



**VICTORIAN MURRAY FLOODPLAIN  
RESTORATION PROJECT**  
HEALTHY LANDSCAPES, STRONG COMMUNITIES

# Receiving Environment Monitoring and Reporting Program

Victorian Murray Floodplain Restoration Projects



**Approved Action**

<b>Person to whom the approval is granted</b>	Lower Murray Urban and Rural Water Corporation
<b>ABN of Approval Holder</b>	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: 

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Date: 17/03/2026

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## Quality Information

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# Glossary

Term	Definition
<b>Adaptive management</b>	<p>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.</p> <p>Adaptive management would be implemented during operation to ensure changes in management actions are most effective at achieving the identified benefits of the projects.</p>
<b>Basin Plan</b>	<p>Passed into law in November 2012 under the <i>Water Act 2007</i> (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 <i>Water Act 2007</i> to coordinate water resources within the Basin.</p>
<b>Blackwater</b>	<p>Blackwater can occur when there is pooling of water on the floodplain or in inundated wetlands and large amounts of organic material (from leaves, grasses, twigs, bark etc) are leached into the ponded water. This organic material is high in dissolved organic carbon (DOC) and nutrients that are rapidly decomposed by bacteria and fungi. This consumes oxygen dissolved in the water more rapidly than replenishment can occur from the atmosphere or from well oxygenated inflowing water. The resultant water takes on a black appearance and in extreme cases the reduction in dissolved oxygen can lead to hypoxic conditions (depleted dissolved oxygen) and potential death of aquatic organisms. This is typically referred to as a 'fish kill' but can also adversely impact other aquatic organisms (such as invertebrates, crustaceans and molluscs) that rely on sufficient dissolved oxygen in the water column to survive. Blackwater is a natural occurrence and not all blackwater events lead to 'fish kills'.</p>
<b>Contamination</b>	<p>The condition of land or water where any chemical substance of waste has been added as a direct or indirect result of human activity at above background level and represents, or potentially represents, an adverse health or environmental impact (as defined in the <i>National Environment Protection (Assessment of Site Contamination Measure 1999)</i>).</p>
<b>Environmental water</b>	<p>Water sourced through environmental entitlements that is used or managed to improve or maintain the health of rivers, wetlands and floodplains.</p>
<b>Infrastructure</b>	<p>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.</p>
<b>Inundation</b>	<p>The deliberate flooding of land as part of the projects.</p>

Term	Definition
<b>Maximum Inundation Area</b>	The maximum area that is able to be inundated by the proposed works based on the design of the project. Inundation of private land would only occur subject to private flood agreements being established for the relevant land
<b>Murray River floodplain</b>	An area of low-lying ground adjacent to the Murray River, which is subject to flooding.
<b>Operation</b>	Operation, also known as the operational phase, refers to the period of project operation and is the longest stage of the project lifecycle and includes the maintenance of infrastructure.
<b>Project area</b>	The project area includes the Maximum Inundation Area and Construction Footprint required for the projects. For the purposes of this report, project areas and ‘the projects’ refer to the Nyah, Vinifera and Hattah Lakes North projects.
<b>Regulator</b>	<p>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:</p> <p><i>Very large</i> – 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 sheetpile cut offs for seepage control. Some will require piled foundations for structural support and some will have fishways</p> <p><i>Large</i> – 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</p> <p><i>Small</i> – 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.</p> <p>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.</p>
<b>Road (see also track or access track)</b>	Refers to existing Council or State managed public roads, comprised of formalised sealed or unsealed pavement structures consisting of a prepared subgrade with base and / or subbase layers.
<b>Threshold</b>	<p>For water – A water height, or flow that defines a critical limit for transition in operational conditions.</p> <p>For ecology – A time or ecological health condition that defines a critical limit for transition in ecological conditions.</p>

# Abbreviations

Abbreviation	Definition
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EcoMRP	Ecology Monitoring Program
EDS	Environmental Delivery Standard
EES	Environment Effects Statement under the <i>Environment Effects Act 1978</i>
EMF	Environmental Management Framework
EPA	Environment Protection Authority (Victoria)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
HyWaQ	Hydrology and Water Quality
Mallee CMA	Mallee Catchment Management Authority
MDBA	Murray-Darling Basin Authority
MNES	Matters of National Environmental Significance
OEMP	Operation Environmental Management Plan
REMRP	Receiving Environment Monitoring and Report Plan
SDLAM	Sustainable Diversion Limit Adjustment Mechanism (Murray-Darling Basin Plan)
VEWH	Victorian Environmental Water Holder
VMFRP	Victorian Murray Floodplain Restoration Project

# 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 (as shown in 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.

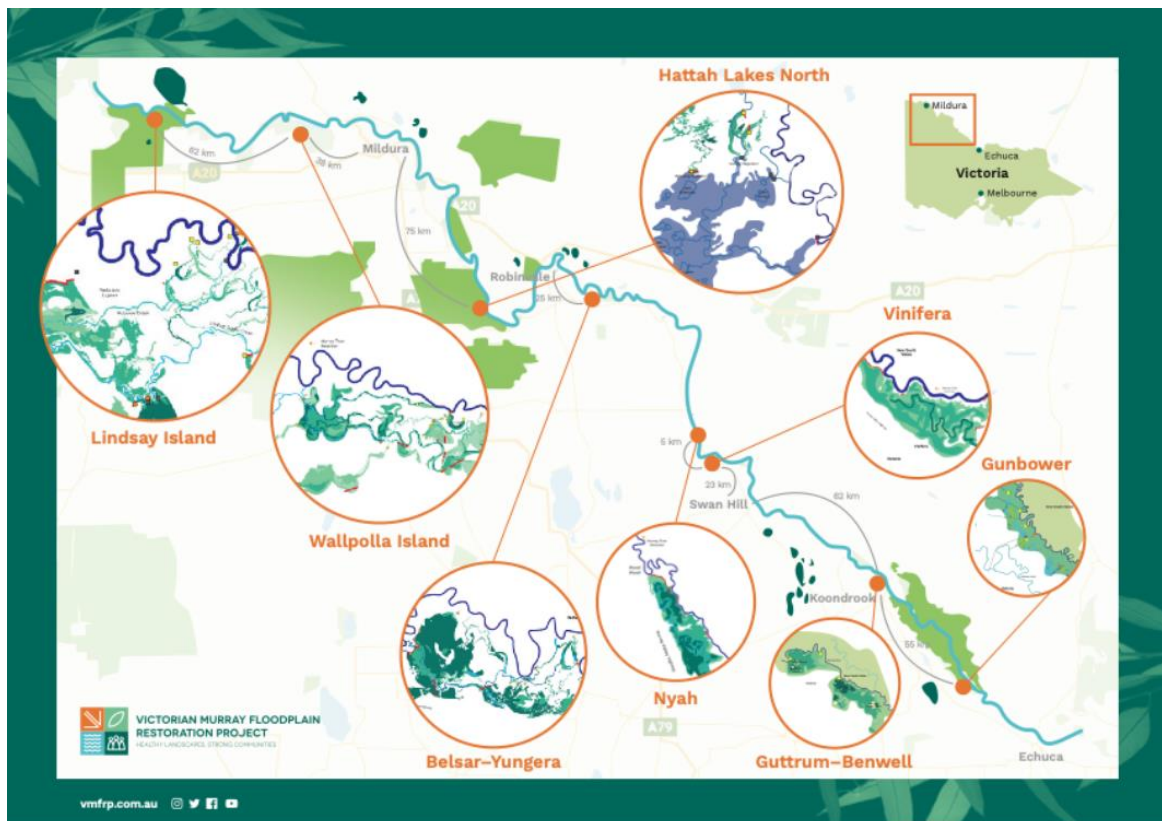


Figure 1 VMFRP sites

The VMFRP comprises eight Projects listed below:

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

This Receiving Environment Monitoring and Reporting Program (REMRP) 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 REMRP 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 environmental objective in the EPBC Act approval condition is as follows:

- To avoid and mitigate harm to protected matters as a result of the Action and larger action, the approval holder must ensure that ecosystem services of the receiving environments, the floodplain environment, and the Murray River area up to 10 river km downstream of the receiving environments do not fall below the baseline ecosystem services.

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

- Include and use baseline data of water quality of the receiving environment.
- Specify how, when and where all of the following areas will be monitored as a minimum, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur:
  - Receiving environment monitoring locations
  - Floodplain environment at release points to the receiving environment
  - Acid sulphate soils risk areas
  - Salinisation risk areas.
- Detail a monitoring program that includes:
  - A map or maps showing the locations and types of all monitoring locations
  - All parameters specified in Attachment A, whether by continuous monitoring or event based monitoring.
  - Measurable performance indicators that monitor demonstrate 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
  - Trigger values for corrective measures, receiving environment water quality thresholds that will prompt mitigation measures, and limits that must not be exceeded
  - The timing and frequency of monitoring, ensuring monitoring is capable of detecting trigger values, receiving environment water quality thresholds, limits and changes in the performance indicators
  - Proposed corrective and mitigation measures which will be undertaken, and the timing of those measures, if trigger values or receiving environment water quality thresholds are reached.
- Specify a reporting program including:
  - Publication on the website of data collected in accordance with the REMRP
  - 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, receiving environment water quality thresholds and limits
- 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.

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.

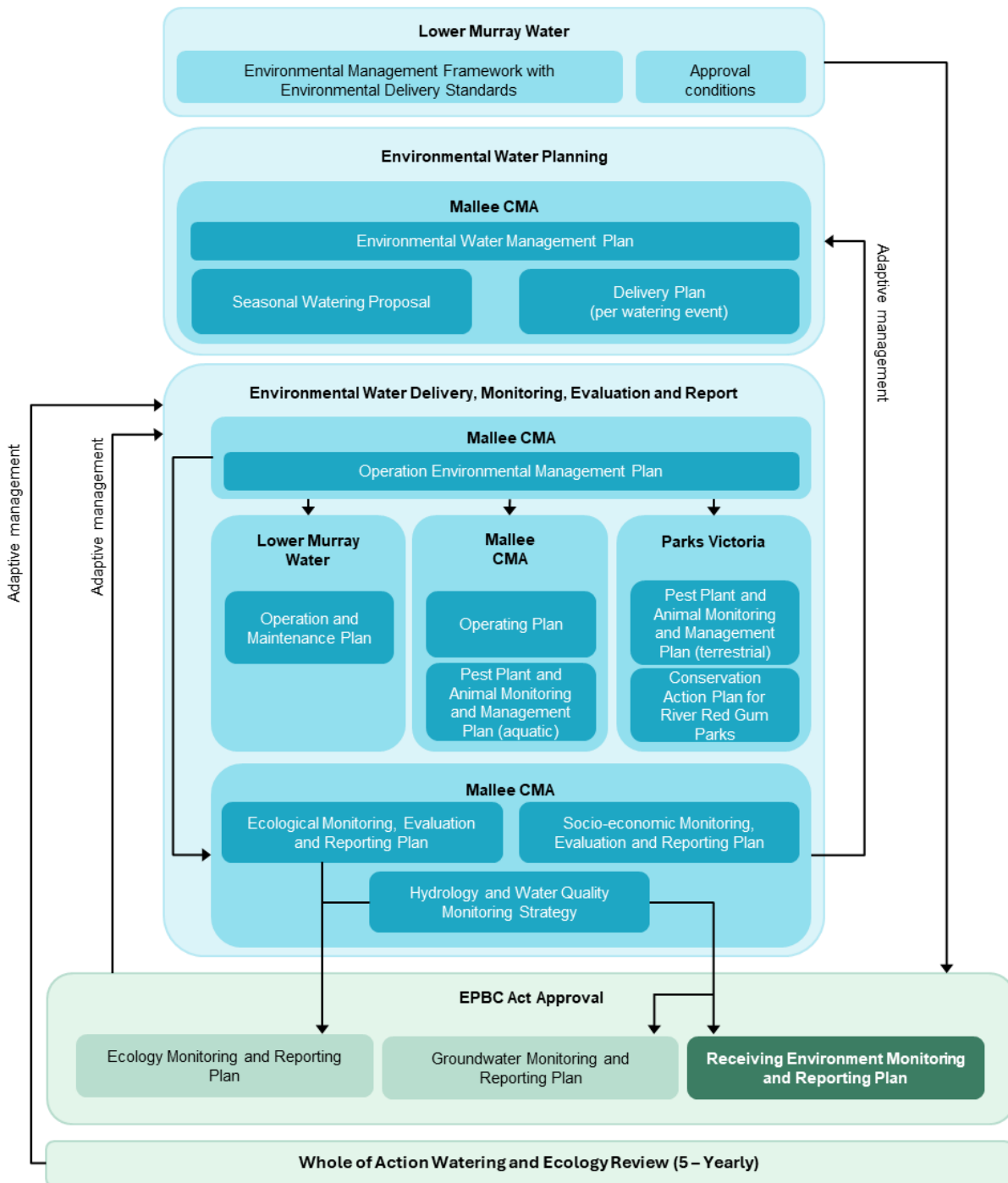
The CMA has prepared Environmental Water Management Plans (EWMPs) that set ecological objectives and hydrological targets for each VMFRP site. The Operational Environmental Management Plans (OEMPs) guide the management of the Projects operation to meet these targets and objectives.

The Ecological Monitoring Evaluation and Reporting Plan (MERP)<sup>[1]</sup> 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 (HyWaq Monitoring Strategy)<sup>[2]</sup>, 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) (EPBC 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 REMRP, Groundwater Monitoring and Reporting Plan (GWMRP) and Ecology Monitoring and Reporting Plan (EcoMRP).

The monitoring strategy specified in the MERP and the HyWaq Monitoring Strategy have informed the development of the REMRP, EcoMRP and GWMRP.



**Figure 2 Environmental Management Documents (diagram adapted from the EMF to include REMRP)**

This Plan provides an overview of the projects monitoring and reporting program and will be supported by site-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 and includes the following sections:

- Project objectives
- Roles and responsibilities
- Reporting requirements
- Environmental impacts and risks
- Monitoring program and methodologies
- Corrective actions and mitigation
- Plan implementation.
- Assessment against the relevant EPBC Act Conditions.

## 1.5 Primary potential impacts

The primary potential impacts relating to water quality for Hattah Lakes North, Nyah and Vinifera during operation phase are as follows:

- Dissolved Oxygen (DO): potential risk of low DO concentration due to organic matter decomposition could lead to impact on ecological and aquatic health
- Water Quality: due to potential inability to release water back to the Murray River, contained poor-quality water can damage floodplain health and vegetation
- Salinity: there is a minor risk of increase in salinity due to discharge of saline groundwater into the Murray River which would require acceptance under Murray-Darling Basin Salinity Management Strategy.

## 1.6 Documents reviewed

The following key documents have been reviewed in preparing this plan:

- Environmental Management Plan Guidelines<sup>[4]</sup>
- Environment Effects Statement / Environment Report<sup>[5][6]</sup>
- EPBC Act approval conditions and Minister's Assessment under the *Environment Effects Act 1978*
- VMFRP Ecological Thresholds and Ecological Triggers – Summary Report<sup>[1]</sup>
- Environmental Management Framework for the Hattah Lakes North Floodplain Restoration Project and Belsar-Yungera Floodplain Restoration <sup>[20]</sup>
- Environmental Management Framework for the Nyah Floodplain Restoration Project and Vinifera Floodplain Restoration Project<sup>[21]</sup>
- Updated HyWaq Strategy for the VMFRP Project Areas<sup>[2]</sup>.
- Hattah Lakes Environmental Water Management Plan<sup>[17]</sup>
- Nyah Environmental Water Management Plan<sup>[18]</sup>
- Vinifera Environmental Water Management Plan<sup>[19]</sup>

## 1.7 Operation

An overview of the operation of the projects has been summarized from the Surface Water Specialist Assessment<sup>[9][10]</sup>.

Operation of the projects consists of three key components, used to guide adaptive management of the ecological needs of the floodplain:

- Water Management Areas – a delineated area used to manage surface water, defined by physical boundaries such as topography and physical structures (such as containment banks)
- Infrastructure – the physical structures to be delivered as part of VMFRP
- Operating Scenarios – used to deliver environmental water at different frequencies and durations to meet the hydrological requirements for high value floodplains. The scenarios are devised to meet the inundation requirements of the Ecological Water Regime Classes / Ecological Vegetation Classes (EVC) present on the floodplains.

For a more detailed description of site-specific operational project activities see the relevant addendum.

While the REMRP has been developed to transparently monitor and manage any potential or 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.

# 2 Roles and responsibilities

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

**Table 1: Roles and responsibilities**

Role	Responsibility
Approval of the REMRP	Minister for the Environment (Cwlth) <sup>1</sup>
Implementation of REMRP	Mallee CMA
Monitoring and reporting	Mallee CMA
Management of operational impacts	Mallee CMA

<sup>1</sup> 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 environment

Specialist Assessment C Surface Water<sup>[9][10]</sup> was prepared for Nyah, Vinifera and Hattah Lakes North as part of the Vinifera, Nyah and Burra Creek Environment Report<sup>[5]</sup> and the Belsar-Yungera and Hattah Lakes North Environment Effects Statement<sup>[6]</sup>

The specialist surface water assessments for the sites reviewed data in the Murray Darling Basin Authority (MDBA) River Murray Water Quality Monitoring Program (RMWQMP). Water quality within the Murray River in the project areas is generally within expected ranges and water quality guideline values.

The MDBA commissioned a data trends assessment in 2022 to analyse the data record for the RMWQMP for long-term change and potential system drivers<sup>[15]</sup>.

The above references have been used to summarise the existing environment relating to the project sites in the relevant addendum.

For complete descriptions of the existing environment surface water quality refer to the surface water specialist assessments<sup>[9][10]</sup>.

## 5.2 Potential impacts

### Threats to Matter of National Environment Significance (MNES) protected under the EPBC Act

Matters of National Environment Significance (MNES) assessments were prepared for Nyah, Vinifera and Hattah Lakes North as part of the Vinifera, Nyah and Burra Creek Environment Report<sup>[5]</sup> and the Belsar-Yungera and Hattah Lakes North EES<sup>[6]</sup>.

Potential operational impact pathways have been documented in the specialist surface water assessments for the Nyah, Vinifera and Hattah Lakes sites.

Potential effects to MNES relating to water quality during the operation phase are associated with the following impact pathways:

- Degradation of aquatic habitat through water quality or water regime changes

MNES identifies as having the potential to be impacted by changes in water quality during the operation phase:

- Threatened Species and Communities
  - Murray Cod
  - Silver Perch

A summary of specific potential water quality effects related to identified impact pathways are outlined in Table 2 below.

**Table 2: Potential water quality effects during operation** <sup>[9][10]</sup>

Variable	Impact Pathway	Effect
Electrical conductivity	<p>Mobilisation of salts stored in soils to surface waters.</p> <p>Discharge of saline groundwater to surface waters.</p>	<p>Increased salinity of receiving waters.</p> <p>Elevated salinity can have an adverse effect on aquatic ecosystems and species (e.g., impaired osmotic processes).</p> <p>Magnitude of increase depends on the dilution capacity of receiving waters – the larger the dilution capacity the less significant the potential effect.</p>
pH	<p>Inundation of acid sulphate soils releases acidic waters or contaminants that generate acidity in receiving waters.</p> <p>Mineralisation of organic matter releases acids.</p> <p>Development of algal blooms can disrupt the balance between photosynthesis and respiration, increasing pH until the bloom collapses and then decreasing pH.</p>	<p>Low pH (increased acidity) or high pH (increased alkalinity) of receiving waters.</p> <p>Waters outside of typical pH ranges can have an adverse effect on aquatic ecosystems and species (e.g., damage to eyes/ gills/ skin). Low pH values can also exacerbate mineralisation of organic matter and mobilisation of metals.</p> <p>Magnitude of pH change depends on buffering and dilution capacity of receiving waters.</p>
Dissolved oxygen	<p>Decomposition of organic matter during inundation consumes oxygen.</p>	<p>Development of blackwater - hypoxic conditions (depleted dissolved oxygen) or anoxic conditions (complete absence of oxygen).</p> <p>Hypoxic and anoxic conditions can cause death of aquatic organisms that rely on sufficient dissolved oxygen in the water column to survive.</p>

Variable	Impact Pathway	Effect
		Magnitude of impact depends on timing of inundation (temperature, sunlight, leaf litter load), duration of inundation, magnitude of return flows and dilution capacity of receiving waters.
Nutrients and algae (eutrophication)	Mineralisation of organic matter during inundation releases nutrients.	<p>Increased nutrient concentrations can promote food web productivity, but when nutrient levels exceed ecosystem requirements, eutrophication can develop.</p> <p>Eutrophication can lead to development of algal blooms, including blue-green algal blooms, if favourable environmental conditions (flow, temperature, sunlight) are present.</p> <p>Magnitude of impact depends on the nature of the inundation event (see dissolved oxygen).</p>
Organic carbon	Mineralisation of organic matter during inundation releases organic carbon.	<p>Increased organic carbon concentrations can promote food web productivity (positive effect/benefit).</p> <p>Magnitude of impact depends on food web resource requirements.</p>

## 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 project wide risk register was developed that provides the rationale behind risks 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 Environmental Delivery Standards.

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

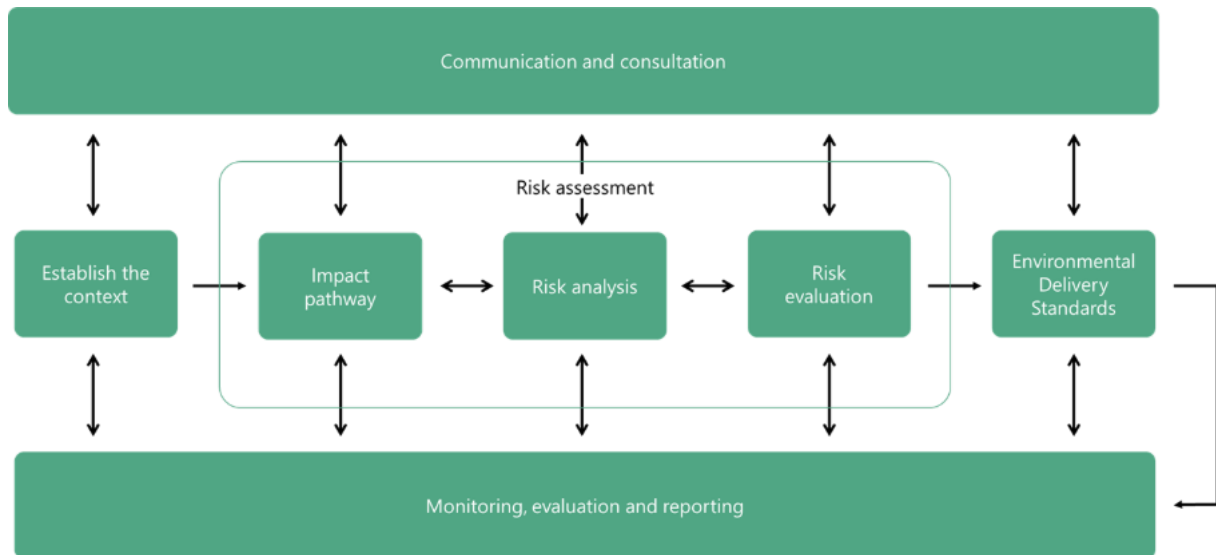


Figure 3: Risk assessment process

### 6.1 Risk analysis

The assignment of an initial level of likelihood and consequence for each of the impact pathways considered 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 generic 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 the relevant addendum to this Plan.

The residual risks relevant to the REMRP is of **low** consequence level and includes following:

- Potential changes to water quality (e.g. water salinity) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)

The development of corrective actions and management measures are discussed below in Section 7.5

**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 EPBC Act Approval requires the REMRP plan to address the following elements:

- Receiving environment monitoring locations
- Floodplain environment at release points to the receiving environment
- Acid sulphate soils risk areas
- Salinisation risk areas.

The HyWaq Monitoring Strategy for the VMFRP Project Areas<sup>[2]</sup> outlines the monitoring infrastructure required to meet the EPBC Act Approval requirements (as well as other regulatory requirements). Monitoring locations and methodologies in the HyWaq have been applied for the REMRP.

## 7.1 Monitoring locations

### 7.1.1 Receiving environment monitoring locations

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.
- **Receiving environment monitoring locations** means the sites at which **characteristics** of the **receiving environment** must as a minimum be **monitored**, as follows:
  - Upstream – in the Murray River within 10 river kilometres upstream of the most upstream release point
  - Downstream – in the Murray River within 10 river kilometres downstream of the most downstream release point
  - Any additional site-specific receiving environment monitoring locations.

The receiving environment monitoring location/s relevant to each site are included in the applicable addendum.

### 7.1.2 Floodplain environment at release points to the receiving environment

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

- **Floodplain environment** means the **maximum inundation area** and all associated tributaries, anabranches and backwaters.
- **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**.
- **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.

The floodplain environment at release points to the receiving environment monitoring location/s relevant to each site are included in the applicable addendum.

### 7.1.3 Acid sulphate soils risk areas

Based on the Geology, soils and contamination specialist reports<sup>[7][8]</sup>, the potential for acid sulphate soils is expected to be low probability of occurrence across the three project sites. Operational pH screening has been included in the REMRP.

### 7.1.4 Salinisation risk areas

Based on the assessment of risks in the specialist reports<sup>[9][10]</sup>, surface water salinity has been assessed to be relatively low risk across the three project areas.

Salinity of groundwater in Vinifera and Nyah is relatively low, however, there is a possibility of slight increase in salinity during unregulated inundation. As the residual salinity risk is considered low with minor consequences for all

three project areas, ongoing monitoring and adaptive management (under EDS GW2 and the Mallee CMA’s salinity program) will ensure any adverse effects are identified and addressed. Salinity monitoring is included in the REMRP.

## 7.2 Monitoring parameters

The EPBC Act Approval requires that the monitoring program includes the following water quality monitoring parameters:

- Specific parameters as specified in Attachment A:
  - pH (pH unit)
  - Electrical Conductivity at 25°C (µS/cm)
  - Dissolved Oxygen (mg/L)
  - Ammonia as N (mg/L)
  - Total Nitrogen as N (mg/L)
  - Dissolved Organic Carbon (DOC) (mg/L).

## 7.3 Monitoring methodology

Water quality monitoring will be undertaken using a combination of telemetry (continuous monitoring) and grab sampling (discrete) at the relevant locations identified and dependent on the parameter to be recorded and analysed.

Detailed monitoring operational requirements are outlined in the HyWaq Strategy<sup>[2]</sup>.

### 7.3.1 Telemetry

Permanent monitoring infrastructure will be in place within the receiving environment and at release point locations (regulators).

At the identified receiving environment and at release point locations the following parameters will be measured using in-situ multi parameter instruments:

- Dissolved Oxygen
- Electrical Conductivity (µS/cm)
- pH (pH unit)

### 7.3.2 Grab sample

At the identified receiving environment and at release points, grab samples for additional water quality parameters are to be collected and be sent for laboratory analysis. These parameters include:

- Ammonia as N (mg/L)
- Total Nitrogen (mg/L)
- Dissolved Organic Carbon (DOC) (mg/L).

There are limited holding times within which the grab samples must be received by the laboratory. This is 48 hours for the parameters listed above.

Samples should be submitted to the laboratory with at least half the ‘analytical holding time’ remaining to minimize the possibility of analysis holding time breaches. The standard turnaround time for laboratory analysis is 5 working days from receipt of the sample.

## 7.4 Baseline data

Baseline data in the receiving environment will be collected for all parameters **prior** to first managed watering event. Table 6 outlines the monitoring frequency for collection of baseline data.

**Table 6: Baseline data collection**

Parameter	Monitoring Type	Frequency
Dissolved Oxygen	Continuous	Daily

Electrical Conductivity	Continuous	Daily
pH	Continuous	Daily
Ammonia as N	Event based	One sample prior to managed watering event.
Total Nitrogen	Event based	One sample prior to managed watering event.
Dissolved Organic Carbon	Event based	One sample prior to managed watering event.

## 7.5 Trigger values and corrective actions

The EPBC Act Approval requires that the REMRP includes site specific water quality limits for key parameters.

Trigger values have been specified for Dissolved Oxygen, Electrical Conductivity, pH, Ammonia as N, Total Nitrogen as N and Dissolved Organic Carbon. Limit values have been specified for Dissolved Oxygen and Electrical Conductivity.

Table 7 below outlines the Trigger Values which are applicable across the three sites.

The DO and EC values have been informed from the Water Quality Traffic Lights for Native Fish report from the Arthur Rylah Institute for Environment Research<sup>[14]</sup>.

The REMRP specifies DO monitoring at the release points and within the receiving environment. Trigger / Limit values have been specified within the receiving environment to ensure the following Condition is satisfied:

The approval holder must not release return flow water as part of this Action unless:

- the receiving environment contains oxygenated water that there will be no harm to protected fishes.

**Table 7: Trigger values and corrective action**

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Dissolved Oxygen</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>1 mg/L</b> lower; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain.</li> </ul>	<ul style="list-style-type: none"> <li>DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>2 mg/L</b> lower;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>In the receiving environment 5 km and 10 km downstream of the release point.</li> <li>In the receiving environment less than 1 km upstream of release point to investigate potential external sources of reduced DO.</li> </ul> <p>If the effect is attributed to discharge from the floodplain and persists for more than <b>5 days</b>, perform corrective action:</p> <ul style="list-style-type: none"> <li>Reduce the discharge rate<sup>1</sup> or measures to increase oxygenation.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Electrical Conductivity at 25°C</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>This is more than <b>500 µS/cm</b> higher than <u>Upstream in the Murray River</u>; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>This is more than <b>1000 µS/cm</b> higher than <u>Upstream in the Murray River</u>;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>In the receiving environment 5 km and 10 km downstream of the release point.</li> </ul> <p>If the effect is confirmed as attributed to discharge from the floodplain, perform corrective measure:</p> <ul style="list-style-type: none"> <li>Reduce the discharge rate<sup>1</sup>; and/or</li> <li>Call on dilution flows to increase River Murray total discharge.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>
<b>pH</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>pH in the receiving environment <u>Upstream in the Murray River</u> is less than or equal to <b>≤6</b>, and;</li> <li>Average daily pH <u>Downstream in the Murray River</u> is one (<b>1</b>) pH unit lower and;</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge to a rate<sup>1</sup> that reduces downstream effect.</li> <li>Investigate origins of low pH.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Ammonia and Total N</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> <li>Increase to every <b>3 days</b> if the trigger for Ammonia and Total N is exceeded.</li> </ul>	<ul style="list-style-type: none"> <li>Ammonia or Total N in the receiving environment is higher the ARMCANZ freshwater trigger value<sup>[16]</sup> and;</li> <li>Ammonia or Total N <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of elevated Ammonia and Total N.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>
<b>Dissolved Organic Carbon</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DOC <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>;</li> <li>The downstream DO trigger has been exceeded and;</li> <li>This occurs while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the trigger being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of high DOC.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

NOTES:

<sup>1</sup> 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.

# 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 REMRP is structured in accordance with conditions of EPBC Approvals (Addendum A) which states:

- Publication on the website of data collected in accordance with the REMRP
- Notification of the commencement and cessation of managed watering events
- Publication of the inundation extent of managed watering events as a shapefiles
- 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, receiving environment water quality thresholds and limits
- 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.

**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. Non-compliance must be reported to the Department within 2 business days of the incident being discovered. The details of the non-compliance must be provided within 12 business days after being aware of the incident.

**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 REMRP 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:

- Details of event-based monitoring in the floodplain environment including the data, location, parameters and levels undertaken during the reporting period
- Relevant GIS digital data of the inundation extent of managed watering events
- 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
- Detail the spatial extent of the receiving environment and the governance structures applying to the receiving environment
- Include a schedule of reporting and review mechanisms to demonstrate compliance with the commitments made in the REMRP
- Include an assessment of risks related to return flow water entering the receiving environment and risk management strategies and/or mitigation measures that will be applied to address identified risks.

## 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 in accordance to EPBC approval conditions).
- 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 in accordance to EPBC approval conditions).

<b>Recipient details:</b>	Branch Head, Environment Assessments (Vic, Tas) and Post Approvals Branch Environment Regulation Division (DCCEEW) <a href="mailto:epbcmonitoring@dcceew.gov.au">epbcmonitoring@dcceew.gov.au</a>
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## 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 works. Each audit report must be submitted to the Department for review and published on the website.

Table 8 provides a summary schedule of reporting (Section 8.2) and review (this Section) mechanisms to demonstrate compliance with commitments made in the REMRP.

**Table 8: 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 REMRP	Annually from commencement of Action or sooner if: <ul style="list-style-type: none"> <li>[1] Implementation of the Plan identifies updates that need to be made</li> <li>[2] If new information becomes available that relates to the Plan</li> <li>[3] Following significant environmental incidents</li> <li>[4] There is a need to improve performance in an area of environmental impact.</li> </ul>
Independent audit of compliance with the conditions of the EPBC Act approval	Every five years following commencement of the Action.

## 8.6 Adaptive management

An adaptive management approach is essential as it recognises and responds to 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 (also referred to as lessons):

- Monitoring to detect exceedances of the trigger values and limits
- 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 REMRP as per the requirements of Sections 8.2 and 8.3.

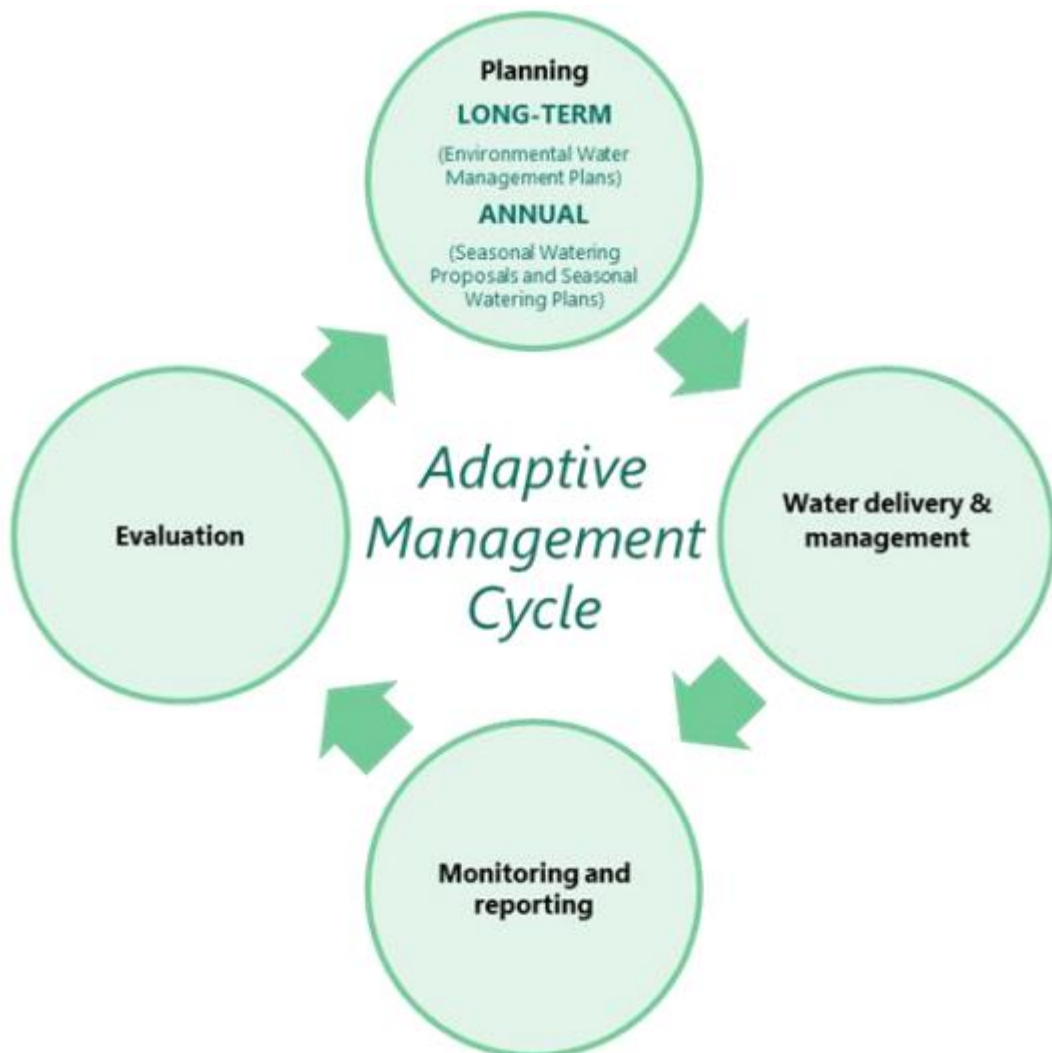


Figure 3 Adaptive management cycle for environmental water<sup>[12][13]</sup>

## References

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- [4] 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.
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## Addendum A: EPBC Act approval conditions

The table below provides a demonstration of how this plan addresses the conditions of the EPBC Act Approval.

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	13	14	The approval holder must submit a Receiving Environment Monitoring Program (REMRP) to the department prior to the commencement of the action for the Minister's approval.	This document	N/A
2	14	15	The environmental outcome of implementing the REMRP is to ensure and demonstrate through scientific evidence that the requirements of condition 1 and condition 13 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	15a	16a	The REMRP must:  Be prepared by a suitably qualified surface water expert	Quality Information	Arup is a global consultancy with expertise in developing Surface Water MPs. The report has been authored by competent hydrologists and peer reviewed for quality assurance.
4	15b	16b	Be prepared in accordance with the Environmental Management Plan Guidelines	Addendum A	This table evidences the relevant REMRP sections for each of the EMP guidelines.
5	15c	16c	Reference the EPBC Act approval conditions to which the REMRP refers.	Addendum A	This table can be used as an index, highlighting relevant sections in the REMRP which relate to the EPBC Act conditions.
6	15d	16d	Include and use baseline data of water quality of the receiving environment.	Section 7.4	Baseline data is to be collected prior to the first managed watering event.

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	15e	16e	Specify how, when and where all of the following areas will be monitored as a minimum, including collection of baseline data, in a manner capable of ensuring that trigger values are detected if they occur: <ul style="list-style-type: none"> <li>i. Receiving environment monitoring locations</li> <li>ii. Floodplain environment at release points to the receiving environment</li> <li>iii. Acid sulphate soils risk areas</li> <li>iv. Salinisation risk areas.</li> </ul>	Section 7	General monitoring method is outlined in Section 7. Site specific monitoring locations can be found in relevant site addendum.
8	15f(i)	16f(i)	Detail a monitoring program that includes: Map or maps showing the locations and types of all monitoring locations.	See relevant site addendums	Maps of monitoring locations are included in the site addendums.
9	15f(ii)	16f(ii)	All parameters specified in Attachment A, whether by continuous monitoring or event-based monitoring.	Section 7.2 and 7.3	Section 7.2 and 7.3 outlines monitoring parameters and defines continuous or event-based monitoring.
10	15f(iii)	16f(iii)	Measurable performance indicators that monitor demonstrate attainment of the environmental outcomes required under condition 1.	Section 7.2	The performance indicators, measured through water quality parameters, are specified in Section 7.2.  The performance indicators measure how well the project is performing in mitigating harm to protected matters.
11	15f(iv)	16f(iv)	Measurable condition indicators to monitor attainment of the ecological outcomes.	This document	The condition indicators, measured through collection of baseline data, are specified in Section 7.4.  The condition indicators measure the actual state or health of the receiving environment.

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
					Achieving the objectives outlined in the REMRP will contribute to attainment to the ecological outcomes.
12	15f(v)	16f(v)	Site specific water quality limits for key parameters including, but not limited to, dissolved oxygen and salinity.	Section 7.5	Section 7.4 includes limit values for dissolved oxygen and electrical conductivity.
13	15f(vi)	16f(vi)	Trigger values for corrective measures, receiving environment water quality thresholds that will prompt mitigation measures, and limits that must not be exceeded.	Section 7.5	Section 7.5 includes trigger values for all parameters.
14	15f(vii)	16f(vii)	The timing and frequency of monitoring, ensuring monitoring is capable of detecting trigger values, receiving environment water quality thresholds, limits and changes in the performance indicators.	Section 7.3	Section 7.5 outlines the timing and frequency for monitoring water quality parameters.
15	15f(viii)	16f(viii)	Proposed corrective and mitigation measures which will be undertaken, and the timing of those measures, if trigger values or receiving environment water quality thresholds are reached.	Section 7.5	Section 7.5 outlines the corrective and mitigation measures.
16	15g(i)	16g(i)	Specify a reporting program including:  Publication on the website of data collected in accordance with the REMRP	Section 8	
17	15g(ii)	16g(ii)	Notification of the commencement and cessation of managed watering events	Section 8	
18	15g(iii)	16g(iii)	Publication of the inundation extent of managed watering events as a shapefile	Section 8	

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	15g(iv)	16g(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	
20	15g(v)	16g(v)	Notification of any detection of trigger values, receiving environment water quality thresholds and limits;	Section 8	
21	15g(vi)	16g(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	
22	15h	16h	Include links to other relevant plans or conditions of approval, including state agency and MDBA approval conditions.	Section 8	
23	15i	16i	Detail the spatial extent of the receiving environment and the governance structures applying to the receiving environment.	Section 8	
24	15j	16j	Include a schedule of reporting and review mechanisms to demonstrate compliance with the commitments made in the REMRP.	Section 8	
25	15k	16k	Include an assessment of risks relating to return flow water entering the receiving environment and risk management strategies and/or mitigation measures that will be applied to address identified risks.	Section 5	Section 5 outlines risks relating to return flow water entering the receiving environment.

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	16	17	The approval holder must not commence the Action until the REMRP has been approved in writing by the Minister. The approval holder must implement the approved REMRP from the commencement of the Action until the expiry date of this approval.	N/A	N/A
27	17	18	<p>If the Minister is not satisfied with the availability of monitoring data provided under the REMRP conditions or, if an adverse level was detected and the Minister is not satisfied that implemented corrective actions and/or procedural changes will remedy, or have remedied, any actual or potential harm to protected matters, the Minister may direct in writing that the approval holder:</p> <ul style="list-style-type: none"> <li>a) provide specified additional data and/or evidence,</li> <li>b) implement specified corrective actions and/or procedural changes at the expense of the approval holder,</li> <li>c) within a timeframe specified by the Minister submit to the department, for the Minister's written approval, an Offset Management Plan (OMP) that details how specified residual harm to protected matters as a result of the Action will be compensated for, and/or</li> <li>d) pause the taking of a specified part of the Action until the Minister subsequently advises in writing that the approval holder may resume taking the specified part of the Action. The approval holder must comply with any such reasonable direction.</li> </ul>	N/A	N/A

# Addendum B: Hattah Lakes North Floodplain Restoration Project



**VICTORIAN MURRAY FLOODPLAIN  
RESTORATION PROJECT**  
HEALTHY LANDSCAPES, STRONG COMMUNITIES

# Receiving Environment Monitoring and Reporting Program – Addendum B

Hattah Lakes North Floodplain Restoration Project

*Hattah Lakes North EPBC: 2020/8632 (Conditions 14 – 18)*



**Approved Action**

<b>Person to whom the approval is granted</b>	Lower Murray Urban and Rural Water Corporation
<b>ABN of Approval Holder</b>	18 475 808 826
<b>Action</b>	
<b>Hattah Lakes North Floodplain Restoration Project (EPBC: 2020/8632)</b>	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

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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	P Wright	BEnvEng Hons, 10 years	S Brown	BSc Hons, Masters Env Studies, 29 years
B – DCCEEW preliminary review	14 October 2025	P Wright	BEnvEng Hons, 10 years	S Brown	BSc Hons, Masters Env Studies, 29 years
C - For stakeholder acceptance	26 February 2026	P Wright	BEnvEng Hons, 10 years	B Disley	BEnv, DipEnvTech, CPEng(Env/Civil) 21 years
D – For issue to DCCEEW	3 March 2026	P Wright	BEnvEng Hons, 10 years	B Disley	BEnv, DipEnvTech, CPEng(Env/Civil) 21 years
0 – For issue to DCCEEW for approval	17 March 2026	P Wright	BEnvEng Hons, 10 years	B Disley	BEnv, DipEnvTech, CPEng(Env/Civil) 21 years

# Abbreviations

Abbreviation	Definition
<b>CMA</b>	Catchment Management Authority
<b>EES</b>	Environment Effects Statement under the <i>Environment Effects Act 1978</i>
<b>EPA</b>	Environment Protection Authority (Victoria)
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
<b>ha</b>	Hectares
<b>HyWaq</b>	Hydrology and Water Quality Monitoring
<b>Mallee CMA</b>	Mallee Catchment Management Authority
<b>MDBA</b>	Murray-Darling Basin Authority
<b>REMRP</b>	Receiving Environment Monitoring and Reporting Program
<b>TLM</b>	The Living Murray
<b>TRG</b>	Technical Reference Group
<b>VMFRP</b>	Victorian Murray Floodplain Restoration Project
<b>WQGV</b>	Water Quality Guideline Values

# 1 Introduction

The purpose of this addendum report is to provide the site-specific monitoring requirements for the Receiving Environment Monitoring and Reporting Plan (REMRP) for 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 located 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 has been designed to build on the benefits of TLM initiative, constructed in 2013, which allows watering of approximately 6,000ha of the central and southern Hattah Lakes floodplain. The project would use natural flood events and releases from the TLM works to facilitate environmental watering of flood-dependent vegetation communities on the northern Hattah Lakes floodplain. Existing TLM infrastructure would be used, including Oatey’s Regulator and Bitterang Regulator.

The infrastructure works include:

- One large regulator (K10 Regulator)
- 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, including for maintenance activities during construction (approximately 16.9km).

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<sup>[8]</sup>.

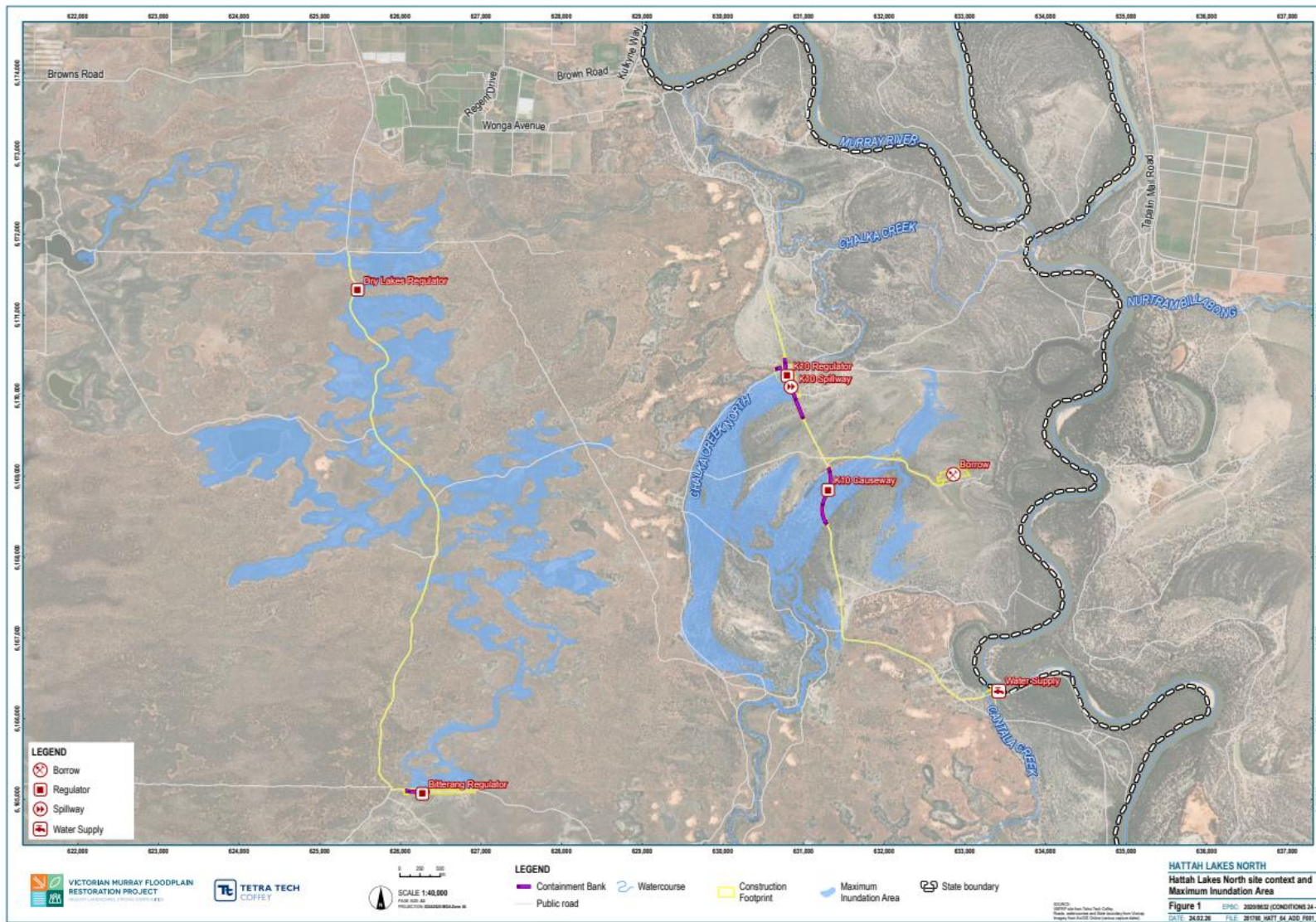


Figure 1 Hattah Lakes North site context and maximum inundation area

## 2 Surface water quality

The following summary of existing conditions surface water quality has been adapted from the specialist surface water assessments for the project<sup>[2]</sup>:

- Data from nearby sites (Swan Hill to Merbein) was used to infer existing conditions.
- Water quality in the Murray River is generally consistent between the monitoring stations.
- Water quality within the Murray River in the Hattah North area is generally within expected ranges.
- Table 2 outlines a summary of water quality data at 'Murray River at Swan Hill' (409204), which has a long record of data available for parameters relevant to the REMRP.
- Swan Hill monitoring station is located 380km upstream of the site.

The Murray Darling Basin Authority (MDBA) commissioned a data trends assessment in 2022 to analyse the data record for the MDBA River Murray Water Quality Monitoring Program (RMWQP) for long-term change and potential system drivers<sup>[5]</sup>.

Table 2 outlines typical ranges of water quality data in the RMWQMP dataset.

**Table 1 Summary of Water Quality Monitoring Data at Swan Hill Monitoring Station<sup>[2]</sup>**

Parameter	Unit	Start Date	End Date	Minimum	Median	Maximum
pH	pH units	7/07/2009	28/08/2017	6.7	7.5	8.8
Electrical Conductivity	µS/cm	2/01/1990	10/08/2021	45.4	112	1100
Dissolved Oxygen	mg/L	19/04/2005	10/08/2021	1.4	9.3	14.2
Ammonia as N	mg/L					
Total Nitrogen	mg/L	3/10/2018	10/08/2021	0.28	0.45	1.2
Dissolved Organic Carbon	mg/L	2/01/1990	10/08/2021	1	4	150

**Table 2 Typical ranges for key water quality parameters in the RMWQMP dataset<sup>[5]</sup>**

Parameter	Unit	Typical range
pH	pH units	6 - 8
Electrical Conductivity	µS/cm	1 - 500
Dissolved Oxygen	mg/L	0 - 15
Dissolved Organic Carbon	mg/L	0 - 20

## 3 Monitoring plan

Figure 2 shows the Hattah Lakes North REMRP monitoring sites. A summary of the monitoring sites is provided in Table 3.

The Hydrology and Water Quality Strategy (HyWaq Strategy) for the VMFRP Project Areas<sup>[3]</sup> outlines the monitoring infrastructure required to meet the EPBC Approval requirements (as well as other regulatory requirements).

Monitoring locations and methodologies in the HyWaq have been applied for the REMRP.

### 3.1 Monitoring locations

#### 3.1.1 Receiving environment

Receiving environment monitoring locations for the Hattah Lakes North site include:

- HA18 – Upstream in the Murray River
- 414207a (existing gauge Murray River @ Colignan) – Downstream in the Murray River
- HA04 – Upstream in Chalka Creek
- HA31 – Downstream in Chalka Creek.

#### 3.1.2 Floodplain environment at release point

Floodplain environment at release point monitoring locations for the site include:

- HA08 – K10 Regulator.

### 3.2 Monitoring parameters

Monitoring parameters IDs for each monitoring location are summarised in Table 3.

The monitoring parameter IDs correspond to the following parameters:

- pH - pH (pH unit)
- EC - Electrical Conductivity at 25°C (µS/cm)
- DO - Dissolved Oxygen (mg/L)
- Ammonia - Ammonia as N (mg/L)
- Nitrogen - Total Nitrogen as N (mg/L)
- DOC - Dissolved Organic Carbon (DOC) (mg/L).

**Table 3 Hattah Lakes North REMRP monitoring sites**

HYWAQ ID	Name	Longitude (GDA94)	Latitude (GDA94)	Monitoring location	Monitoring parameter
414207a	Downstream in the Murray River (Murray River @ Colignan)	142.40721	-34.56709	Receiving Environment	DO, EC, pH, Ammonia, Total Nitrogen, DOC
HA08	K10 Regulator Upstream in Chalka Creek	142.42643	-34.60128	Floodplain Environment Release Point	
HA18	Upstream in the Murray River	142.50275	-34.74033	Receiving Environment	
HA31	Downstream in Chalka Creek	142.43384	-34.59888	Receiving Environment	

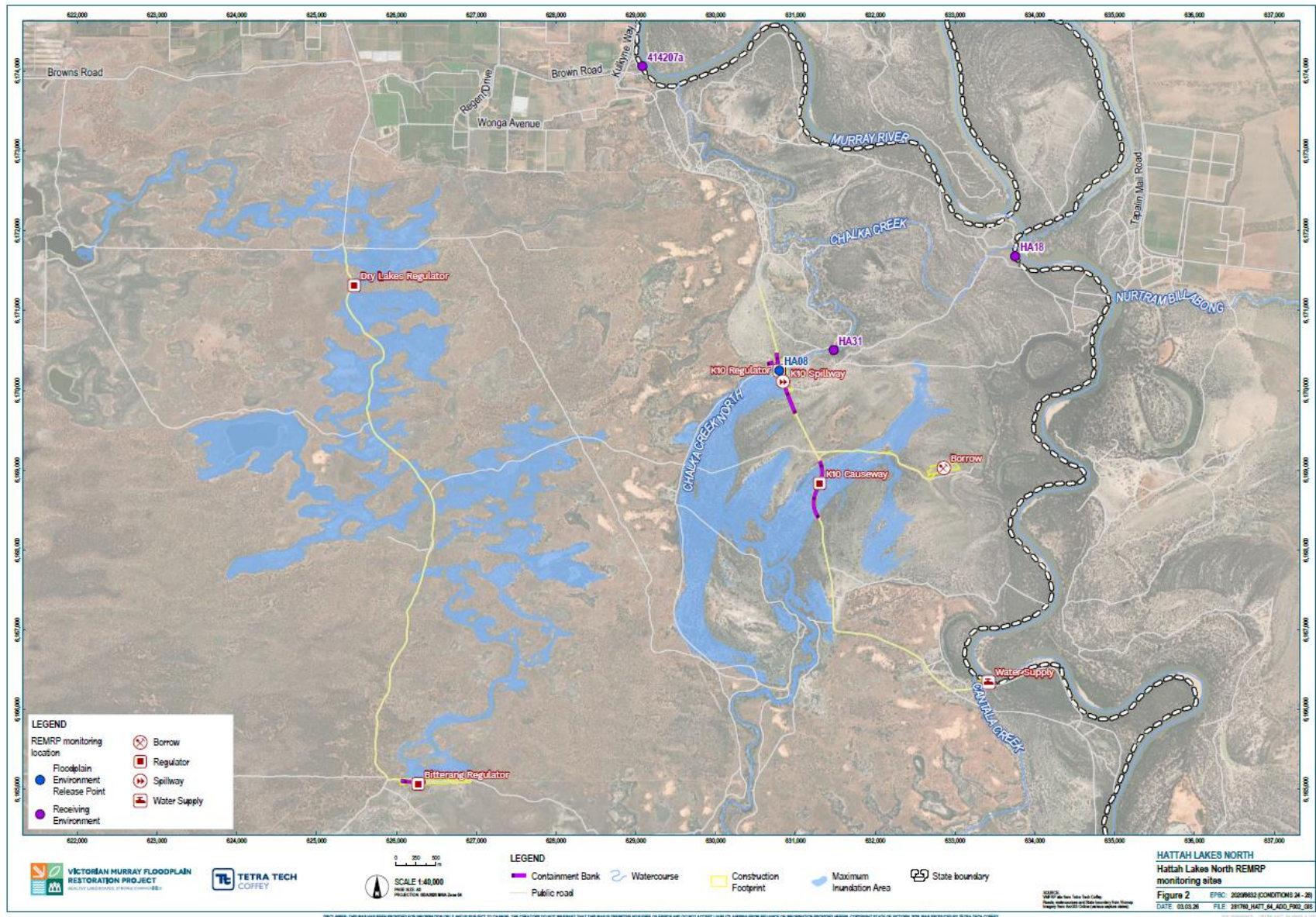


Figure 2 Hattah Lakes North REMPP monitoring sites

### 3.3 Trigger values and corrective measures

Trigger values for the Hattah Lakes North site are outlined in Table 4 below.

**Table 4 Trigger values and corrective measures**

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Dissolved Oxygen</b>	<ul style="list-style-type: none"> <li>• <b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>• DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>• DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>1 mg/L</b> lower; and</li> <li>• This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain.</li> </ul>	<ul style="list-style-type: none"> <li>• DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>• DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>2 mg/L</b> lower;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>• In the receiving environment 5 km and 10 km downstream of the release point.</li> <li>• In the receiving environment less than 1 km upstream of release point to investigate potential external sources of reduced DO.</li> </ul> <p>If the effect is attributed to discharge from the floodplain and persists for more than <b>5 days</b>, perform corrective action:</p> <ul style="list-style-type: none"> <li>• Reduce the discharge rate<sup>1</sup> or measures to increase oxygenation.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>• Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect.</li> </ul>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Electrical Conductivity at 25°C</b>	<ul style="list-style-type: none"> <li>• <b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>• EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>• This is more than <b>500 µS/cm</b> higher than <u>Upstream in the Murray River</u>; and</li> <li>• This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>• EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>• This is more than <b>1000 µS/cm</b> higher than <u>Upstream in the Murray River</u>;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>• In the receiving environment 5 km and 10 km downstream of the release point.</li> </ul> <p>If the effect is confirmed as attributed to discharge from the floodplain, perform corrective measure:</p> <ul style="list-style-type: none"> <li>• Reduce the discharge rate<sup>1</sup>; and/or</li> <li>• Call on dilution flows to increase River Murray total discharge.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>• Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>
<b>pH</b>	<ul style="list-style-type: none"> <li>• <b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>• pH in the receiving environment <u>Upstream in the Murray River</u> is less than or equal to <b>≤6</b>, and;</li> <li>• Average daily pH <u>Downstream in the Murray River</u> is one (1) pH unit lower and;</li> <li>• This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>• Consider stopping the discharge<sup>1</sup> or;</li> <li>• Changing the discharge to a rate<sup>1</sup> that reduces downstream effect.</li> <li>• Investigate origins of low pH.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>
<b>Ammonia and Total N</b>	<ul style="list-style-type: none"> <li>• Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> <li>• Increase to every <b>3 days</b> if the trigger for Ammonia and Total N is exceeded.</li> </ul>	<ul style="list-style-type: none"> <li>• Ammonia or Total N in the receiving environment is higher the ARMCANZ freshwater trigger value<sup>7</sup> and;</li> <li>• Ammonia or Total N <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>; and</li> <li>• This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>• Consider stopping the discharge<sup>1</sup> or;</li> <li>• Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>• Investigate origins of elevated Ammonia and Total N.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Dissolved Organic Carbon</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DOC <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>;</li> <li>The downstream DO trigger has been exceeded and;</li> <li>This occurs while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the trigger being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of high DOC.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

NOTES:

<sup>1</sup>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.

# References

- [1] VMFRP (2025). *Restoration projects*. Available at: <https://www.vmfrp.com.au/projects/> (Accessed: 11 September 2025).
- [2] R8 Joint Venture (2022). *Specialist Assessment C Surface Water. 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.
- [3] Water Technology (2024). *Updated HyWaQ Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.
- [4] Cornell, G. Stoios, R., and Lyon, J. (2024). *Water quality traffic lights for native fish*. Unpublished Client Report for the Department of Energy, Environment and Climate Action. Arthur Rylah Institute for Environmental Research, Heidelberg, Victoria.
- [5] LaTrobe Uni (2022). *River Murray Water Quality Monitoring Program (RMWQMP) Data Trends Analysis 2021*. Report prepared for Murray-Darling Basin Authority.
- [6] VMFRP (2023). *Attachment II – Environmental Risk Report*. Environment Report: Belsar-Yungera and Hattah Lakes North Floodplain Restoration Projects. Victorian Murray Floodplain Restoration Project, Mildura.
- [7] ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
- [8] VMFRP (2023). *Environmental Effects Statement: Belsar-Yungera and Hattah Lakes North Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

# Appendix A: Risk Register

Relevant risk relating to surface water quality during operation has been extracted from the Environment Effects Statement: Belsar-Yungera and Hattah Lakes North Floodplain Restoration Projects - Attachment II – Environmental risk report - Hattah Lakes North project risk register<sup>[6]</sup>.

Aspect	Impact Pathway	Activity	Initial Risk			Environmental Delivery Standards	EDS	Residual Risk			Rationale	State of knowledge	Reasonably practicable
			Likelihood	Consequence	Inherent Risk Rating			Likelihood	Consequence	Residual Risk Rating			
Surface water – Quality	Potential changes to water quality (e.g. water salinity) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Operation	Possible	Moderate	Medium	<p><b>Surface water – Operation</b></p> <p>In accordance with the Water Act 1989, operate the project within the Victorian annual environmental water management cycle and, at the local level, be guided by site specific Operating Plans developed to outline the operational arrangements including identification of overarching operating risks and mitigation measures associated with the delivery of environmental water.</p> <p>The Operating Plan is developed by the CMA prior to the first operation in consultation with relevant stakeholders.</p> <p>Operation of the project to consider and seek to avoid, minimise and manage where practicable:</p> <ul style="list-style-type: none"> <li>• Adverse anoxic (blackwater) events.</li> <li>• Excessive algal growth.</li> <li>• Increased Carp population.</li> <li>• Native fish stranded on the floodplain during drawdown events.</li> <li>• Excessive erosion during filling and drawdown.</li> </ul> <p>This will include consideration of the following measures as appropriate:</p> <ul style="list-style-type: none"> <li>• Factor seasonal implications in the timing of filling and drawdown.</li> <li>• Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions.</li> <li>• 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).</li> <li>• Provide throughflow to replicate first flush or consider staged inundation.</li> <li>• Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow.</li> <li>• Implement measures to allow native fish to migrate from the floodplain while stranding Carp (e.g. providing cues, maintaining passage).</li> <li>• Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators.</li> </ul> <p><b>Surface water – Monitoring</b></p> <p>Monitor the volume, duration, frequency and surface water quality of managed environmental watering events in accordance with the Operation Environmental Management Plan to inform adaptive management (e.g. through the Environmental Water Management Plan and Seasonal Watering Proposals).</p> <p>In addition to the EDS above, the risk is also controlled by: E4a – Overall biodiversity improvement – Belsar-Yungera, CM3 – Contaminated land duties, GW2 – Operational groundwater management</p>	SW2, SW3, E4b, CM3, GW2	Rare	Moderate	Low	<p>The initial and residual risk ratings are based on the likelihood and consequence definitions in the VMFRP Guide to Environmental Risk Management, with residual risk rating informed by the revised EDS and state of knowledge.</p> <p>The likelihood has been reduced as the Operating Plan sets limits for the Maximum Inundation Area and manages impacts to surface water, noting the Plan has yet to be produced.</p>	<ul style="list-style-type: none"> <li>• EES Central Surface Water Specialist Assessment</li> </ul>	<p>In the context of the state of knowledge for the Hattah Lakes North project, the risk of harm to human health and the environment was assessed, controls to eliminate or otherwise reduce those risks were then identified, and the preferred controls determined based on what is reasonably practicable to be undertaken as part of the Hattah Lakes North project. The preferred controls are documented in the Environmental Delivery Standard.</p>

# **Addendum C: Nyah Floodplain Restoration Project**



**VICTORIAN MURRAY FLOODPLAIN  
RESTORATION PROJECT**  
HEALTHY LANDSCAPES, STRONG COMMUNITIES

# Receiving Environment Monitoring and Reporting Program – Addendum C

Nyah Floodplain Restoration Project

*Nyah EPBC: 2020/8648 (Conditions 13 – 17)*



**Approved Action**

<b>Person to whom the approval is granted</b>	Lower Murray Urban and Rural Water Corporation
<b>ABN of Approval Holder</b>	18 475 808 826
<b>Action</b>	
<b>Nyah Floodplain Restoration Project (EPBC: 2020/8648)</b>	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

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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	P Wright	BEnvEng Hons, 10 years	S Brown	BSc Hons, Masters Env Studies, 29 years
B – DCCEEW preliminary review	14 October 2025	P Wright	BEnvEng Hons, 10 years	S Brown	BSc Hons, Masters Env Studies, 29 years
C - For stakeholder acceptance	26 February 2026	P Wright	BEnvEng Hons, 10 years	B Disley	BEnv, DipEnvTech, CPEng(Env/Civil) 21 years
D – For issue to DCCEEW	3 March 2026	P Wright	BEnvEng Hons, 10 years	B Disley	BEnv, DipEnvTech, CPEng(Env/Civil) 21 years
0 – for issue to DCCEEW for approval	17 March 2026	P Wright	BEnvEng Hons, 10 years	B Disley	BEnv, DipEnvTech, CPEng(Env/Civil) 21 years

# Abbreviations

Abbreviation	Definition
<b>CMA</b>	Catchment Management Authority
<b>EES</b>	Environment Effects Statement under the <i>Environment Effects Act 1978</i>
<b>EPA</b>	Environment Protection Authority (Victoria)
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
<b>ha</b>	Hectares
<b>HyWaq</b>	Hydrology and Water Quality Monitoring
<b>Mallee CMA</b>	Mallee Catchment Management Authority
<b>MDBA</b>	Murray-Darling Basin Authority
<b>REMRP</b>	Receiving Environment Monitoring and Reporting Program
<b>TLM</b>	The Living Murray
<b>TRG</b>	Technical Reference Group
<b>VMFRP</b>	Victorian Murray Floodplain Restoration Project
<b>WQGV</b>	Water Quality Guideline Values

# 1 Introduction

The purpose of this addendum report is to provide the site-specific monitoring requirements for the Receiving Environment Monitoring and Reporting Plan (REMRP) for Nyah (the site).

The Nyah Floodplain Restoration Project will 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, 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 will involve works to facilitate inundation of approximately 475 ha of high ecological value Murray River floodplain. The project is almost entirely in the Rural City of Swan Hill and the Mallee CMA region, 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.

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.

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

## 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<sup>[8]</sup>.

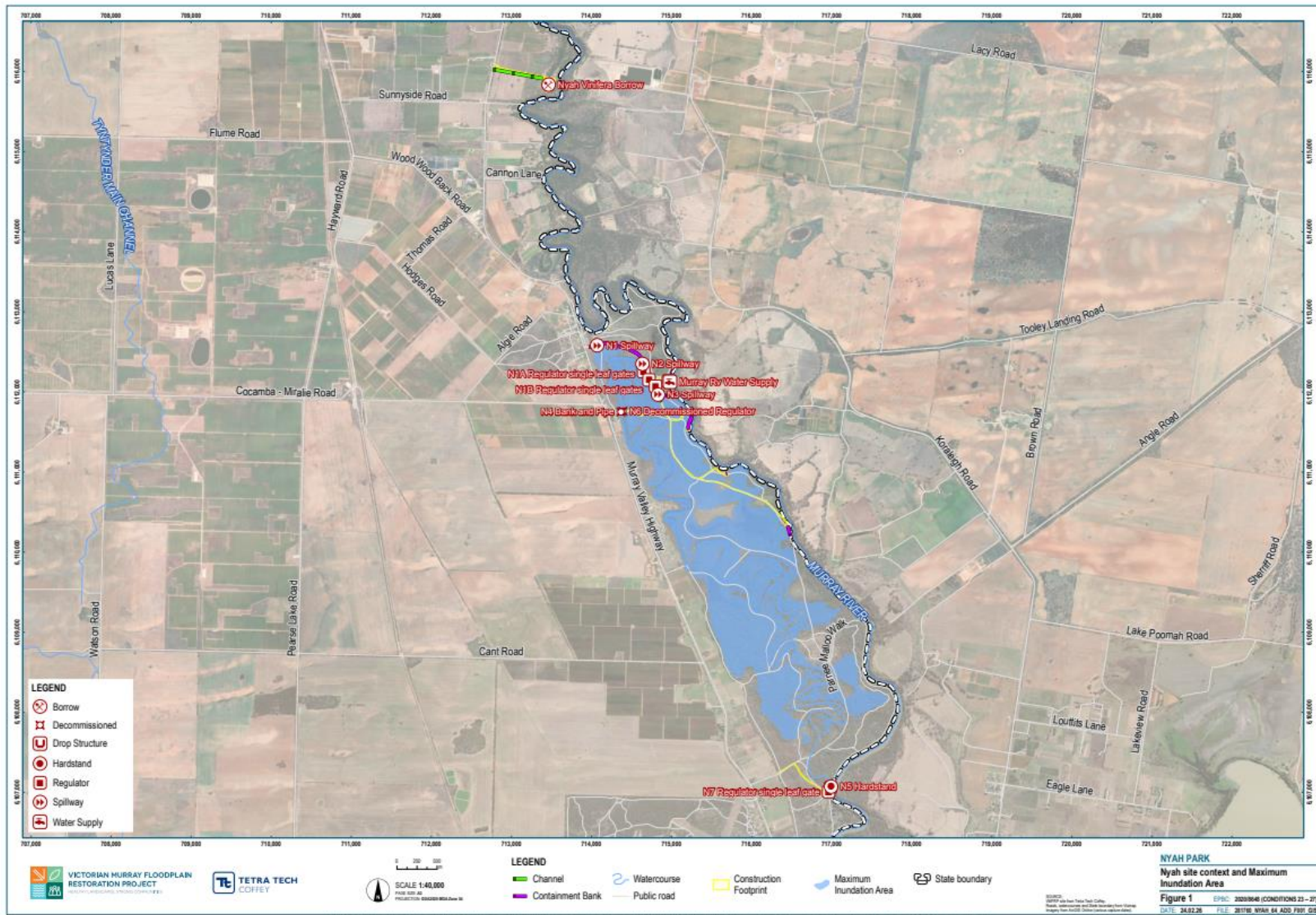


Figure 1 Nyah site context and maximum inundation area

## 2 Surface water quality

The following summary of existing conditions surface water quality has been adapted from the specialist surface water assessments for the project<sup>[2]</sup>:

- Data from nearby sites (Swan Hill to Euston) was used to infer conditions.
- Water quality in the Murray River is generally consistent between Swan Hill to Euston.
- Water quality within the Murray River in the Nyah area is generally within expected ranges.
- Table 1 outlines a summary of water quality data at ‘Murray River @ Swan Hill’ (409204) for parameters relevant to the REMRP.
- Swan Hill monitoring station is located 50km upstream of the site.

The Murray Darling Basin Authority (MDBA) commissioned a data trends assessment in 2022 to analyse the data record for the MDBA River Murray Water Quality Monitoring Program (RMWQP) for long-term change and potential system drivers<sup>[5]</sup>.

- Table 1 outlines typical ranges of water quality data in the RMWQMP dataset.

**Table 1 Summary of Water Quality Monitoring Data at Swan Hill Monitoring Station<sup>[2]</sup>**

Parameter	Unit	Start Date	End Date	Minimum	Median	Maximum
pH	pH units	7/07/2009	28/08/2017	6.7	7.5	8.8
Electrical Conductivity	µS/cm	2/01/1990	10/08/2021	45.4	112	1100
Dissolved Oxygen	mg/L	19/04/2005	10/08/2021	1.4	9.3	14.2
Ammonia as N	mg/L					
Total Nitrogen	mg/L	3/10/2018	10/08/2021	0.28	0.45	1.2
Dissolved Organic Carbon	mg/L	2/01/1990	10/08/2021	1	4	150

**Table 2 Typical ranges for key water quality parameters in the RMWQMP dataset<sup>[5]</sup>**

Parameter	Unit	Typical range
pH	pH units	6 - 8
Electrical Conductivity	µS/cm	1 - 500
Dissolved Oxygen	mg/L	0 - 15
Dissolved Organic Carbon	mg/L	0 - 20

## 3 Monitoring plan

Figure 2 shows the Nyah REMRP monitoring sites. A summary of the monitoring sites is provided in Table 3.

The Hydrology and Water Quality Strategy (HyWaq Strategy) for the VMFRP Project Areas<sup>[3]</sup> outlines the monitoring infrastructure required to meet the EPBC Approval requirements (as well as other regulatory requirements). Monitoring locations and methodologies in the HyWaq have been applied for the REMRP.

### 3.1 Monitoring locations

#### 3.1.1 Receiving environment

Receiving environment monitoring locations for the Nyah site include:

- NY07 – Upstream in the Murray River
- NY16 – Downstream in the Murray River.

#### 3.1.2 Floodplain environment at release point

Floodplain environment at release point monitoring locations for the site include:

- NY04 – N2 Regulator.

### 3.2 Monitoring parameters

Monitoring parameters IDs for each monitoring location summarised in Table 3.

The monitoring parameter IDs correspond to the following parameters:

- pH - pH (pH unit)
- EC - Electrical Conductivity at 25°C (µS/cm)
- DO - Dissolved Oxygen (mg/L)
- Ammonia - Ammonia as N (mg/L)
- Nitrogen - Total Nitrogen as N (mg/L)
- DOC - Dissolved Organic Carbon (DOC) (mg/L).

**Table 3 Nyah REMRP monitoring sites**

HYWAQ ID	Name	Longitude (GDA94)	Latitude (GDA94)	Monitoring location	Monitoring parameter ID
NY04	N2 Regulator	143.35690	-35.11132	Floodplain Environment Release Point	DO, EC, pH, Ammonia, Total Nitrogen, DOC
NY07	Upstream in the Murray River	143.38332	-35.15742	Receiving Environment	DO, EC, pH, Ammonia, Total Nitrogen, DOC
NY16	Downstream in the Murray River	143.36009	-35.10853	Receiving Environment	DO, EC, pH, Ammonia, Total Nitrogen, DOC

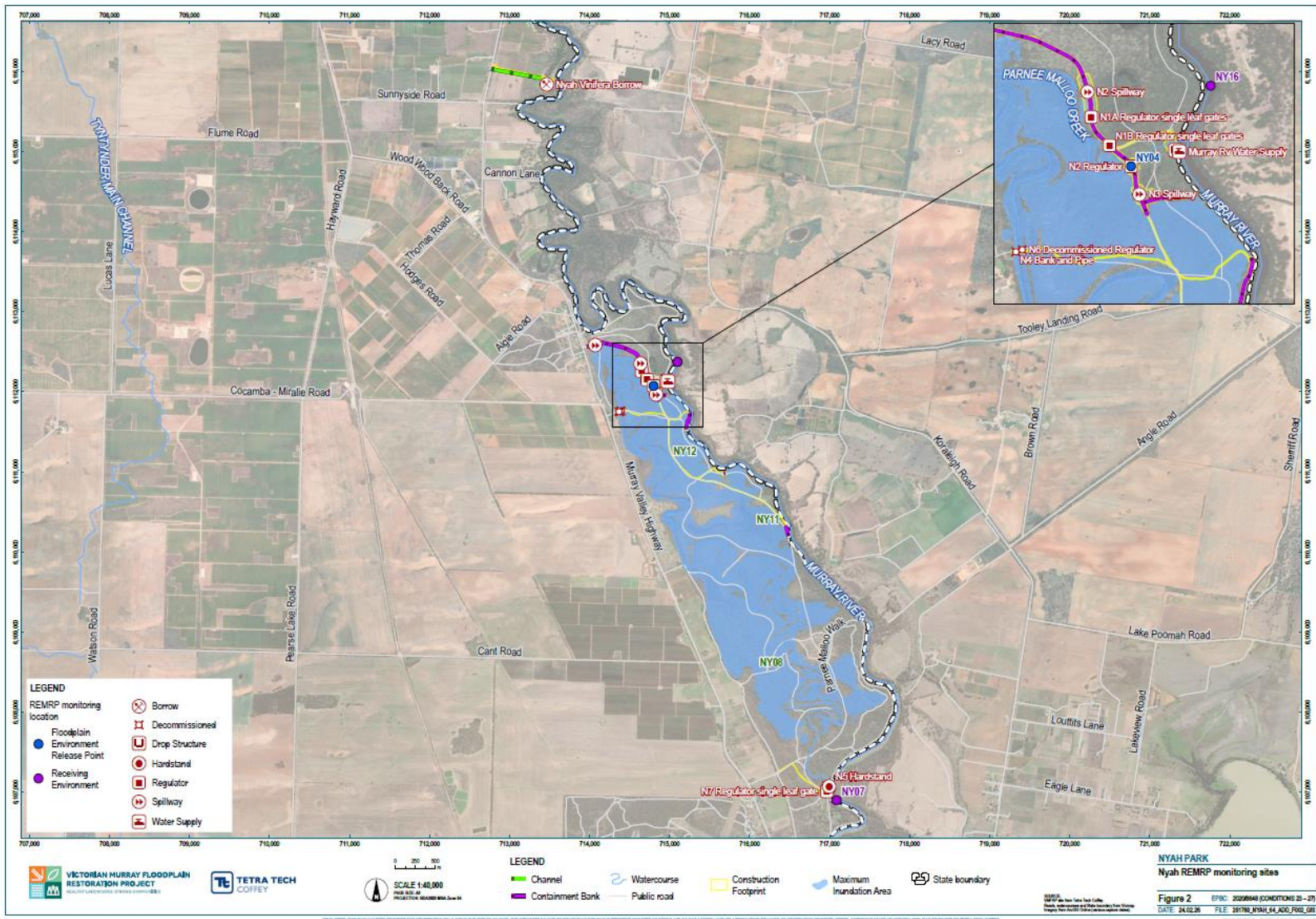


Figure 2 Nyah REMRP monitoring sites

### 3.3 Trigger values and corrective actions

Trigger values and corrective actions for the Nyah site are outlined in Table 4 below.

Table 4 Trigger values and corrective actions

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Dissolved Oxygen</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>1 mg/L</b> lower; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain.</li> </ul>	<ul style="list-style-type: none"> <li>DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>2 mg/L</b> lower;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>In the receiving environment 5 km and 10 km downstream of the release point.</li> <li>In the receiving environment less than 1 km upstream of release point to investigate potential external sources of reduced DO.</li> </ul> <p>If the effect is attributed to discharge from the floodplain and persists for more than <b>5 days</b>, perform corrective action:</p> <ul style="list-style-type: none"> <li>Reduce the discharge rate<sup>1</sup> or measures to increase oxygenation.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Electrical Conductivity at 25°C</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>This is more than <b>500 µS/cm</b> higher than <u>Upstream in the Murray River</u>; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>This is more than <b>1000 µS/cm</b> higher than <u>Upstream in the Murray River</u>;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>In the receiving environment 5 km and 10 km downstream of the release point.</li> </ul> <p>If the effect is confirmed as attributed to discharge from the floodplain, perform corrective measure:</p> <ul style="list-style-type: none"> <li>Reduce the discharge rate<sup>1</sup>; and/or</li> <li>Call on dilution flows to increase River Murray total discharge.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>
<b>pH</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>pH in the receiving environment <u>Upstream in the Murray River</u> is less than or equal to <b>≤6</b>, and;</li> <li>Average daily pH <u>Downstream in the Murray River</u> is one (<b>1</b>) pH unit lower and;</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge to a rate<sup>1</sup> that reduces downstream effect.</li> <li>Investigate origins of low pH.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Ammonia and Total N</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> <li>Increase to every <b>3 days</b> if the trigger for Ammonia and Total N is exceeded.</li> </ul>	<ul style="list-style-type: none"> <li>Ammonia or Total N in the receiving environment is higher the ARMCANZ freshwater trigger value<sup>[7]</sup> and;</li> <li>Ammonia or Total N <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of elevated Ammonia and Total N.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>
<b>Dissolved Organic Carbon</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DOC <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>;</li> <li>The downstream DO trigger has been exceeded and;</li> <li>This occurs while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the trigger being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of high DOC.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

NOTES:

<sup>1</sup> 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.

## References

- [1] VMFRP, 2025. *Restoration projects*. Available at: <https://www.vmfrp.com.au/projects/> (Accessed: 11 September 2025).
- [2] R8 Joint Venture, 2022. *Specialist Assessment C Surface Water. 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.
- [3] Water Technology, 2024. *Updated HyWaQ Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.
- [4] Cornell, G. Stoios, R., and Lyon, J., 2024. *Water quality traffic lights for native fish*. Unpublished Client Report for the Department of Energy, Environment and Climate Action. Arthur Rylah Institute for Environmental Research, Heidelberg, Victoria.
- [5] LaTrobe Uni (2022). *River Murray Water Quality Monitoring Program (RMWQMP) Data Trends Analysis 2021*. Report prepared for Murray-Darling Basin Authority.
- [6] VMFRP (2023). *Attachment II – Environmental Risk Report. Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.
- [7] ANZECC & ARMCANZ 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
- [8] VMFRP (2023). *Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

## Appendix A: Risk Register

Relevant risk relating to surface water quality during operation has been extracted from the Environment Effects Statement: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects - Attachment II – Environmental risk report – Nyah project risk register<sup>[7]</sup>

Aspect	Impact Pathway	Activity	Initial Risk			Environmental Delivery Standards	EDS	Residual Risk			Rationale	State of knowledge	Reasonably practicable
			Likelihood	Consequence	Inherent Risk Rating			Likelihood	Consequence	Residual Risk Rating			
Surface water – Quality	Potential changes to water quality (e.g. water salinity) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Operation	Possible	Minor	Medium	<p><b>Surface water management – Operation</b></p> <p>In accordance with the Water Act 1989, operate the project within the Victorian annual environmental water management cycle and, at the local level, be guided by site specific Operating Plans developed to outline the operational arrangements including identification of overarching operating risks and mitigation measures associated with the delivery of environmental water.</p> <p>The Catchment Management Authority is to develop the Operating Plan in consultation with relevant stakeholders prior to the first watering event. Operation of the project to consider and seek to avoid, minimise and manage where practicable:</p> <ul style="list-style-type: none"> <li>• Adverse anoxic (blackwater) events.</li> <li>• Excessive algal growth.</li> <li>• Increased Carp population.</li> <li>• Native fish stranded on the floodplain during drawdown events.</li> <li>• Excessive erosion during filling and drawdown.</li> </ul> <p>This will include consideration of the following measures as appropriate:</p> <ul style="list-style-type: none"> <li>• Factor seasonal implications in the timing of filling and drawdown.</li> <li>• Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions.</li> <li>• 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).</li> <li>• Provide throughflow to replicate first flush or consider staged inundation.</li> <li>• Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow.</li> <li>• Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain</li> <li>• Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects</li> <li>• Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators.</li> </ul> <p><b>Surface water – Monitoring</b></p> <p>Monitor the volume, duration, frequency and surface water quality of managed environmental watering events in accordance with the Operation Environmental Management Plan to inform adaptive management (e.g. through the Environmental Water Management Plan and Seasonal Watering Proposals)</p>	SW2, SW3, GS1, GS3, GW2	Unlikely	Minor	Low	The likelihood has been reduced because the Operating Plan sets out a framework for the monitoring of inundation events and the EWMP improves the management of surface water flow through monitoring and adaptive management.	<ul style="list-style-type: none"> <li>• Draft Surface water assessment</li> </ul>	In the context of the state of knowledge for the Nyah project, the risk of harm to human health and the environment was assessed, controls to eliminate or otherwise reduce those risks were then identified, and the preferred controls determined based on what is reasonably practicable to be undertaken as part of the Vinifera project. The preferred controls are documented in the Initial Environmental Delivery Standard.

# Addendum D: Vinifera Floodplain Restoration Project



**VICTORIAN MURRAY FLOODPLAIN  
RESTORATION PROJECT**  
HEALTHY LANDSCAPES, STRONG COMMUNITIES

# Receiving Environment Monitoring and Reporting Program – Addendum D

Vinifera Floodplain Restoration Project

*Vinifera EPBC: 2020/8647 (Conditions 13 – 17)*




**Approved Action**

<b>Person to whom the approval is granted</b>	Lower Murray Urban and Rural Water Corporation
<b>ABN of Approval Holder</b>	18 475 808 826
<b>Action</b>	
<b>Vinifera Floodplain Restoration Project (EPBC: 2020/8647)</b>	To construct and operate water regulating structures to facilitate managed inundation of up to 335 ha of the Vinifera floodplain, NyahVinifera 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

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<b>EES</b>	Environment Effects Statement under the <i>Environment Effects Act 1978</i>
<b>EPA</b>	Environment Protection Authority (Victoria)
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
<b>ha</b>	Hectares
<b>HyWaq</b>	Hydrology and Water Quality Monitoring
<b>Mallee CMA</b>	Mallee Catchment Management Authority
<b>MDBA</b>	Murray-Darling Basin Authority
<b>REMP</b>	Receiving Environment Monitoring and Reporting Program
<b>TLM</b>	The Living Murray
<b>TRG</b>	Technical Reference Group
<b>VMFRP</b>	Victorian Murray Floodplain Restoration Project
<b>WQGV</b>	Water Quality Guideline Values

# 1 Introduction

The purpose of this addendum report is to provide the site-specific monitoring requirements for the Receiving Environment Monitoring and Reporting Plan (REM RP) for Vinifera (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, V4 regulating 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 within the Rural City of Swan Hill and the Mallee Catchment Management Authority (Mallee CMA) region, except for the drop structure. The drop structure would extend into the banks and bed of the river on the New South Wales border and so is in the Murray River Council local government area. There are no permanent pumps proposed as part of the project.

## 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<sup>[8]</sup>.

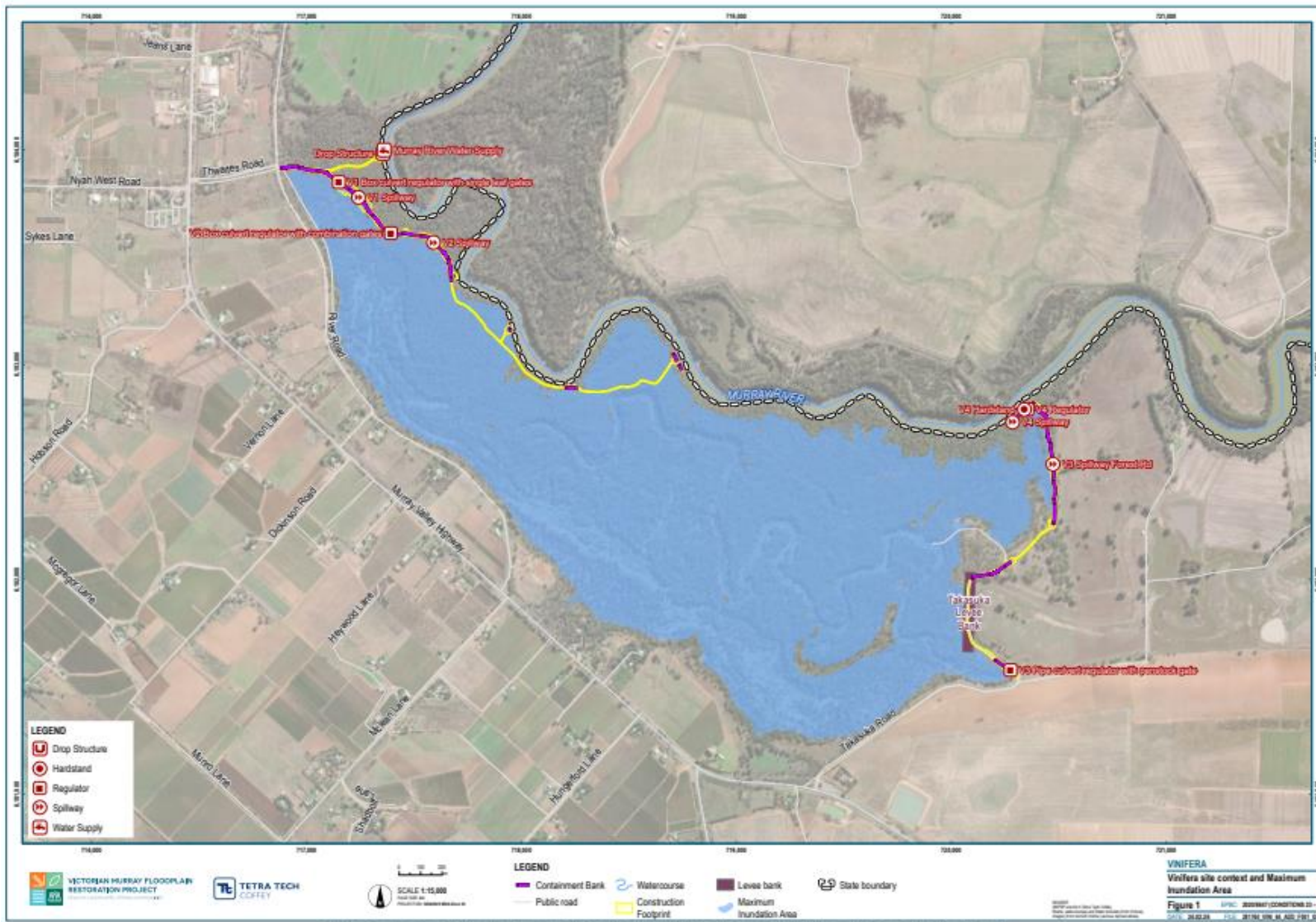


Figure 1 Vinifera site context and MIA

## 2 Surface water quality

The following summary of existing conditions surface water quality has been adapted from the specialist surface water assessments for the project<sup>[2]</sup>:

- Data from nearby sites (Swan Hill to Euston) was used to infer conditions.
- Water quality in the Murray River is generally consistent between the monitoring stations.
- Water quality within the Murray River in the Vinifera area is generally within expected ranges.
- Table 1 outlines a summary of water quality data at ‘Murray River @ Swan Hill’ (409204) for parameters relevant to the REMRP.
- Swan Hill monitoring station is located 40km upstream of the site.

The Murray Darling Basin Authority (MDBA) commissioned a data trends assessment in 2022 to analyse the data record for the MDBA River Murray Water Quality Monitoring Program (RMWQP) for long-term change and potential system drivers<sup>[5]</sup>.

- Table 1 outlines typical ranges of water quality data in the RMWQMP dataset.

**Table 1 Summary of Water Quality Monitoring Data at Swan Hill Monitoring Station<sup>[2]</sup>**

Parameter	Unit	Start Date	End Date	Minimum	Median	Maximum
pH	pH units	7/07/2009	28/08/2017	6.7	7.5	8.8
Electrical Conductivity	µS/cm	2/01/1990	10/08/2021	45.4	112	1100
Dissolved Oxygen	mg/L	19/04/2005	10/08/2021	1.4	9.3	14.2
Ammonia as N	mg/L					
Total Nitrogen	mg/L	3/10/2018	10/08/2021	0.28	0.45	1.2
Dissolved Organic Carbon	mg/L	2/01/1990	10/08/2021	1	4	150

**Table 2 Typical ranges for key water quality parameters in the RMWQMP dataset<sup>[5]</sup>**

Parameter	Unit	Typical range
pH	pH units	6 - 8
Electrical Conductivity	µS/cm	1 - 500
Dissolved Oxygen	mg/L	0 - 15
Dissolved Organic Carbon	mg/L	0 - 20

## 3 Monitoring

Figure 2 shows the Vinifera REMRP monitoring sites. A summary of the monitoring sites is provided in Table 3.

The Hydrology and Water Quality Monitoring Strategy (HyWaq Monitoring Strategy) for the VMFRP project areas<sup>[3]</sup> outlines the monitoring infrastructure required to meet the EPBC Act Approval requirements (as well as other regulatory requirements). Monitoring locations and methodologies in the HyWaq Monitoring Strategy have been applied for the REMRP.

### 3.1 Monitoring locations

#### 3.1.1 Receiving environment

Receiving environment monitoring locations for the Vinifera site include:

- VI08 – Upstream in the Murray River
- VI14 – Downstream in the Murray River.

#### 3.1.2 Floodplain environment at release point

Floodplain environment at release point monitoring locations for the site include:

- VI04 – V2 Regulator.

### 3.2 Monitoring parameters

Monitoring parameters IDs for each monitoring location are labelled on Figure 1 and summarised in Table 3.

The monitoring parameter IDs correspond to the following parameters:

- pH - pH (pH unit)
- EC - Electrical Conductivity at 25°C (µS/cm)
- DO - Dissolved Oxygen (mg/L)
- Ammonia - Ammonia as N (mg/L)
- Nitrogen - Total Nitrogen as N (mg/L)
- DOC - Dissolved Organic Carbon (DOC) (mg/L).

**Table 3 Vinifera REMRP monitoring sites**

HYWAQ ID	Name	Longitude (GDA94)	Latitude (GDA94)	Monitoring location	Monitoring parameter ID
VI04	V2 Regulator	143.3875827	-35.1870315	Floodplain Environment Release Point	DO, EC, pH, Ammonia, Total Nitrogen, DOC
VI08	Upstream in the Murray River	143.4201332	-35.1928422	Receiving Environment	DO, EC, pH, Ammonia, Total Nitrogen, DOC
VI14	Downstream in the Murray River	143.3876539	-35.1831326	Receiving Environment	DO, EC, pH, Ammonia, Total Nitrogen, DOC

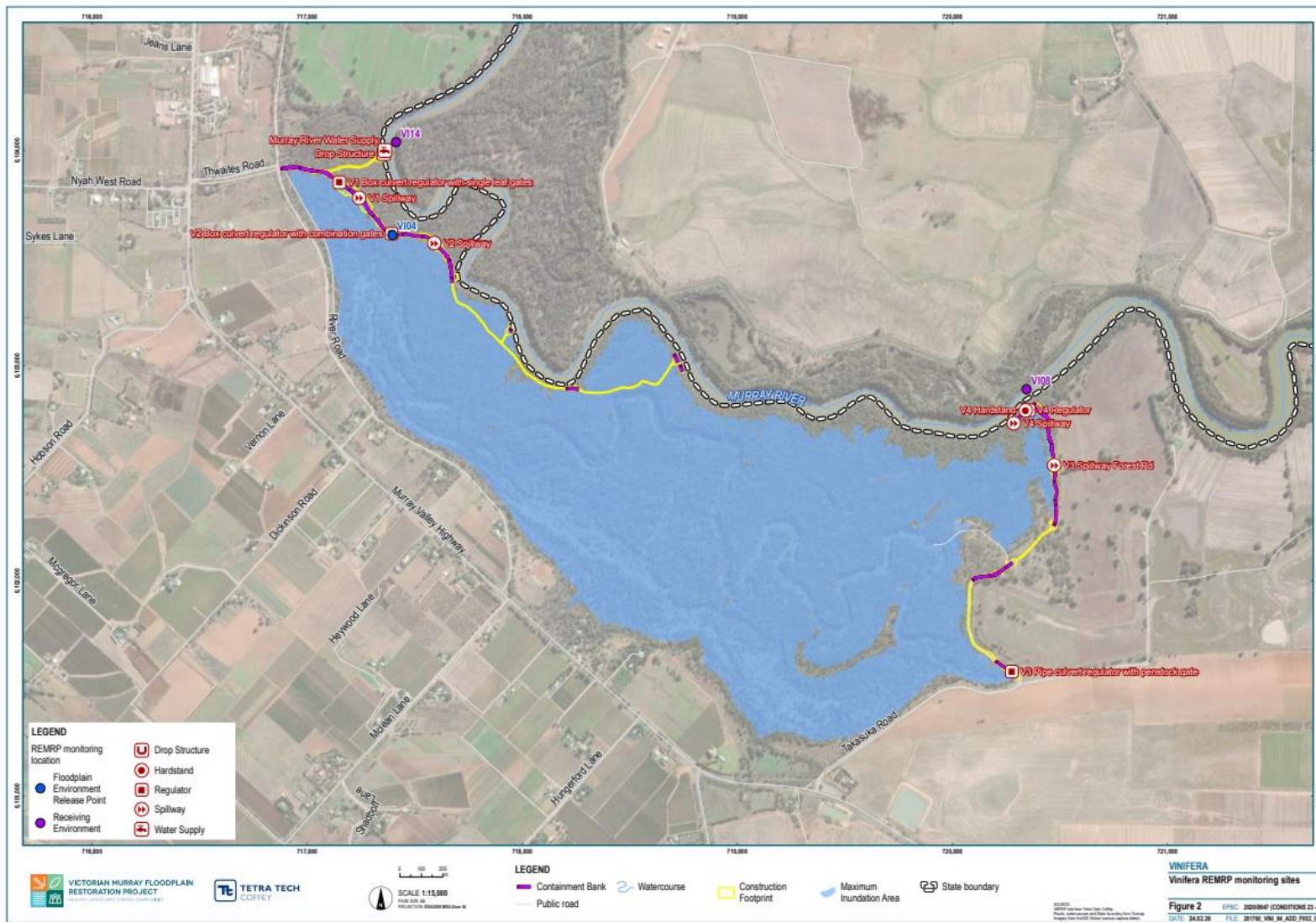


Figure 2 Vinifera REMRP monitoring sites

### 3.3 Trigger values and corrective actions

Trigger values and corrective actions for the Nyah site are outlined in Table 4 below.

Table 4 Trigger values and corrective action

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Dissolved Oxygen</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>1 mg/L</b> lower; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain.</li> </ul>	<ul style="list-style-type: none"> <li>DO in the receiving environment <u>Upstream in the Murray River</u> is less than <b>6 mg/L</b>; and</li> <li>DO in the receiving environment <u>Downstream in the Murray River</u> is more than <b>2 mg/L</b> lower;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>In the receiving environment 5 km and 10 km downstream of the release point.</li> <li>In the receiving environment less than 1 km upstream of release point to investigate potential external sources of reduced DO.</li> </ul> <p>If the effect is attributed to discharge from the floodplain and persists for more than <b>5 days</b>, perform corrective action:</p> <ul style="list-style-type: none"> <li>Reduce the discharge rate<sup>1</sup> or measures to increase oxygenation.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Electrical Conductivity at 25°C</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>This is more than <b>500 µS/cm</b> higher than <u>Upstream in the Murray River</u>; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>EC in the receiving environment <u>Downstream in the Murray River</u> is more than <b>4300 µS/cm</b>; and</li> <li>This is more than <b>1000 µS/cm</b> higher than <u>Upstream in the Murray River</u>;</li> </ul>	<p>If the <b>trigger value</b> is exceeded:</p> <p>Undertake additional sampling within <b>5 days</b>:</p> <ul style="list-style-type: none"> <li>In the receiving environment 5 km and 10 km downstream of the release point.</li> </ul> <p>If the effect is confirmed as attributed to discharge from the floodplain, perform corrective measure:</p> <ul style="list-style-type: none"> <li>Reduce the discharge rate<sup>1</sup>; and/or</li> <li>Call on dilution flows to increase River Murray total discharge.</li> </ul> <p>If the <b>limit value</b> is exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping or changing discharge<sup>1</sup> to a rate that reduces the downstream effect</li> </ul>
<b>pH</b>	<ul style="list-style-type: none"> <li><b>Daily</b> while release of water from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>pH in the receiving environment <u>Upstream in the Murray River</u> is less than or equal to <b>≤6</b>, and;</li> <li>Average daily pH <u>Downstream in the Murray River</u> is one (<b>1</b>) pH unit lower and;</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge to a rate<sup>1</sup> that reduces downstream effect.</li> <li>Investigate origins of low pH.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

Parameter	Monitoring frequency	Trigger values	Limit values	Corrective actions
<b>Ammonia and Total N</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> <li>Increase to every <b>3 days</b> if the trigger for Ammonia and Total N is exceeded.</li> </ul>	<ul style="list-style-type: none"> <li>Ammonia or Total N in the receiving environment is higher the ARMCANZ freshwater trigger value<sup>[7]</sup> and;</li> <li>Ammonia or Total N <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>; and</li> <li>This occurs for more than <b>2 consecutive days</b> while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the <b>trigger value</b> being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of elevated Ammonia and Total N.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>
<b>Dissolved Organic Carbon</b>	<ul style="list-style-type: none"> <li>Every <b>7 days</b> when the trigger for DO in the receiving environment is exceeded while water is being released from the floodplain regulator.</li> </ul>	<ul style="list-style-type: none"> <li>DOC <u>Downstream in the Murray River</u> is <b>20% higher</b> than <u>Upstream in the Murray River</u>;</li> <li>The downstream DO trigger has been exceeded and;</li> <li>This occurs while water is being released from the floodplain regulator.</li> </ul>		<p>Within <b>3 days</b> of notification of the trigger being exceeded:</p> <ul style="list-style-type: none"> <li>Consider stopping the discharge<sup>1</sup> or;</li> <li>Changing the discharge<sup>1</sup> to a rate that reduces downstream effect.</li> <li>Investigate origins of high DOC.</li> </ul> <p>Within <b>8 weeks</b> of notification of trigger being exceeded identify options to mitigate impacts.</p>

NOTES:

<sup>1</sup> 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.

## References

- [1] VMFRP (2025). *Restoration projects*. Available at: <https://www.vmfrp.com.au/projects/> (Accessed: 11 September 2025).
- [2] R8 Joint Venture (2022). *Specialist Assessment C Surface Water. 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.
- [3] Water Technology (2024). *Updated HyWaq Strategy for the VMFRP Project Areas*. Report prepared for Mallee CMA. Water Technology, Melbourne.
- [4] Cornell, G. Stoios, R., and Lyon, J. (2024). *Water quality traffic lights for native fish*. Unpublished Client Report for the Department of Energy, Environment and Climate Action. Arthur Rylah Institute for Environmental Research, Heidelberg, Victoria.
- [5] LaTrobe Uni (2022). *River Murray Water Quality Monitoring Program (RMWQMP) Data Trends Analysis 2021*. Report prepared for Murray-Darling Basin Authority.
- [6] VMFRP (2023). *Attachment II – Environmental Risk Report. Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.
- [7] ANZECC & ARMCANZ 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
- [8] VMFRP (2023). *Environment Report: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects*. Victorian Murray Floodplain Restoration Project, Mildura.

# Appendix A: Risk Register

Relevant risk relating to surface water quality during operation has been extracted from the Environment Effects Statement: Vinifera, Nyah and Burra Creek Floodplain Restoration Projects - Attachment II – Environmental risk report – Vinifera project risk register<sup>[6]</sup>

Aspect	Impact Pathway	Activity	Initial Risk			Environmental Delivery Standards	EDS	Residual Risk			Rationale	State of knowledge	Reasonably practicable
			Likelihood	Consequence	Inherent Risk Rating			Likelihood	Consequence	Residual Risk Rating			
Surface water – Quality	Potential changes to water quality (e.g. water salinity) leading to adverse impacts on environmental values including waterway health and listed Wetlands (if applicable)	Operation	Possible	Minor	Medium	<p><b>Surface water management – Operation</b></p> <p>In accordance with the Water Act 1989, operate the project within the Victorian annual environmental water management cycle and, at the local level, be guided by site specific Operating Plans developed to outline the operational arrangements including identification of overarching operating risks and mitigation measures associated with the delivery of environmental water.</p> <p>The Catchment Management Authority is to develop the Operating Plan in consultation with relevant stakeholders prior to the first watering event. Operation of the project to consider and seek to avoid, minimise and manage where practicable:</p> <ul style="list-style-type: none"> <li>• Adverse anoxic (blackwater) events.</li> <li>• Excessive algal growth.</li> <li>• Increased Carp population.</li> <li>• Native fish stranded on the floodplain during drawdown events.</li> <li>• Excessive erosion during filling and drawdown.</li> </ul> <p>This will include consideration of the following measures as appropriate:</p> <ul style="list-style-type: none"> <li>• Factor seasonal implications in the timing of filling and drawdown.</li> <li>• Maintain throughflow during managed inundation if appropriate and possible to mitigate anoxic conditions.</li> <li>• 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).</li> <li>• Provide throughflow to replicate first flush or consider staged inundation.</li> <li>• Manage drawdown rates to maintain mixing and dilution in the Murray River, especially during times of low Murray River flow.</li> <li>• Develop and test the success of a native fish exit strategy to allow native fish to migrate from the floodplain</li> <li>• Develop and test the success of a strategy to retain carp on the floodplain for the Nyah, Vinifera and Burra projects</li> <li>• Manage drawdown rates to minimise increase in velocity and shear stress downstream of regulators.</li> </ul> <p><b>Surface water – Monitoring</b></p> <p>Monitor the volume, duration, frequency and surface water quality of managed environmental watering events in accordance with the Operation Environmental Management Plan to inform adaptive management (e.g. through the Environmental Water Management Plan and Seasonal Watering Proposals)</p>	SW2, SW3, GS1, GS3, GW2	Unlikely	Minor	Low	The likelihood has been reduced because the Operating Plan sets out a framework for the monitoring of inundation events and the EWMP improves the management of surface water flow through monitoring and adaptive management.	<ul style="list-style-type: none"> <li>• Draft Surface water assessment</li> </ul>	In the context of the state of knowledge for the Vinifera project, the risk of harm to human health and the environment was assessed, controls to eliminate or otherwise reduce those risks were then identified, and the preferred controls determined based on what is reasonably practicable to be undertaken as part of the Vinifera project. The preferred controls are documented in the Initial Environmental Delivery Standard.