. There are no permanent pumps proposed as part of the project. The park is managed by Parks Victoria in accordance with the objectives of the Crown Land (Reserves) Act 1978 (Vic.).

1.2 Operation

The Nyah project has been designed to respond to the declining health of high-value floodplains from river regulation and the future effects of climate change. The Maximum Inundation Area of the project includes River Red Gum and Black Box forests and woodlands.

Operation of the environmental watering is managed by the Mallee CMA. The project infrastructure provides a high degree of operational flexibility enabling adaptive management principles to be implemented. Adaptability and flexibility of project operations is critical to the successful operation of the Nyah project, enabling it to respond to varying seasonal conditions and learn from each operation event. The adaptive management process is detailed in the site-specific Environmental Water Management Plan for the Nyah project. Monitoring would provide the data required to guide adaptive management. Monitoring undertaken in accordance with this EcoMRP is used to provide the data required to guide adaptive management.

The decision to initiate an environmental watering event as part of the project is based on:

- Water availability, based on seasonal water allocations determined by storage operators
- The floodplain water requirements, to ensure consistency with the watering regime, ecological objectives and targets
- Operational risks, such as risks associated with blackwater, algae and salinity, as detailed in the Environmental Water Management Plan for the project and seasonal watering proposals
- The regional context, such as the need for survival watering, recruitment watering, maintenance watering, and other river operations that may occur within the river reach.

Timing of each environmental watering event considers late winter and spring flow triggers, such as upstream rainfall or the need for environmental watering to facilitate ecological events. The extent of inundation is managed according to the equivalent flow rate in the Murray River. For further detail about operations and environmental watering scenarios, please see Chapter 6 Project description of the Environment Report[2].

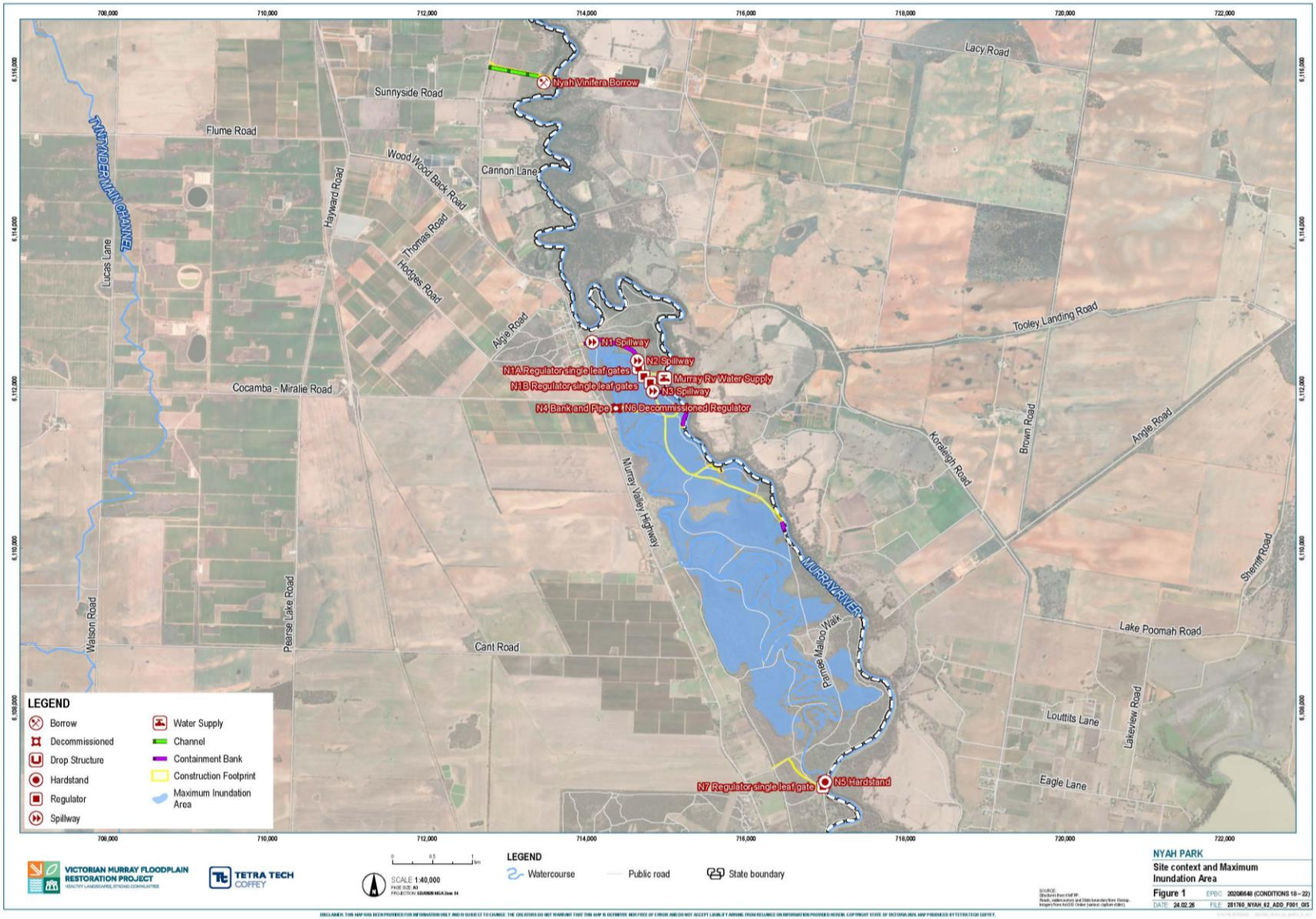

Figure 1 Nyah site context and MIA[1]

Potential environmental impacts

The Matters of National Environment Significance (MNES) assessment was prepared for Nyah as part of the Nyah, Vinifera and Curra Creek Floodplain Restoration Project Environmental Report (Attachment 11: Nyah Matters of National Environmental Significance Assessment[2]).

The MNES considered for the Nyah project and their conservation status are provided below:

- Murray Cod *Maccullochella peelii* – Vulnerable
- Silver Perch *Bidyanus bidyanus* – Critically Endangered
- Regent Parrot *Polytelis anthopeplus* – Vulnerable.

The MNES assessment determined that, after implementation of the Environmental Delivery Standards (EDS), no significant residual adverse impacts on MNES are likely to occur for the Hattah Lakes North project. As noted in Section 1.1, the key aim of the Project is to build on the benefits of the TLM initiative and deliver an overall improvement in biodiversity as a result of better aligning the frequency, duration, and timing of inundation with the ecological needs of the floodplain.

A summary of the findings and mitigation measures for each MNES is provided below. EPBC Act approval 2020/8648 requires consideration of Murray Cod, Silver Perch, and Regent Parrot, and as such, only these MNES will be considered in this section.

2 Potential environmental impacts

2.1 Summary of findings for Murray Cod and Silver Perch

Murray Cod and Silver Perch are considered present in the study area. The study area adopted for the aquatic ecology assessment included all land and waterways within 10 km of the project area.

During operation, key impact pathways and relevant mitigation measures that were considered for Murray Cod and Silver Perch are summarised in Table 1.

Table 1 Murray Cod and Silver Perch operation impact pathways and mitigation measures

Key impact pathways	Mitigation measures
Altered fish passage and connectivity	Regulators will be placed within the Parnee Malloo Creek channel at locations that are either semi-permanently inundated under existing conditions or at locations that would become inundated during operation. None of these structures includes a fishway, although all regulator gating choices have been selected to provide passive fish passage where possible. If Murray Cod or Silver Perch do enter the floodplain during a managed inundation event, it is possible that they may be stranded following managed inundations, especially if the drawdown is too rapid. In accordance with EDS SW2, during operation a native fish exit strategy to allow native fish to migrate from the floodplain would be developed and tested to inform adaptive management.
Spreads of pest species	Inundation of floodplain habitat also has a high likelihood of increasing Carp populations within wetland habitat and in aquatic habitat that remains following inundation events. In accordance with EDS SW2, during operation a strategy to allow native fish to migrate from the floodplain while stranding Carp would be developed and tested to inform adaptive management.
Degradation of aquatic habitat through water quality or regime changes	Degradation of aquatic habitat would be avoided, minimised and managed through the implementation of industry standard management measures that manage commonly occurring environmental impacts and have been demonstrated to be effective in addressing these impacts.

A significant impact assessment for Murray Cod and Silver Perch was undertaken considering these impacts pathways and mitigation measures and no residual impacts were considered significant. Monitoring of trigger values, as outlined in this EcoMRP, has been recommended to ensure that potential negative impacts are minimised.

2.2 Summary of findings for Regent Parrot (eastern)

The Regent Parrot was identified as present in the MIA.

During operation, key impact pathways and relevant mitigation measures that were considered for Regent Parrot are summarised in Table 2.

Table 2 Regent Parrot operation impact pathways and mitigation measures

Key impact pathways	Mitigation measures
Temporary removal or damage to habitat values	During inundation events, the species would not be able to forage on the ground in some or all of the MIA. However, the Regent Parrot would still be able to forage in the trees in and beside the MIA. This temporary loss of relatively small areas of potential foraging habitat is expected to be very minor and ecologically inconsequential.
Spread of pests	Weed and pest species already exist in the MIA and more frequent inundation may increase the number of pest plants and animals present. Through EDS E3 monitoring and active management of weeds and pest animals during the project operation would be undertaken. In accordance with EDS RU1, management measures for resource use and waste would be developed and implemented. With measures in place, the spread or establishment of weeds and pest animals to the extent that habitat for species is degraded, or that this species is significantly harmed, is unlikely.
Increased vegetation growth and bushfire risk	Inundation aims to improve habitat condition, which is likely to be accompanied by a general increase in biomass. This could increase the risk of intense bushfire, potentially threatening flora and fauna. With appropriate management of fire, increased biomass is expected to have a positive effect on ecology. EDS BF2 sets out the requirements for bushfire preparedness and management to reduce the likelihood and impact of an unplanned fire.

A significant impact assessment for Regent Parrot was undertaken considering these impact pathways and mitigation measures and no residual impacts were considered significant. Monitoring of trigger values, as outlined in this EcoMRP, has been recommended to ensure that potential negative impacts are minimised.

3 Risk assessment

The outcomes of the environmental risk assessment have directly informed the monitoring requirements for Nyah. In particular, ecological risks identified as having medium or higher residual risk, following the application of Environmental Delivery Standards, have guided the selection of monitoring parameters, locations and frequencies. The monitoring program is intended to assess the effectiveness of mitigation measures, detect any unanticipated ecological impacts, and provide information to support adaptive management of environmental watering operations.

An extract of the relevant risks associated with the Nyah project, from the Environment Risk Report[4], are included in Appendix A.

4 Monitoring

This section outlines the site-specific monitoring requirements for the Nyah Floodplain Restoration Project. As discussed in the EcoMRP, monitoring is required for:

- Bank stability at outflow points
- Erosion impacts in the receiving environment
- The condition of EVCs (as a proxy for MNES) with the maximum inundation area, in particular but not limited to those that are at a medium to high risk of salinisation impacts
- The species, diversity, weight, length, condition, life stage, habitat availability of protected fishes and any harm to protected fishes.

4.1 Bank stability at outflow points and erosion impacts in the receiving environment

Monitoring locations for bank stability at outflow points and erosion impacts in the receiving environment have been adopted from the Hydrology and Water Quality Monitoring Strategy[3] (HyWaq). Bank stability will be monitored at one release point and erosion impacts will be monitored at one point in the downstream receiving environment. These monitoring locations are shown in Figure 2.

4.2 EVC condition (as a proxy for MNES)

4.2.1 Stand condition

As discussed in EcoMRP Section 7.2.1, stand condition will be reported for black box and river red-gum plant communities across the MIA.

4.2.2 Tree health

As discussed in EcoMRP Section 7.2.2, monitoring plots at Nyah and Vinifera have now been established by Mallee CMA and the Arthur Rylah Institute (ARI), and baseline data has been collected to inform the assessment prior to commencement of operation.

4.3 Protected fishes

4.3.1 Fish population

Fish population will be monitored at Nyah in five shallow water monitoring plots and three deep water plots. The locations of these monitoring plots are provided in Figure 3.

4.4 Trigger values and corrective actions

The trigger values and corrective actions set to address the EPBC Act approval conditions are outlined in Section 7.4 of the EcoMRP.

References

[1] Victorian Murray Floodplain Restoration Project (VMFRP) (2025). *Restoration projects*. Available at: https://www.vmfrp.com.au/projects/ (Accessed: 11 September 2025).

[2] VMFRP (2023a). *Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

[3] Water Technology (2024). *Updated HyWaQ Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.

[4] VMFRP (2023b). *Attachment II – Environmental Risk Report. Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

Appendix A: Risk register

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Aquatic species / Potential impact on aquatic species or their habitat	Possible	Major	High	**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: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are present then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators.	Unlikely	Major	Medium
Ecology – Arboriculture / Potential impact on Large Trees such as from holding water on the floodplain for longer than required during managed inundation events	Possible	Moderate	Medium	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act-listed flora within the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational Management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management	Rare	Minor	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Native species / Potential impact on terrestrial native species, or their habitat such as from anoxic (blackwater) events during managed inundation events	Unlikely	Moderate	Medium	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act-listed flora within the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. 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Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management, NV2 – Operational noise management, SW2 – Surface water - Operation	Possible	Insignificant	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Native vegetation / Potential direct or indirect impacts on native vegetation (including patches of native vegetation and scattered trees) during the operating phase of the project	Likely	Major	High	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. 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It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management	Unlikely	Minor	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Threatened ecological communities and their habitat / Potential impacts on Commonwealth and/or Victorian listed threatened ecological communities, or their habitat, as a result of the operating phase, including from changes to natural flooding and drainage regimes during managed inundation events	Unlikely	Minor	Low	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act-listed flora within the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **Overall biodiversity improvement – Nyah** 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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, SW2 – Surface water - Operation	Possible	Insignificant	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Threatened species and their habitat / Potential impact on Commonwealth and/or Victorian listed threatened species, or their habitat such as from anoxic (blackwater) events, stranding or isolation during drawdown events, increased Carp population, changes to water quality and reduced hydraulic variability during managed inundation events	Possible	Moderate	Medium	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act-listed flora within the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management, NV2 – Operational noise management, SW2 – Surface water - Operation	Unlikely	Minor	Low
Ecology – Weeds, pest species and pathogens / Potential introduction or spread of weeds, pest species or pathogens	Possible	Major	High	**Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. In addition to the EDS identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, SW2 – Surface water - Operation	Likely	Minor	Medium
Groundwater – Flow / Potential changes to groundwater levels or flows during managed inundation events on environmental values	Unlikely	Insignificant	Low	**Operational groundwater management** Monitor and manage the risk of salinity in accordance with the relevant Catchment Management Authority's salinity management program.	Unlikely	Insignificant	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Groundwater – Quality / Potential impacts on groundwater quality resulting from managed inundation impacting on environmental values including groundwater-dependent ecosystems	Unlikely	Insignificant	Low	**Operational groundwater management** Monitor and manage the risk of salinity in accordance with the relevant Catchment Management Authority's salinity management program.	Unlikely	Insignificant	Low
Surface Water – Flow / Potential changes to fluvial processes as a result of managed inundation events, leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Possible	Minor	Medium	**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: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are present then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. **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 Environmental Water Management Plan and Seasonal Watering Proposals).	Unlikely	Minor	Low
Surface Water Quality / Potential changes to water quality (e.g. water salinity, suspension of sediments) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Possible	Minor	Medium	**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: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are present then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. **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 Environmental Water Management Plan and Seasonal Watering Proposals).	Unlikely	Minor	Low

Appendix B: Figures

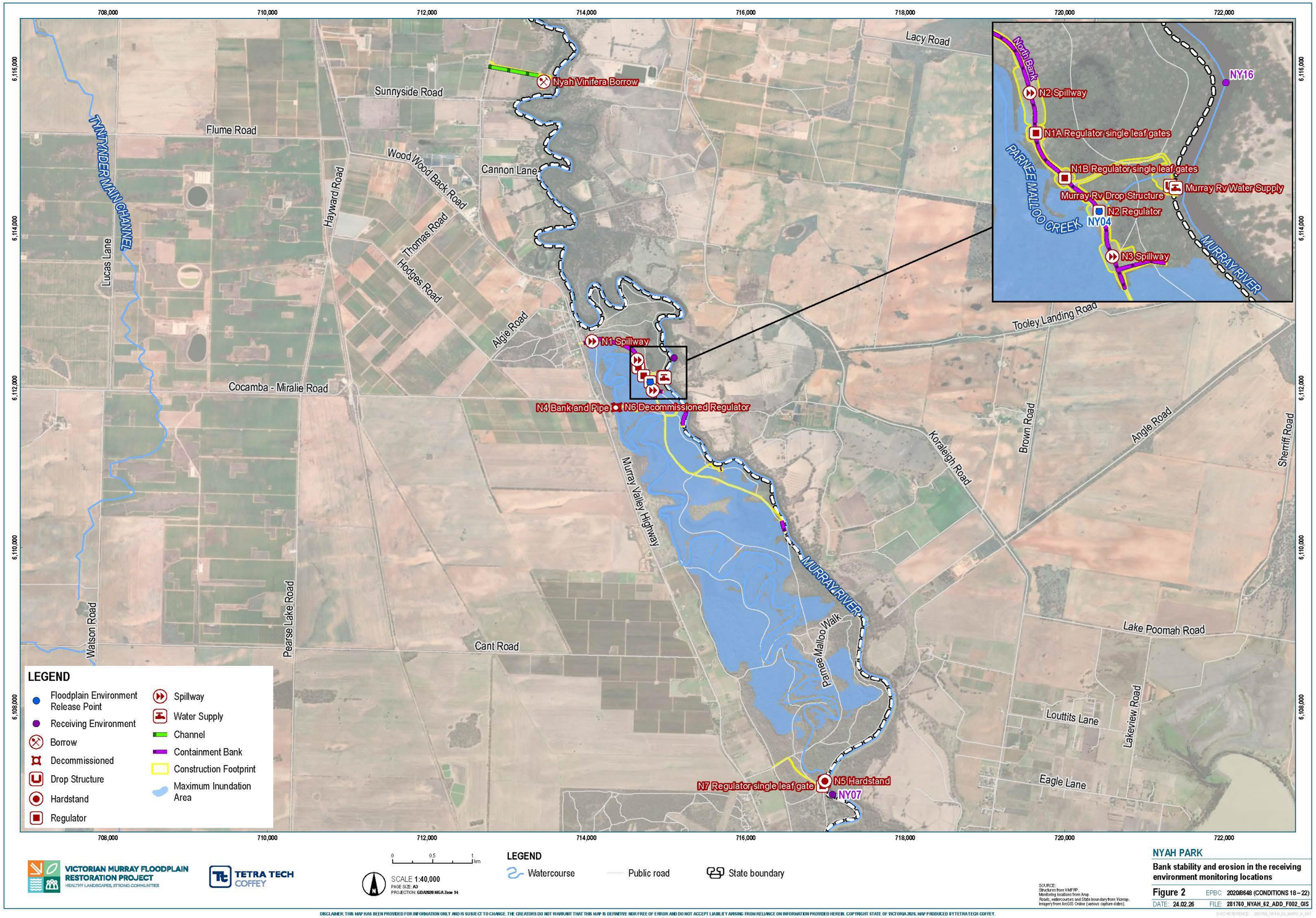

Figure 2 Bank stability and erosion in the receiving environment monitoring locations

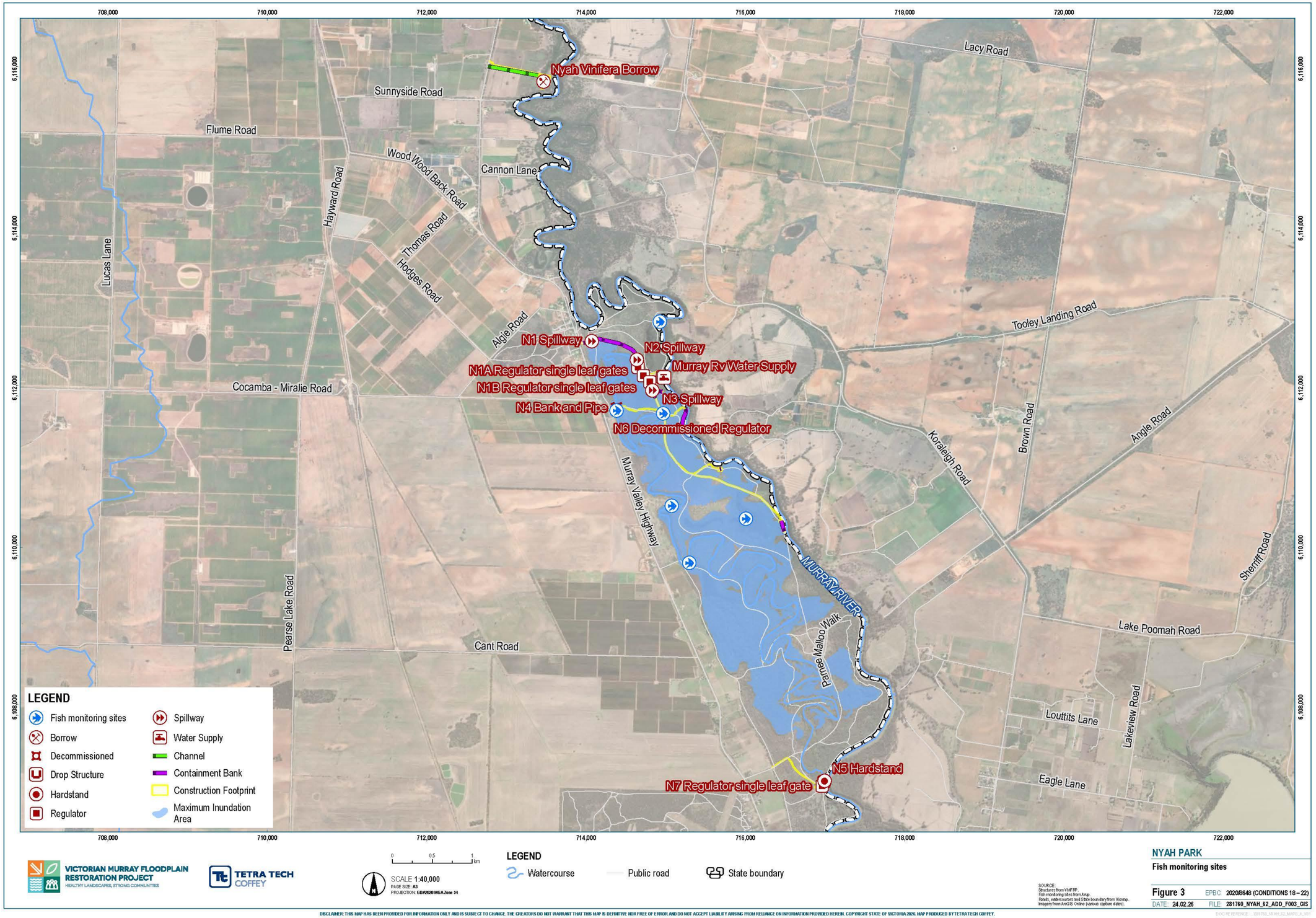

Figure 3 Fish monitoring locations

Addendum D: Vinifera Floodplain Restoration Project

VICTORIAN MURRAY FLOODPLAIN RESTORATION PROJECT

HEALTHY LANDSCAPES, STRONG COMMUNITIES

Ecology Monitoring and Reporting Program – Addendum D

Vinifera Floodplain Restoration Project

Australian Government | VICTORIA State Government | LOWER MURRAY WATER | Goulburn-Murray WATER | mallee catchment management authority | North Central CMA | Parks VICTORIA

Approved Action

Person to whom the approval is granted	Lower Murray Urban and Rural Water Corporation
ABN of Approval Holder	18 475 808 826
Action	
Vinifera Floodplain Restoration Project (EPBC: 2020/8647)	To construct and operate water regulating structures to facilitate managed inundation of up to 335 ha of the Vinifera floodplain, Nyah-Vinifera Park, Victoria [See EPBC Act referral 2020/8647 and variation request dated 4 November 2022].

Declaration of accuracy

In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: 

Full name (please print): ASHER SUTTON

Organisation (please print): LOWER MURRAY URBAN AND RURAL WATER CORPORATION

Date 17/03/2026

Table of contents

Quality Information

Version	Date	Prepared by	Approved for submission
A – VMFRP and stakeholder review	22 September 2025	K Petersen, D Lim	S Brown
B – DCCEEW preliminary review	14 October 2025	D Lim	S Brown
C – DCCEEW comments for stakeholder acceptance	27 February 2026	D Lim	S Brown
D – for issue to DCCEEW	3 March 2026	D Lim	S Brown
0 – for issue to DCCEEW for approval	17 March 2026	D Lim	S Brown

Abbreviations

Abbreviation	Definition
ARI	Arthur Rylah Institute
CMA	Catchment Management Authority
EcoMRP	Ecology Monitoring and Reporting Program
EDS	Environmental Delivery Standard
EES	Environment Effects Statement under the *Environment Effects Act 1978*
EMF	Environmental Management Framework
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EVC	Ecological Vegetation Class
ha	Hectares
HyWaq	Hydrology and Water Quality Monitoring Strategy
Mallee CMA	Mallee Catchment Management Authority
MER	Monitoring, Evaluating and Reporting
MIA	Maximum Inundation Area
MNES	Matters of National Environmental Significance
TLM	The Living Murray
VMFRP	Victorian Murray Floodplain Restoration Project

1 Introduction

The purpose of this addendum report is to provide the site-specific monitoring requirements for the Ecology Monitoring and Reporting Plan (EcoMRP) for the Vinifera Floodplain Restoration Project (the site).

The Vinifera Floodplain Restoration Project will construct and operate water regulating structures (as shown in Figure 1.) to facilitate managed inundation of up to 335 ha of the Vinifera floodplain, Nyah-Vinifera Park, Victoria, which is across the Vinifera Water Management Area.

The Vinifera project has been designed to replicate key components of the natural hydrology of the system, to provide maximum operational flexibility and to complement basin river flows to deliver environmental outcomes. Figure 1 depicts the indicative inundation areas (depicted as the Maximum Inundation Area) and flow paths (watercourses) and regulating structures. Environmental watering events will occur in response to seasonal triggers, ecological need, water availability and operational risks, with timing generally aligned to late-winter and spring flow cues and adjusted through adaptive management. Additional details are provided in Section 1.1 and Section 1.2 below.

The infrastructure has been designed to be operated in several possible flow regimes. Five potential scenarios have been developed to illustrate how the structures can be used to achieve environmental watering targets, which would contribute to an overall improvement for biodiversity:

- **Default:** this scenario is the default configuration for Vinifera water management structures, in normal regulated river conditions when environmental watering is not required. All regulating structures will be open
- **Seasonal Fresh**: this scenario increases the frequency and duration of watering into Vinifera Creek and seasonal wetlands. All regulating structures open except V3, which may be open or closed depending on private landholder arrangements. V4 closed if pumping
- **Vinifera Intermediate**: this scenario increases the frequency and duration of Red Gum Swamp Forest. V1, V2, V4regulating structures set to height required to achieve operational objectives, (between open and 64.4 m Australian Height Datum (AHD), with through flow maintained and V3 closed
- **Vinifera Maximum:** this scenario increases the frequency and duration of Red Gum Swamp Forest and Red Gum Forest and Woodland. V1, V2, V4 structures set to maximum operating level 64.4 m AHD, with through flow maintained and V3 closed.
- **Natural Inundation / Flood Operation.**

The operating scenarios rely on high Murray River flow events and temporary pumps to deliver water from the Murray River to the Vinifera project. Pump infrastructure will not be permanent; pumps will be brought in on a temporary basis for watering events. The infrastructure can be operated to hold the water on the floodplain, this can then be topped up or additional areas can be inundated, using temporary pumping.

The indicative flow thresholds below show how different Murray River flow events influence inundation frequency, duration and the operating scenarios:

- 15,000 ML/day flow event – inundation approximately 10 times every 10 years, median duration 4.9 months, environmental objectives can be achieved under Seasonal Fresh operating scenario
- 17,500 ML/day flow event – inundation approximately 9.5 times every 10 years, median duration 4.7 months, environmental objectives can be achieved under Vinifera Intermediate operating scenario
- 20,000+ ML/day flow event – inundation approximately 8.1 times every 10 years, median duration 2.6 months, environmental objectives can be achieved under Vinifera Maximum operating scenario.

1.1 Vinifera Project Description

The Vinifera project is located on the western side of the Murray River in the Nyah-Vinifera Park (managed by Parks Victoria), approximately 25 km north of Swan Hill in the north-west region of Victoria, between Swan Hill and Nyah. The Vinifera project area, which includes the Construction Footprint, Maximum Inundation Area (MIA) and proposed operational infrastructure, is shown in Figure 1.

The Vinifera project will involve works to facilitate inundation of approximately 335 ha of significant floodplain at the northern and southern end of Vinifera Creek. The project is expected to deliver a substantial net improvement to biodiversity and ecosystem function across the floodplain. By restoring more natural water regimes, better aligning the frequency, duration, and timing of inundation with ecological needs, the project aims to enhance habitat quality

for threatened species, improve the health and diversity of native vegetation, and strengthen resilience to climate change.

The infrastructure works to enable the operation of the Vinifera project would include:

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

The project is almost entirely in the Rural City of Swan Hill, the Mallee CMA region, and Crown land within the Nyah-Vinifera Park, except for the drop structure. The drop structure would extend into the banks and bed of the river on the New South Wales border, in the Murray River Council local government area. There are no permanent pumps proposed as part of the project. The park is managed by Parks Victoria in accordance with the objectives of the Crown Land (Reserves) Act 1978 (Vic.).

1.2 Operation

The Vinifera project has been designed to respond to the declining health of high-value floodplains from river regulation and the future effects of climate change. The Maximum Inundation Area of the project includes River Red Gum and Black Box forests and woodlands.

Operation of the environmental watering is managed by the Mallee CMA. The project infrastructure provides a high degree of operational flexibility enabling adaptive management principles to be implemented. Adaptability and flexibility of project operations is critical to the successful operation of the Vinifera project, enabling it to respond to varying seasonal conditions and learn from each operation event. The adaptive management process is detailed in the site-specific Environmental Water Management Plan for the Vinifera project. Monitoring would provide the data required to guide adaptive management. Monitoring undertaken in accordance with this EcoMRP is used to provide the data required to guide adaptive management.

The decision to initiate an environmental watering event as part of the project is based on:

- Water availability, based on seasonal water allocations determined by storage operators
- The floodplain water requirements, to ensure consistency with the watering regime, ecological objectives and targets
- Operational risks, such as risks associated with blackwater, algae and salinity, as detailed in the Environmental Water Management Plan for the project and seasonal watering proposals
- The regional context, such as the need for survival watering, recruitment watering, maintenance watering, and other river operations that may occur within the river reach.

Timing of each environmental watering event considers late winter and spring flow triggers, such as upstream rainfall or the need for environmental watering to facilitate ecological events. The extent of inundation is managed according to the equivalent flow rate in the Murray River. For further detail about operations and environmental watering scenarios, please see Chapter 6 Project description of the Environment Report.

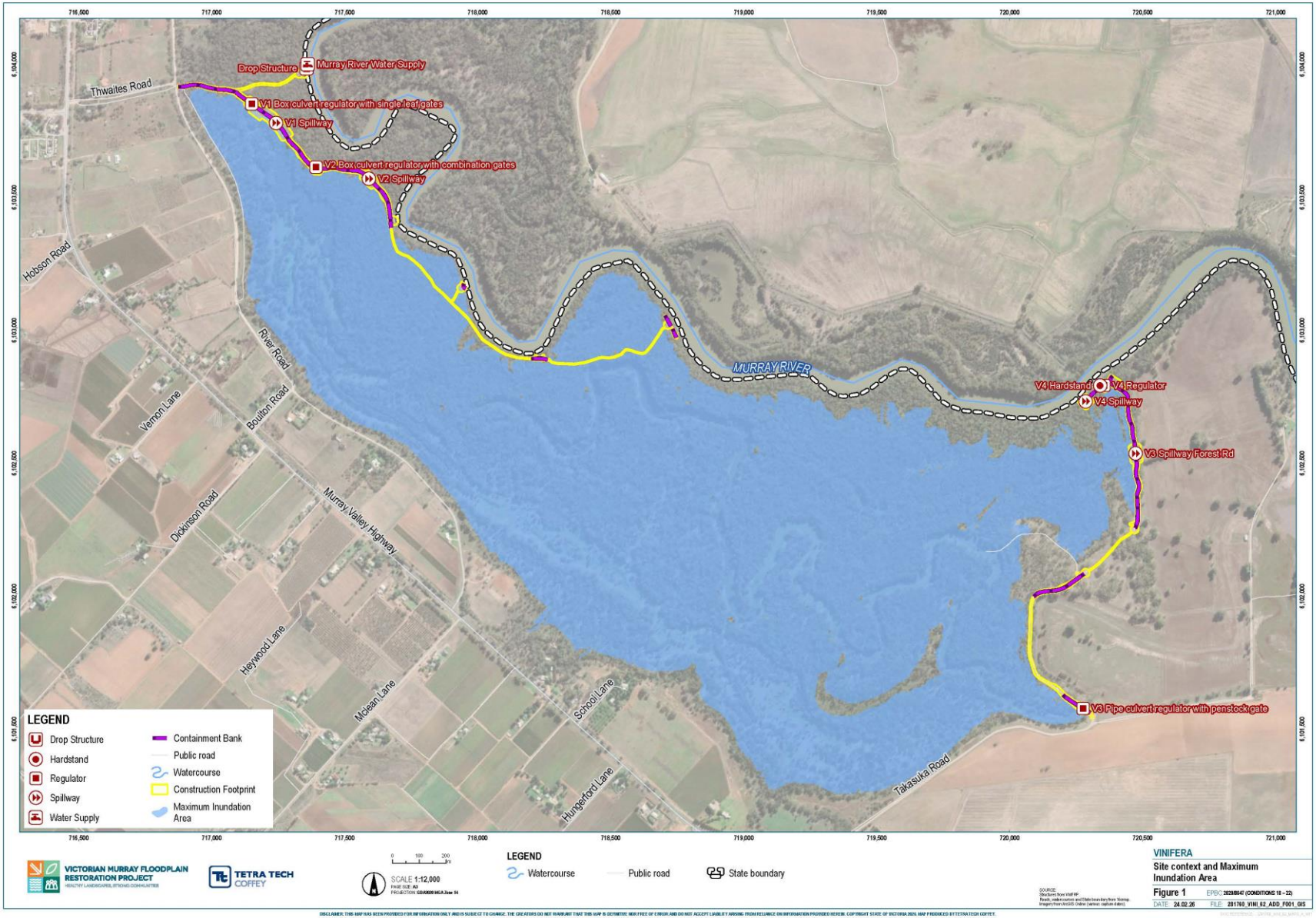

Figure 1 Vinifera site context and MIA[1]

2 Potential environmental impacts

The Matters of National Environment Significance (MNES) assessment was prepared for Vinifera as part of the Nyah, Vinifera and Curra Creek Floodplain Restoration Project Environmental Report (Attachment 10: Vinifera Matters of National Environmental Significance Assessment[2]).

The MNES considered for the Vinifera project and their conservation status are provided below:

- Murray Cod *Maccullochella peelii* – Vulnerable
- Silver Perch *Bidyanus bidyanus* – Critically Endangered
- Regent Parrot *Polytelis anthopeplus* – Vulnerable
- Southern-eastern Long-eared Bat *Nyctophilus corbeni* – Vulnerable.

The MNES assessment determined that, after implementation of the Environmental Delivery Standards (EDSs), no significant residual adverse impacts on MNES are likely to occur for the Vinifera project. As noted in Section 1.1, the key aim of the project is to deliver an overall improvement in biodiversity as a result of better aligning the frequency, duration, and timing of inundation with the ecological needs of the floodplain. The project will build on the benefits of The Living Murray initiative.

A summary of the findings and mitigation measures for each MNES is provided below. EPBC Act Approval 2020/8647 requires consideration of Murray Cod, Silver Perch, and Regent Parrot, and as such, only these MNES will be considered in this section.

2.1 Summary of findings for Murray Cod and Silver Perch

Murray Cod and Silver Perch are considered present in the study area. The study area adopted for the aquatic ecology assessment included all land and waterways within 10 km of the project area.

During operation, key impact pathways and relevant mitigation measures that were considered for Murray Cod and Silver Perch are summarised in Table 1.

Table 1 Murray Cod and Silver Perch operation impact pathways and mitigation measures

Key impact pathways	Mitigation measures
Altered fish passage and connectivity	If Murray Cod or Silver Perch do enter the floodplain during a managed inundation event, it is possible that they may be stranded following managed inundations, especially if the drawdown is too rapid. In accordance with EDS SW2, during operation a native fish exit strategy to allow native fish to migrate from the floodplain would be developed and tested to inform adaptive management.
Spreads of pest species	Inundation of floodplain habitat also has a high likelihood of increasing Carp populations within wetland habitat and in aquatic habitat that remains following inundation events. In accordance with EDS SW2, during operation a strategy to allow native fish to migrate from the floodplain while stranding Carp would be developed and tested to inform adaptive management.
Degradation of aquatic habitat through water quality or regime changes	Degradation of aquatic habitat would be avoided, minimised and managed through the implementation of industry standard management measures that manage commonly occurring environmental impacts and have been demonstrated to be effective in addressing these impacts.

A significant impact assessment for Murray Cod and Silver Perch was undertaken considering these impacts pathways and mitigation measures and no residual impacts were considered significant. Monitoring of trigger values, as outlined in this EcoMRP, has been recommended to ensure that potential negative impacts are minimised.

2.2 Summary of findings for Regent Parrot (eastern)

The Regent Parrot was identified as present in the MIA.

During operation, key impact pathways and relevant mitigation measures that were considered for Regent Parrot are summarised in Table 2.

Table 2 Regent Parrot operation impact pathways and mitigation measures

Key impact pathways	Mitigation measures
Temporary removal or damage to habitat values	During inundation events, the species would not be able to forage on the ground in some or all of the MIA. However, the Regent Parrot would still be able to forage in the trees in and beside the MIA. This temporary loss of relatively small areas of potential foraging habitat is expected to be very minor and ecologically inconsequential.
Spread of pests	Weed and pest species already exist in the MIA and more frequent inundation may increase the number of pest plants and animals present. Through EDS E3 monitoring and active management of weeds and pest animals during the project operation would be undertaken. In accordance with EDS RU1, management measures for resource use and waste would be developed and implemented. With measures in place, the spread or establishment of weeds and pest animals to the extent that habitat for species is degraded, or that this species is significantly harmed, is unlikely.
Increased vegetation growth and bushfire risk	Inundation aims to improve habitat condition, which is likely to be accompanied by a general increase in biomass. This could increase the risk of intense bushfire, potentially threatening flora and fauna. With appropriate management of fire, increased biomass is expected to have a positive effect on ecology. EDS BF2 sets out the requirements for bushfire preparedness and management to reduce the likelihood and impact of an unplanned fire.

A significant impact assessment for Regent Parrot was undertaken considering these impact pathways and mitigation measures and no residual impacts were considered significant. Monitoring of trigger values, as outlined in this EcoMRP, has been recommended to ensure that potential negative impacts are minimised.

3 Risk assessment

The outcomes of the environmental risk assessment have directly informed the monitoring requirements for Vinifera. In particular, ecological risks identified as having medium or higher residual risk, following the application of Environmental Delivery Standards, have guided the selection of monitoring parameters, locations and frequencies. The monitoring program is intended to assess the effectiveness of mitigation measures, detect any unanticipated ecological impacts, and provide information to support adaptive management of environmental watering operations.

An extract of the relevant risks associated with the Vinifera project, from the Environment Risk Report[4], are included in Appendix A.

4 Monitoring

This section outlines the site-specific monitoring requirements for the Vinifera project. As outlined in the EcoMRP, monitoring is required for:

- Bank stability at outflow points
- Erosion impacts in the receiving environment
- The condition of Ecological Vegetation Classes (EVCs) (as a proxy for MNES) with the maximum inundation area, in particular but not limited to those that are at a medium to high risk of salinisation impacts
- The species, diversity, weight, length, condition, life stage, habitat availability of protected fishes and any harm to protected fishes.

4.1 Bank stability at outflow points and erosion impacts in the receiving environment

Monitoring locations for bank stability at outflow points and erosion impacts in the receiving environment have been adopted from the Hydrology and Water Quality Monitoring Strategy[3] (HyWaq Monitoring Strategy). These monitoring locations are shown in Figure 2.

4.2 EVC condition (as a proxy for MNES)

4.2.1 Stand condition

As discussed in EcoMRP Section 7.2.1, stand condition will be reported for black box and river red-gum plant communities across the MIA.

4.2.2 Tree health

As discussed in EcoMRP Section 7.2.2, monitoring plots at Nyah and Vinifera have now been established by Mallee CMA and the Arthur Rylah Institute (ARI), and baseline data has been collected to inform the assessment prior to commencement of operation.

4.3 Protected fishes

4.3.1 Fish population

Fish population will be monitored at Vinifera in three shallow water monitoring plots and three deep water plots. The locations of these monitoring plots are provided in Figure 3.

4.4 Trigger values and corrective actions

The trigger values and corrective actions set to address the EPBC Act approval conditions are outlined in Section 7.4 of the EcoMRP.

References

[1] Victorian Murray Floodplain Restoration Project (VMFRP) (2025). *Restoration projects*. Available at: https://www.vmfrp.com.au/projects/ (Accessed: 11 September 2025).

[2] VMFRP (2023). *Environmental Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

[3] Water Technology (2024). *Updated HyWaQ Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.

[4] VMFRP (2023b). *Attachment II – Environmental Risk Report. Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

Appendix A: Risk register

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Aquatic species / Potential impact on aquatic species or their habitat	Likely	Moderate	High	**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: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are present then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. In addition to the EDSs identified above, this risk is also controlled by: GS1 - Geology and soils, GW2 - Groundwater, GS3, SW2 - Surface water and more	Possible	Moderate	Medium
Ecology – Arboriculture / Potential impact on Large Trees such as from holding water on the floodplain for longer than required during managed inundation events	Unlikely	Minor	Low	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act-listed flora within the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EMF3 – Operational Management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management	Rare	Minor	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Native species / Potential impact on terrestrial native species, or their habitat such as from anoxic (blackwater) events during managed inundation events	Unlikely	Moderate	Medium	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). This includes movement and storage of all vehicles, machinery, equipment and materials. • Avoid and/or minimise the removal of native vegetation including Large and/or hollow-bearing trees, threatened species and threatened communities as far as reasonably practicable, particularly in the design phase when finalising the Construction Footprint (e.g. looking at alternative locations for turning circles and laydown areas that avoid impacts to any large trees, refining track class and alignment to avoid and minimise impacts to threatened species and Large or Very Large Trees). • Design and implement no-go zones to protect ecological values, and provide detailed maps of their location in the Construction Environmental Management Plan. No-go zone fencing (bunting/barriers considerate of culturally sensitive areas) to be installed around significant ecological values to be retained, including populations of EPBC Act-listed flora within the Area of Investigation, FFG Act listed flora and Large or Very Large Trees on the edge of the Construction Footprint that are proposed to be retained during construction.) **Flora and Fauna Construction Management Plan administrative processes** A Native Flora and Fauna Management Sub-Plan as a sub-plan of the Construction Environmental Management Plan (EDS EMF2) must be developed and implemented for the projects and include auditable specific commitments. It must include requirements and methods for avoiding and minimising impacts on biodiversity values, particularly native vegetation and threatened species and communities, including: • 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 EES assessment: - Stop works at that location and implement appropriate measures (e.g. temporary fencing will be installed), pending discussions with DAWE/DELWP 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. **Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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 In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management ,NV2 – Operational noise management, SW2 – Surface water - Operation	Unlikely	Insignificant	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Native vegetation / Potential direct or indirect impacts on native vegetation (including patches of native vegetation and scattered trees) during the operating phase of the project	Unlikely	Moderate	Medium	**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: • Minimise footprint and surface disturbance of temporary and permanent works within the Construction Footprint as far as reasonably practicable, particularly near wetlands, endangered EVCs and fauna habitats (e.g. native and exotic vegetation, hollows, logs, soil and water). 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Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Threatened ecological communities and their habitat / Potential impacts on Commonwealth and/or Victorian listed threatened ecological communities, or their habitat, as a result of the operating phase, including from changes to natural flooding and drainage regimes during managed inundation events	Unlikely	Minor	Low	**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]. 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Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Ecology – Threatened species and their habitat / Potential impact on Commonwealth and/or Victorian listed threatened species, or their habitat such as from anoxic (blackwater) events, stranding or isolation during drawdown events, increased Carp population, changes to water quality and reduced hydraulic variability during managed inundation events	Unlikely	Moderate	Medium	**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]. 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Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. **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. In addition to the EDSs identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, BF2 – Bushfire management during operation, GW2 – Operational groundwater management, NV2 – Operational noise management, SW2 – Surface water - Operation	Unlikely	Minor	Low
Ecology – Weeds, pest species and pathogens / Potential introduction or spread of weeds, pest species or pathogens	Likely	Moderate	High	**Flora and Fauna Operational Management Plan** A Flora and Fauna Operational Management Plan must be developed and implemented as part of the Operations Environment Management Plan (EDS EMF4) for the projects. The FFOMP is to implement measures to improve environmental outcomes and mitigate potential threats arising or increasing as a result of environmental watering, including: • Weed and pest animal management, monitoring, reporting and auditing requirements. • Monitoring of native vegetation, threatened species and ecological communities to determine the implications of the environmental watering, to identify adaptive management responses in accordance with EDS EMF4 and EMF5. • Implement measures to minimise noise and lighting impacts on known threatened fauna species and habitat, 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)) • Monitoring of erosion and sedimentation resulting from flooding in accordance with EDS GS2 • Monitoring of vegetation at risk of hypersaline groundwater impacts in accordance with EDS GW2 • Monitor and document managed inundation extents to verify flood modelling. Undertake adaptive management to respond to potentially inappropriate flooding regimes (e.g. duration or frequency of flooding not suitable to endangered EVCs or threatened species (i.e. Ogyris Butterfly)). These requirements will be documented in the procedures within the Operations Environment Management Plan which will outline how infrastructure built as part of the project may operate in order to achieve ecological objectives. In addition to the EDS identified above, this risk is also controlled by: EMF1 – Environmental Management System, EFM3 – Operational management, EMF4 – Operation performance management, SW2 – Surface water - Operation	Likely	Minor	Medium
Groundwater – Flow / Potential changes to groundwater levels or flows during managed inundation events on environmental values	Rare	Insignificant	Low	**Operational groundwater management** Monitor and manage the risk of salinity in accordance with the relevant Catchment Management Authority's salinity management program.	Rare	Insignificant	Low

Aspect / Impact Pathway	Initial Likelihood	Initial Consequence	Inherent Risk Rating	Environmental Delivery Standards	Residual Likelihood	Residual Consequence	Residual Risk Rating
Groundwater – Quality / Potential impacts on groundwater quality resulting from managed inundation impacting on environmental values including groundwater-dependent ecosystems	Rare	Insignificant	Low	**Operational groundwater management** Monitor and manage the risk of salinity in accordance with the relevant Catchment Management Authority's salinity management program.	Rare	Insignificant	Low
Surface Water – Flow / Potential changes to fluvial processes as a result of managed inundation events, leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Possible	Minor	Medium	**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: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are present then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. **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 Environmental Water Management Plan and Seasonal Watering Proposals).	Unlikely	Minor	Low
Surface Water Quality / Potential changes to water quality (e.g. water salinity, suspension of sediments) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Possible	Minor	Medium	**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: • Adverse anoxic (blackwater) events. • Excessive algal growth. • Increased Carp population. • Native fish stranded on the floodplain during drawdown events. • Excessive erosion during filling and drawdown. This will include consideration of the following measures as appropriate: • Factor seasonal implications in the timing of filling and drawdown. • Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions. • Assess accumulated organic material load and adjust inundation timing and extent (if larger litter loads are present then consider small inundation with maintenance of throughflow). • Provide throughflow to replicate first flush or consider staged inundation. • Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow. • Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain • Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects • Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators. **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 Environmental Water Management Plan and Seasonal Watering Proposals).	Unlikely	Minor	Low

Appendix B: Figures

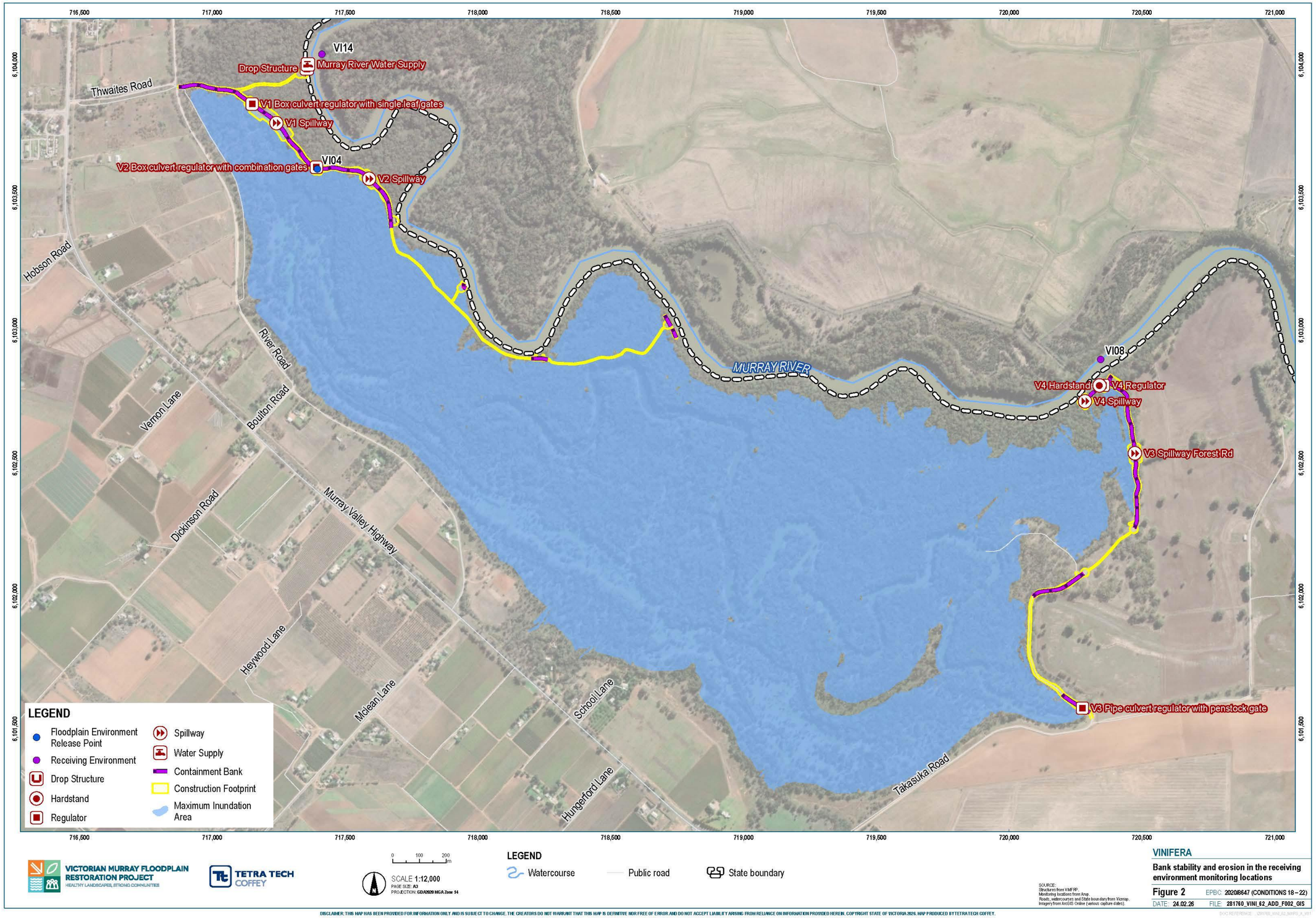

Figure 2 Bank stability and erosion in the receiving environment monitoring locations

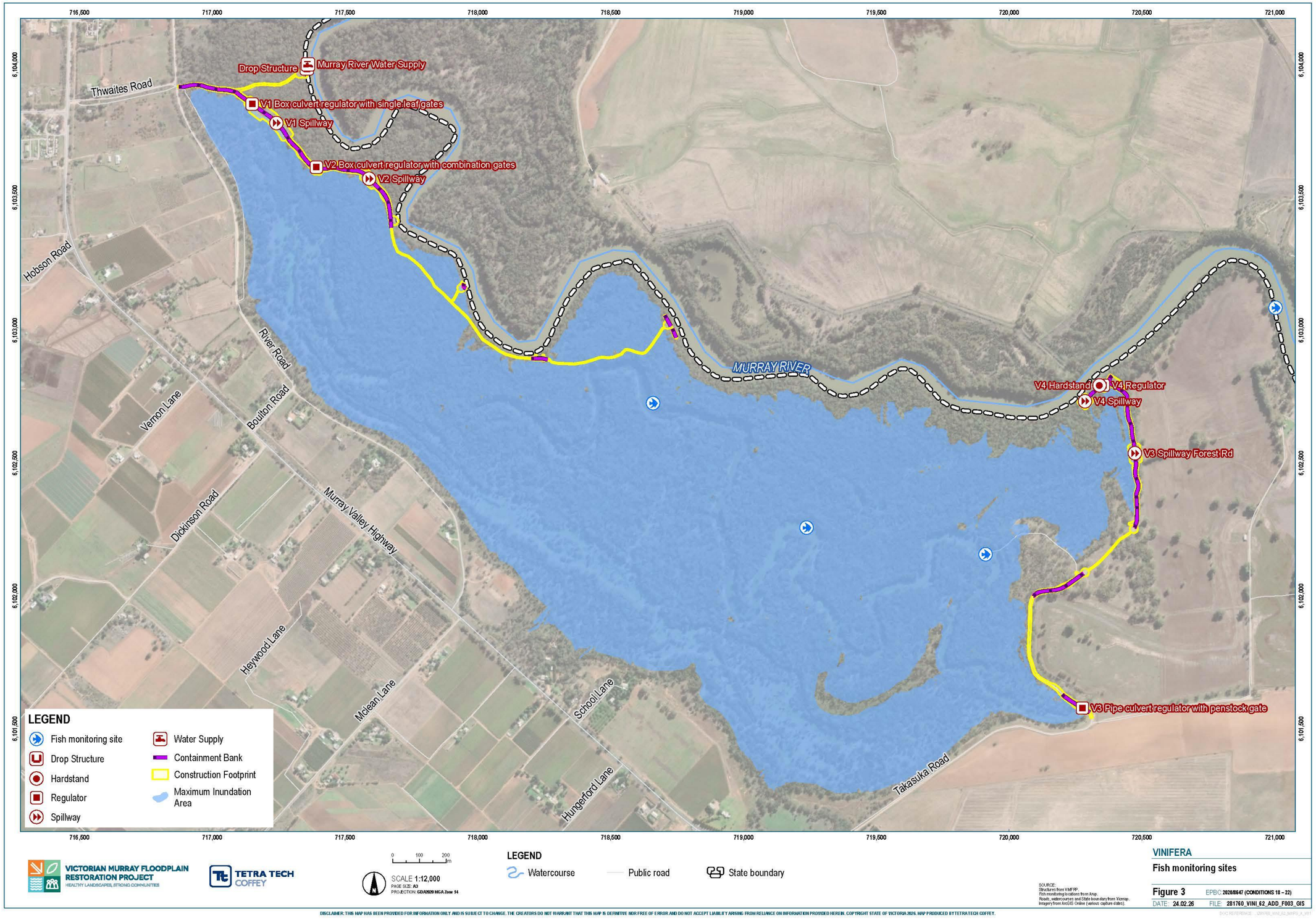

Figure 3 Fish monitoring sites

Addendum E: Bank stability at outflow points and erosion impacts in the receiving environment baseline data

[Placeholder for baseline data – to be added prior to the first managed watering event]

Addendum F: Stand Condition baseline data

[Placeholder for baseline data – to be added prior to the first managed watering event]

Addendum G: Tree Health baseline data

[Placeholder for baseline data – to be added prior to the first managed watering event]

Addendum H: Fish Population baseline data

[Placeholder for baseline data – to be added prior to the first managed watering event]