VICTORIAN MURRAY FLOODPLAIN RESTORATION PROJECT

HEALTHY LANDSCAPES, STRONG COMMUNITIES

Operating Plan

Vinifera Environmental Works and Measures Program

March 2020

LOWER MURRAY WATER

mallee catchment management authority

Australian Government

Parks VICTORIA

Healthy Parks Healthy People®

Publication details

Vinifera Environmental Works and Measures Program Operating Plan, March 2020

Report Number:
Project Number:
Contract Number:

March 2020

Author: Tickle, I and Ram, R., Report prepared for Victorian Murray Floodplain Restoration Project by Mallee CMA

Acknowledgements

[Acknowledgements here.]

Cover images

Left: [Caption.] Photo:
Middle: [Caption.] Photo:
Right: [Caption.] Photo:

Mallee Catchment

Management Authority

www.malleecma.vic.gov.au
PO Box 5017 Mildura 3502
Telephone 03 5051 4377
Facsimile 03 5051 4379

Copyright

Disclaimer

Version	Prepared	Author	Reviewed
1	19.02.2019	Isabel Tickle	MCMA
2	13.03.2020	Rinesh Ram	MCMA
3	27.03.2020	Rinesh Ram	MCMA
Final Draft			
Final			

Contents

Figures

Tables

List of abbreviations	
Abbreviation	**Full description**
AHD	Above Height Datum
ARI	Arthur Rylah institute
AWOC	After SDL works operation commencement
BSMS	Basin Salinity Management Strategy
BWS	Basin-wide Environmental Watering Strategy
CAMBA	China-Australia Migratory Bird Agreement
CEWH	Commonwealth Environmental Water Holder
CMA	Catchment Management Authority
DELWP	Department of Environment, Land, Water and Planning
DEPI	Department of Environment and Primary industry
DTF	Department of Treasury and Finance
EMF	Environmental Management Framework
EPBC	Environmental Protection and Biodiversity Conservation
EWMP	Environmental Water Management Plans
FFG	Flora and Fauna guarantee
GHD	Guttridge Haskins & Davey
GL	Gigalitre
GMW	Goulburn Murray Water
JAMBA	Japan-Australian Migratory Bird Agreement
LMW	Lower Murray Water
LTWP	Long-Term Watering Plans
MCMA	Mallee Catchment Management Authority
MDBA	Murray Darling Basin Authority
MDFRC	Murray-Darling Freshwater Research Centre
MER	Monitoring, evaluation and reporting
ML	Megalitre
PEA	Priority Environmental Assets
PEF	Priority Ecosystem Functions
PWOC	Prior to SDL works operation commencement
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SCBWEC	Southern Connected Basin Environmental Watering Committee
SDL	Sustainable Diversion Limit
SKM	Sinclair Knight Merz [consultant]
SWP	Seasonal Watering Proposal
TLM	The Living Murray
VEAC	Victorian Environmental Assessment Council
VEWH	Victorian Environmental Water Holder
VMFRP	The Victorian Murray Floodplain Restoration project
WRP	Water Resource Plan

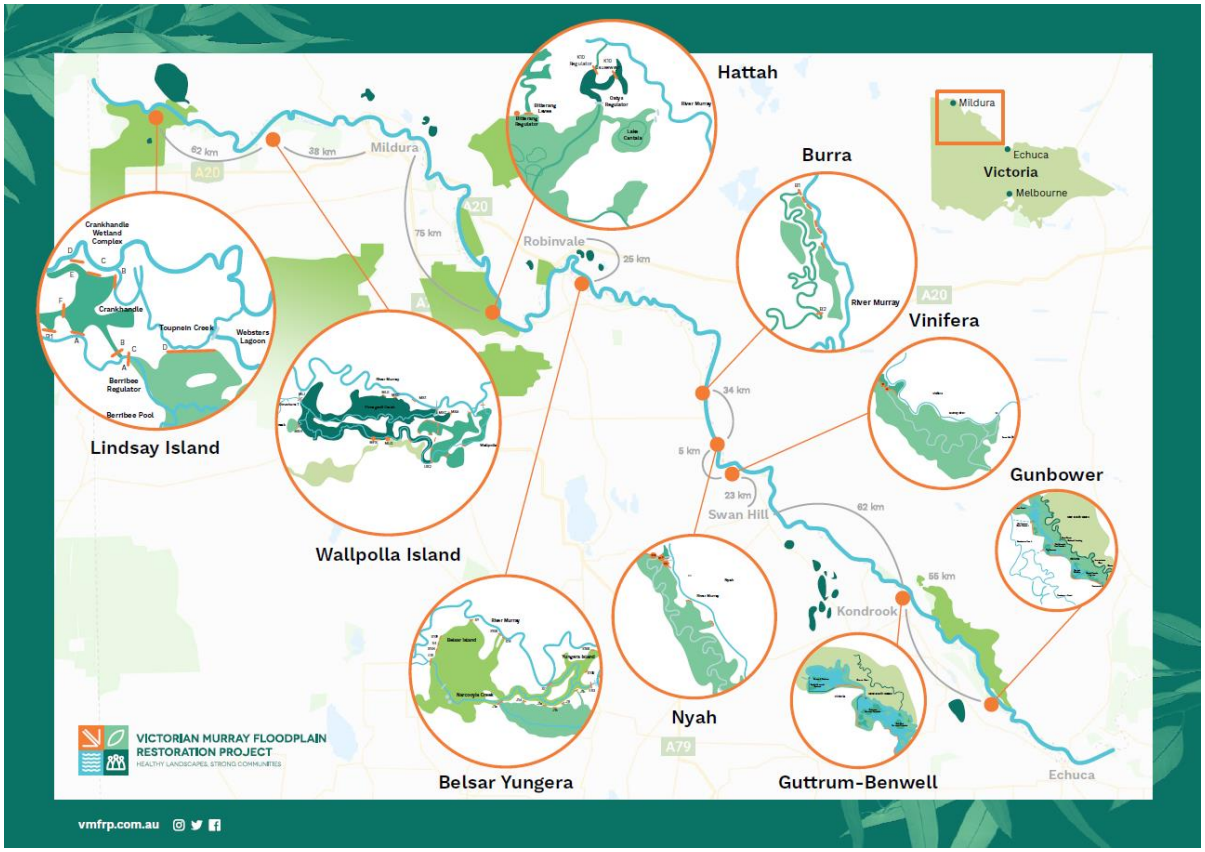
1 Introduction

The Victorian Murray Floodplain Restoration Project (VMFRP) is being implemented as part of Victoria's obligations under the Murray Darling Basin Plan in partnership with Lower Murray Water, Goulburn Murray Water, Mallee CMA, North Central CMA, Parks Victoria and the Department of Environment, Land Water and Planning (DELWP). The VMFRP Project is funded by the Australian Government's Department of Agriculture.

The project consists of nine discrete environmental works projects that aim to return an enhanced natural inundation regime across more than 14,000 ha of high ecological value Murray River floodplain in Victoria through the construction of new infrastructure and in coordination with existing infrastructure operating regimes (refer to Figure 1).

The proposed works will allow environmental water to be diverted from the Murray River to high value wetlands and floodplains. This will mimic the impact of natural flood events and improve the condition of vegetation communities and provide habitat for native fish, birds, frogs and reptiles.

Figure 1. VMFRP Project Locations



The Vinifera project is located 20 km north west of Swan Hill, in the Nyah Vinifera Regional Park on the western banks of the River Murray between Nyah and Swan Hill.

Vinifera park has been selected as one of the VMFRP projects to restore the River Red Gum forest and woodland area and wetlands. The condition of the area has been in decline due to the reduced flood frequency and durations.

The Vinifera project will increase the frequency and duration of inundation provide to up to 353.5 ha of floodplain. Under a restored water regime, the wetland and flooded forest areas would provide dependable refuge and breeding habitat for aquatic fauna and waterbirds.

Environmental watering goals, ecological objectives and watering regimes are detailed in the Nyah Environmental Water Management Plan Addendum (VMFRP Project Team, 2020).

This Operating Plan provides the framework for the operation of the VMFRP infrastructure at Vinifera to meet these goals and objectives.

2 Purpose of the Operating Plan

This Operating Plan provides the framework for the operation of the Vinifera water management structures to meet key ecological objectives within the broader context of VMFRP legislative requirements and governance. The purpose of this operating plan is to:

- Summarise the governance arrangements for managed inundation activities at the site;
- Summarise the roles and responsibilities of partner agencies;
- Aid in decision making and planning prior to, during, and after watering events;
- Summarise operational risks and mitigation strategies;
- Outline water measurement arrangements;
- Outline communication and consultation requirements; and
- Provide links to documents containing further detail.

The Operating Plan also defines the obligation of the various parties to manage and operate the structures as required under the Murray-Darling Basin Agreement (S 52 – 54; *Water Act* (Commonwealth of Australia, 2007)).

The Operating Plan is not intended to prescribe particular watering events. The audience for the Operating Plan is summarised in Table 1.

This document is a 'living document' that will be further refined and updated over time by the Mallee CMA and relevant project partners if legislation changes, operations in the major river systems etc require it.

It is expected that knowledge and information in relation to adjusting and optimising structure operations will improve with each event. As asset owners, Lower Murray Water/Goulburn Murray Water will adopt their own Operating Plan on completion of construction.

Table 1: Intended Audience for the Operating Plan

Audience	Key Requirements	Primary Interest		
		Ecological	Operation	Risk
Event Managers (Lower Murray Water, Goulburn Murray Water, Mallee CMA, RM Operations)	Adaptive management	✓	✓	✓
Land Manager (Parks Vic)	Adaptive management	✓	✓	✓
Other Environmental Managers (DELWP)	Adaptive management	✓		✓
Operators (Lower Murray Water, Goulburn Murray Water)	Operation of structures Accounting		✓	✓
Water holder/funder (TLM-MDBA, CEWH, VEWH)	Accountability	✓	✓	✓
MDBA (BSMS)	Meet legal requirements			✓
Asset Manager (Lower Murray Water/Goulburn Murray Water)	Meet legal requirements		✓	✓

Additional Documents

This addendum is one of six supporting documents to the Nyah and Vinifera Environmental Water Management Plan (EWMP) (MCMA, 2015). Each schedule focuses on a specific area of operations for Vinifera Park (Table 2).

Table 2: Additional documents supporting water management at the Vinifera Project Area

Document	Purpose
Nyah & Vinifera Environmental Water Management Plan (MCMA, 2015)	Environmental Watering Management Plan.
Vinifera Environmental Water Management Plan Addendum (VMFRP Project Team, 2020)	Update to the Vinifera Environmental Water Management Plan to include information relevant to the VMFRP project
Hydrodynamic Modelling Report (Jacobs, 2016)	Report on Hydrodynamic Modelling of the Vinifera project.
Vinifera Detailed Design Report (R8, 2020 (R8, In prep)	Report on Detailed Design for Vinifera including Detailed Design Drawings.
Groundwater salinity monitoring bore specification for SDL project (Jacobs, 2019)	Report on groundwater salinity monitoring of the proposed inundated areas
Monitoring and Evaluation Reporting Plan (Arthur Rylah Institute, 2020)	Framework for reporting on monitoring and evaluations, in preparation by ARI. Anticipated completion by February 2020

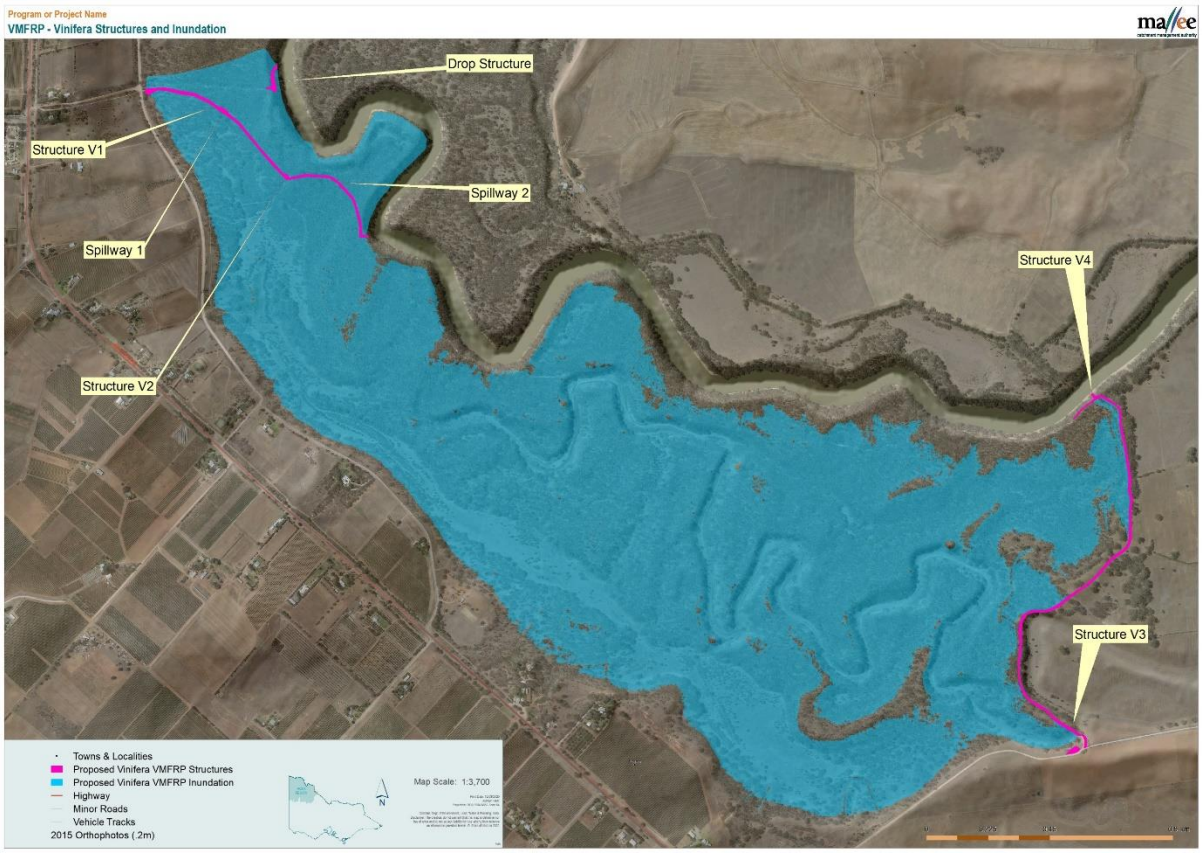
3 Proposed VMFRP Structures and Inundation Extent

Vinifera Park is situated 243 km upstream of Lock 15 (MDBA, 2017) and is outside the influence of its weir pool. In addition to the River Murray, the flows at Vinifera are also influenced by the Goulburn River and all upstream River Murray tributaries (MCMA, 2014).

The infrastructure works to be delivered for the Vinifera project include:

- Two main regulating structures (V1 and V2), as well as a long section of track raising at the downstream end of the floodplain.
- A pipe culvert regulating structure (V3) that will pass local drainage flows, overland flows and prevent backflow onto private land during a managed water event.
- A pipe culvert regulator (V4) to allow inflow from the River Murray and prevent backflow into the river
- A series of minor works including raised tracks and overflow sills to secure low points and contain water within the floodplain.

Figure 2: VMFRP structures and inundation extent



The project will provide inundation of up to 353.5 ha of inundation dependent habitat with a water level of 64.4 m AHD (Figure 2), requiring a volume of 2743 ML. The project works will rely on natural high River Murray flow events and temporary pumps to deliver water to the Vinifera area (Ecological Associates, 2015, p. 50).

Table 4 describes the infrastructure that will be used. Section 7 details the infrastructure that will be used in different operating scenarios.

4 Governance

4.1 Governance Arrangement for Operating the VMFRP Structures

Structures will be owned and operated under an agreement between Lower Murray Water and Goulburn Murray Water. The Mallee CMA and environmental water holders will plan and select the areas of inundation as per their published Seasonal Watering Proposals.

Arrangements will be put in place to ensure appropriate senior oversight of project operations to allow for the successful operation of the works. These arrangements will be predominantly based around those that were used to deliver the four Living Murray Environmental Works and Measures Program (EWMP) projects within Victoria, complemented by existing state government frameworks, which together will underpin a set of robust and thorough processes for project management.

The project management structure and team will be overseen by the project owner. In line with the governance arrangements that have underpinned the Business Case preparation for this proposed supply measure, the project owner will be supported by a Project Control Board (PCB), comprised of senior executives representing the project owner, the relevant Victorian CMAs, the relevant constructing authorities (e.g. GMW; LMW), Parks Victoria and the Commonwealth.

4.2 Vinifera Operations Group

An Operations Group will be established to assist and advise on the commissioning and operation of the Vinifera works. This Group will provide a forum to involve project partners in the decision-making process, to consider broader system operations (e.g. of the River Murray and other environmental watering events) during planning and operations, and to inform stakeholders of operations and progress.

For the Vinifera site, the Operations Group membership will consist of partners and stakeholders, including the Murray Darling Basin Authority, Department of Environment, Land, Water and Planning, the Victorian Department of Environment and Primary Industries, Goulburn Murray Water, Lower Murray Water, Parks Victoria, the Commonwealth Environmental Water Holder and the Victorian Environmental Water Holder. Other agencies and organisations may be invited to participate as guests or observers.

The key responsibilities of the Operations Group will be to ensure the necessary planning, monitoring, communication and reporting arrangements are established prior to and during events and to identify and monitor any event risks or issues. This allows for safe and effective operation of the works, real time response and adaptive management when necessary. (Table 3).

Table 3: Organisational Roles and Responsibilities supporting Nyah Environmental watering

Organisation	Main Roles	Tasks/Responsibilities		
		Event Planning	**Event Management**	**Event Reporting**
Planning & monitoring- Mallee CMA	Communications Monitoring	▪ Ensure planning process is to annual schedule ▪ Review and Revise Operating Plan and Risk Management Plan with other NOG input ▪ Prepare Annual Watering Plan with Vinifera Operations Group (VOG) input	▪ Coordinate event monitoring (ecology/environment/water use) ▪ Coordinate Community Communications and Consultation	▪ Prepare Annual Watering Report with other stakeholder input ▪ Compile/Collate Monitoring Results ▪ Update event record and incorporate lessons learnt into operating plan
Site Manager - LMW	Event Coordination Communications Monitoring	▪ Convene VOG	▪ Convene VOG and coordinate weekly (or as required) meetings/teleconferences. ▪ Coordinate Community Communications and Consultation ▪ Coordinate event monitoring (water use)	
MDBA - River Operations Modellers	Instruct Operations Water Delivery Modelling	▪ Provide advice on basin wide river operations and any implications for Vinifera ▪ Provide advice to assist in planning	▪ ▪ Provide advice on basin wide river operations and any implications ▪ Re-calibrate the water use model during the event	▪ Assist LMW/GMW with water measuring ▪ Provide advice on any water delivery implications encountered and future considerations ▪ Model calibration confidence
LMW/GMW	Structure Operation & Maintenance, Water Accounting	▪ Provide advice on structural or maintenance issues and any implications ▪ Conduct maintenance ▪ Provide advice on water accounting planning and preparedness and any implications for an event	▪ Operate Structures to meet requests ▪ Provide advice on structural or maintenance issues and any implications ▪ Data collection and provision of data to MDBA during events including flow, level and water quality monitoring ▪ Watering accounting – calculate weekly diversion volumes	▪ Provide details on performance of structures and any issues or future considerations ▪ Provide details of issues associated with operational costs ▪ Watering accounting against Victorian entitlements – provide the VEWH with volumes used and inform VOG ▪ Report on water use.
Parks Victoria	Land Manager	▪ Provide advice on expected ecological response to proposed watering ▪ Advise the group regarding site ecological values or threats and any	▪ Manage public access during and after event ▪ Advise of any threats to site ecological values	▪ Provide details of site ecological responses and any future implications

		implications ▪ Approve watering on public land		
VEWH	Water Availability (If VEWH water used) Approvals	▪ Approve Victorian state wide watering priorities ▪ Approve Annual Watering Plan – Victorian priorities ▪ Co-ordinates water use with other environmental water holders, including advising on water availability for the site from all environmental water holders.	▪ Authorises all watering activities through Seasonal Watering Statements ▪ Provides indication on water availability for watering activities ▪ Seek further water if required ▪ Water accounting verification of volumes, use and coordinate return flows	▪ Assist with report compilation and review ▪ Review volumes of environmental water used
MDBA Environmental Water Coordination	Water Availability (If TLM water used)	▪ Advise on TLM watering objectives ▪ Advise on TLM water availability ▪ Coordinating activities across TLM Icon Sites	OBSERVER ROLE ONLY if contributing environmental water	▪ Assist with report compilation and review
CEWH	Water Availability (If Commonwealth water used)	▪ Advise on Commonwealth watering objectives ▪ Advise on Commonwealth water availability ▪ Coordinating other CEWH activities	OBSERVER ROLE ONLY if participating	Assist with report compilation and review
DEWLP	Environmental Water Policy	▪ Provide advice on state wide environmental water policy ▪ Ensure integration of activities with the Basin Plan and related state initiatives	OBSERVER ROLE ONLY	OBSERVER ROLE ONLY
Scientific consultants	Event Monitoring	▪ Provide advice on achieving ecological objectives	Undertake monitoring activities as directed by the Mallee CMA or other contracting agency	Report monitoring results
Scientific Advisors	Specialist Advice	Assist setting ecological objectives	Provide specialist advice when required	NO ROLE EXPECTED
SCBEWC	Allocation of TLM	- Decision making on the use of TLM	NO ROLE –unless site or in river conditions	Reporting included in annual SCBEWC

(includes TLM partner governments)	water (if TLM water used) Coordination of the delivery environmental water in the Southern Connected Murray-Darling Basin	portfolio, River Murray unregulated flows and River Murray increased flows - Input into the development of large-scale multi-site environmental watering events	lead to substantial change from planned event	report to the Basin Officials Committee and reporting on annual TLM watering activities

4.3 Stakeholder Roles and Responsibilities

Mallee Catchment Management Authority (CMA) – Site Manager

Catchment Management Authorities are the caretakers of river health and responsible for the management of environmental water in Victoria, as specified in the Water Act 1989. The Mallee CMA works closely with its partner agencies, Lower Murray Water, Goulburn-Murray Water, Parks Victoria and DELWP and is supported by a number of site-specific committees.

Lower Murray Water (LMW) – Site Manager

The site manager for the Vinifera project is the Chief Executive Officer of the LMW, working closely with its partner agencies, Mallee CMA, Goulburn-Murray Water, Parks Victoria and DELWP and is supported by a number of site-specific committees.

Murray-Darling Basin Authority – River Management (Operations, Modelling and Data Management)

MDBA River Operations attends and contributes to the Vinifera Operations Group meetings.

Operational data is collected at structures throughout watering events. The data is stored on the MDBA data system and is available for all to use upon request. Modellers provide advice to Mallee CMA during events – from the water bid proposal to the end of the event. The modellers also re-calibrate the model as the event takes place.

Lower-Murray Water (LMW) – Asset operations and maintenance

Lower-Murray Water (LMW) is responsible for day to day river operations.

LMW is also responsible for the operation and maintenance of all water delivery structures within Vinifera, as well as the weir operations that support environmental watering

LMW is also responsible for collecting data during the event and providing it to MDBA River Management to assist with real-time management and modelling.

Goulburn-Murray Water (GMW) – Water accounting

GMW is the delegated Resource Manager for the Victorian River Murray system under the Water Act 1989 (Victoria) and coordinates the accounting of resources associated with operations in this reach. In this role, GMW liaises closely with the River Murray Operations team of the MDBA to ensure bulk and retail water accounts are correctly credited and debited.

Parks Victoria – Public Land Manager

Parks Victoria is the public land manager responsible for management of the Vinifera Park. Under the Parks Victoria Act 1998, Parks Victoria is responsible for providing services to the

state and its agencies for the management of parks, reserves and other public land and is responsible for all areas reserved under the National Parks Act 1975.

Victorian Environmental Water Holder (VEWH)

The VEWH is responsible for holding and managing Victoria's environmental water entitlements and allocations and coordinating the delivery of Victorian environmental water allocations with other environmental entitlement holders to maximise benefits to the environment.

The VEWH works closely with catchment management authorities and Melbourne Water to ensure that environmental water entitlements are used to maximise ecological outcomes for the water available. In terms of Vinifera, the VEWH will consider environmental watering proposals along with all others in the state to determine environmental watering priorities from a state perspective.

If Vinifera is determined to be an environmental priority for the year and water is made available to the site, the VEWH then authorises the use of water by the Mallee CMA through a Seasonal Watering Statement.

Murray-Darling Basin Authority – Environmental Water Coordination

The MDBA – Environmental Water Coordination team coordinates the planning and delivery of TLM environmental water to TLM Icon Sites. This undertaken as part of Southern Connected Basin Environmental Watering Committee (SCBEWC) environmental delivery coordination. SCBEWC is chaired by the MDBA and includes representative from the TLM government partners and the Commonwealth Environmental Water Office.

Commonwealth Environmental Water Office (CEWH)

As a component of Murray-Darling Basin reforms, the Australian Government has acquired a number of water entitlements with the objective to return more water to the environment. These entitlements have become a part of the Commonwealth environmental water holdings and are managed by CEWO. The volume of environmental water held by CEWO is significant and may constitute an important source of environmental water for the Vinifera Floodplains.

Victorian Department of Environment, Land, Water and Planning (DELWP)

In Victoria, the overall Environmental program is delivered by DELWP, which provides high level policy input and coordinates the delivery across all Victorian Sites. One of the key roles for DELWP is to provide statutory and strategic guidance to the planning of Victoria. DELWP is also the site owner for most Crown land in Victoria and may delegate the management of Crown land to others on its behalf, as is the case with Parks Victoria.

Southern Connected Basin Environmental Watering Committee (SCBWEC)

The Southern Connected Basin Environmental Watering Committee (SCBEWEC) coordinates the delivery of environmental water to maximise environmental outcomes in the Southern Connected Murray-Darling Basin. Members include Basin state and Australian Government

environmental water holders, water managers and key river operators. In addition to the coordination function, SCBEWC also makes decisions on the use of jointly held environmental water portfolios -The Living Murray portfolio, River Murray Unregulated Flows and River Murray Increased Flows. The MDBA chairs the Committee and provides secretariat support for SCBEWC activities.

4.4 Sourcing Water for Managed Inundation Events

Environmental watering at the site will be undertaken in accordance with the VEWH's annual seasonal watering plan and in partnership between Lower Murray Water, Goulburn Murray Water, the Mallee CMA and Parks Victoria.

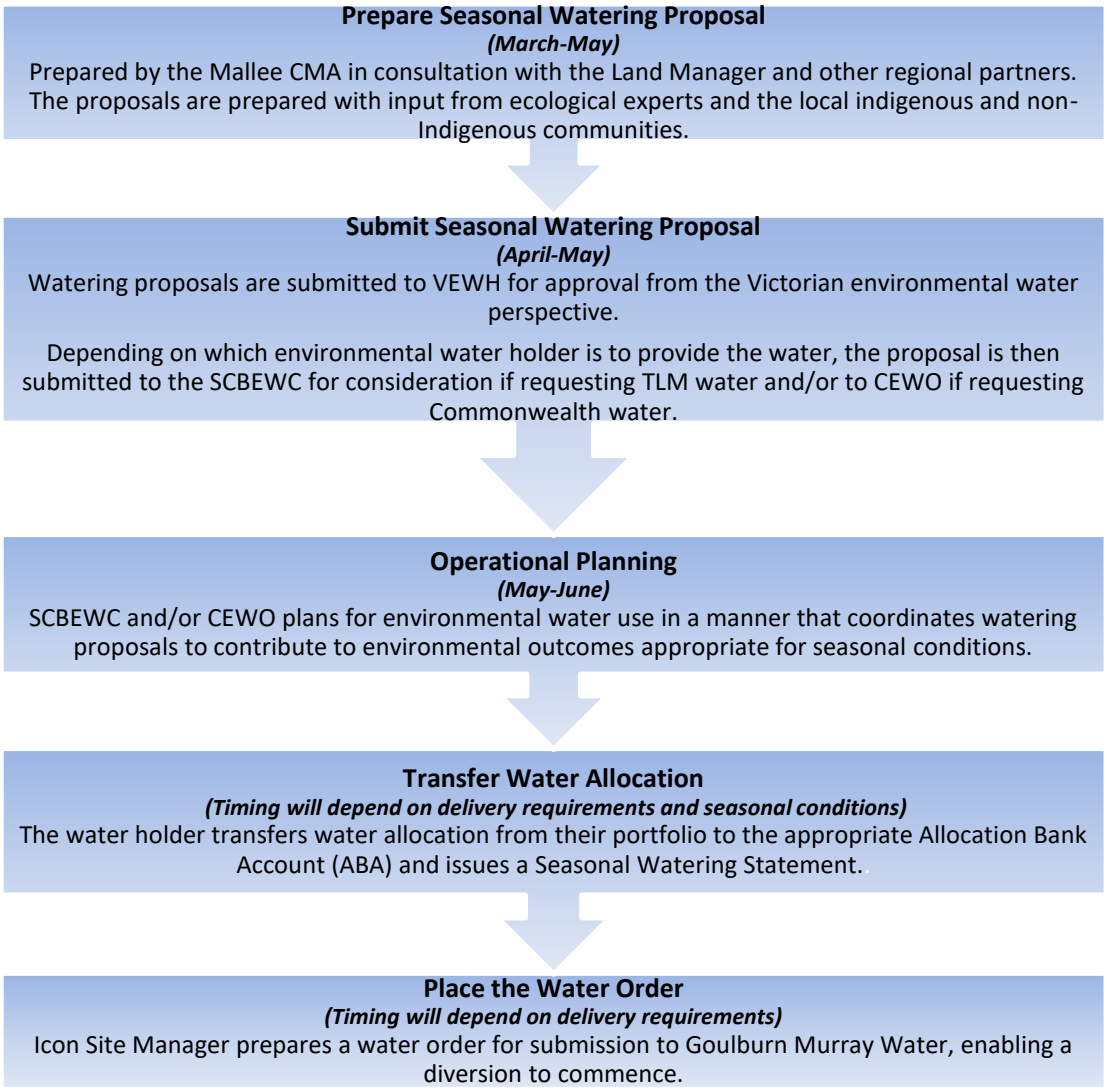
Before a watering action can commence, a Seasonal Watering Proposal must be prepared by The Mallee CMA and approved by the VEWH (Figure 3).

Submissions for environmental water allocations are presented by the VEWH to the relevant water holders who subsequently prioritise the watering proposals against all other watering proposals.

Once a watering action is approved, the VEWH ensures sufficient water is in the appropriate allocation bank account (ABA). This may require a transfer of water from one ABA to another. The VEWH will then issue a Seasonal Watering Statement to the Mallee CMA allowing access to an allocation of water in the ABA.

Once the Seasonal Watering Statement is approved, a water order can be placed by MCMA with GMW, enabling a diversion to commence.

Figure 3: Sourcing Environmental Water for a watering event at Vinifera



The VMFRP works will leverage natural high River Murray flow events to deliver water to the Vinifera areas.

5 Site Characteristics Guiding Managed Inundation

Vinifera Park is one of the most downstream areas of the central river red gum forests, lying near the western limit of the Murray Fans bioregion. The park also contains broad wetland depressions that retain water following flood recession.

Under a restored water regime, aquatic fauna and waterbirds would be provided with reliable refuge and breeding habitat.

5.1 Waterflow

The Vinifera floodplain forms an elongate basin that runs parallel to the River Murray. It is located between a natural levee formed by the high bank along the river in the north and the terrestrial landscape to the south.

The natural hydrology of the river at Vinifera Park is characterised by frequent and sustained floodplain inundation events. Events between 10,000 ML/d and 25,000 ML/d, which inundate wetland and forest areas, occurred with a frequency of more than 10 events every 10 years. The duration of these events was substantial. Events exceeding 15,000 ML/d, which would introduce water to red gum forest, had a median duration of more than 5 months. Events that would completely flood the forest and reach the edge of the woodland (25,000 ML/d) had a median duration of 2 months. Under this flow regime floodplain wetlands would have frequently remained flooded throughout the year (Ecological Associates, 2014).

Low-lying meandering watercourses and wetlands in the floodplain are referred to collectively as Vinifera Creek. River flows of 12,500 ML/d introduce water to the creek system from a connection in the east of Vinifera Park. At higher flows minor effluents along the river bank also introduce water to the creek. (Ecological Associates, 2015).

Under current conditions, the frequency of flow peaks between 10,000 ML/d and 17,500 ML/d has declined somewhat but the median duration of these events has occurred even more. Flows of 10,000 to 15,000 ML/d, which would have occurred 100 times every 100 years under natural conditions, last 3 months rather than the 6-month median duration under natural conditions. At higher flows, the current frequency is lower than natural while the duration of events remains relatively unimpacted. The frequency of events that reach the upper extent of river red gum forest communities (25,000 ML/d) has almost halved from 72 events per 100 years to 37. However, the median duration of these events has only declined from 87 days to 70 (Ecological Associates, 2015).

Very high flows of 30,000 ML/d rarely occur in this reach and remain relatively unimpacted by regulation.

6 Operating Thresholds

This section provides guidance on the operational thresholds that inform the Vinifera Operations Group during planning and adaptive management of events.

6.1 Natural Inundation Events (Jacobs, 2018)

Natural flows into Vinifera occur at multiple locations:

- River flows of 12,500 ML/d introduce water to Vinifera Creek
- At higher flows minor effluents along the river bank also introduce water to the Vinifera Creek.
- Under natural conditions Vinifera Creek would have received inflows from its upstream effluent near this flow threshold and the channel would act as an anabranch. However, modification to the floodplain upstream of the park have blocked the channel and the creek now functions as a separate wetland.
- A minor effluent, just downstream of the constructed levee may promote through-flow in a narrow flow band, just before overbank flows commence (Ecological Associates, 2015).

The arrangement of structures, banks and overflow sills is designed to minimise the potential for erosion over the whole range of flow conditions. This requires a tiered approach to hydraulic design for through flow, as follows:

- Pass low and medium flows through regulators until a tailwater develops on the floodplain.
- Pass higher flows through purpose designed overflow sills, with rock protection, located on natural flow paths.
- Overtop the earthen bank only after the tailwater is fully developed and the bank/track is near submerged by the tailwater.

Outflows from Vinifera Creek to the River Murray occurs via the downstream (north western) end.

6.2 Managed events – Flood capture (Jacobs, 2018)

Two distinct phases of managed flood capture event have been conceived:

- The initial phase in which gates would be open. The point at which the gates are closed would depend on the predominant direction of inflow and would vary depending on the specifics of the event. The design flows for through flow for this phase are similar to natural events.
- Capture phase in which the gates are operated to retain water in the forest at maximum design water level of 64.4 m AHD.

The volume of the floodplain at elevation level 64.4 is 2743 ML.

Managed events will also utilise minor works in the form of sills or block banks required at drainages along the river bank to prevent the escape of water. In total the works will inundate up to 353.5 ha of floodplain.

6.3 Managed Event – Managed Drawdown (Jacobs, 2018)

The infrastructure will have the capability to control the drawdown following a managed event. The drawdown criteria are as follows:

- Empty the wetland in a period of 7 to 10 days (maximum 20 days) for the purposes of drying the tracks and reopening the parks to the public;
- Managed drawdown to be coincident with a low water level in the River Murray approximately three months after the managed release;
- Limiting the frequency of operator visits during the drawdown period. This would be no more than once per day, and preferably less frequent depending on the duration of the drawdown period;
- Minimise the potential for erosion at the regulator and the confluence of the River Murray;
- Provide downstream fish passage for fish to exit the forest; and
- Prevent stranding of fish due to excessive rate of drawdown

6.4 Details of Structures

The proposed works consist of environmental regulators and supporting structures.

The V1, V2, V3, and V4 regulators, in conjunction with Basin Plan flows, will be the primary means of delivering water to Vinifera and achieving the ecological objectives for the site. The proposed works and the existing infrastructure are described in Table 4. Temporary pumping will also be used to deliver water onto the floodplain when required

Table 4– Proposed Vinifera VMFRP structures (Jacobs, 2018). (MCMA, 2014)

Infrastructure	Description	Role (Jacobs, 2018)	Associated Area
Regulator V1	A regulator with ten bays to retain water within Vinifera Creek allowing release of gravity-controlled water to the very north-western tip of the Vinifera floodplain. 10 box culverts, 4 with dual leaf combination gates and 6 with single leaf gates.	Distribute flood flow across the floodplain Secondary control regulator when Regulator V2 is inaccessible (recessions of larger floods) Provide downstream fish passage through fully opened gates; and through overshot gates when regulating	Whole of project
Regulator V2	A regulator with four bays allowing the release of water into the bend directly adjacent to the River Murray in the northern section of the Vinifera floodplain. 10 box culverts with split lead combination gates.	Allow backflow into the forest from the River Murray Regulate flow out of the forest during a management event Contain water in the forest during a managed event Provide fish passage into the forest when the structure is fully open Provide downstream fish passage during a management event	

Regulator V3	New pipe culvert regulator on Vinifera creek to pass both local drainage and overland flows in large events. 1,200 mm diameter concrete pipe with penstock gate.	Prevent flow from the forest onto the private land during managed events Pass local drainage flows into the forest Pass overland flow in large events	
Regulator V4	New pipe culvert to allow inflows from the River Murray and prevent backflow to the River Murray when retaining water on the floodplain during a watering event. 1,200 mm diameter concrete pipe with penstock gate	Pass inflow from the river into the forest Contain water in the forest during a managed event	
Drop Structure	Rock structure to minimise erosion risk associated with the return of the impounded water to the River Murray	To provide fish passage on return flow to the River Murray	
Main track raising/ containment banks and overflow sills	1087 m long raised track, to a height of 1700 mm incorporating 2 x 70 m long overflow sills. 7 overflow sill works, to contain water on the floodplain. The location of overflow sills to align with existing roads where possible, to reduce environmental and cultural heritage impacts	Track raising/ containment banks used to retain water to the desired level in the target areas of Vinifera. Overflow sills will contain water on the floodplain and also provide inflow and outflow for natural flood events.	

Examples of the proposed types of works to be delivered by the Vinifera project are shown in Figure 4 and Figure 5.

Figure 4 – A regulating structure at Mullaroo inlet (Lindsay Island), similar to the proposed regulator V2 and V1

Figure 5 – A containment bank constructed under The Living Murray at the Hattah Lakes, similar to those proposed for Vinifera

7 Operations

The Vinifera works have been designed to provide inundation to areas on the floodplain. The project will enable the replication of key components of the natural hydrology of the system to these areas.

The infrastructure has been designed to be operated in several possible flow regimes consistent with the requirements set out in the business case described by the operating scenarios shown in

Table 6. Transitioning between scenarios is possible and provides a high level of operational flexibility when delivering planned watering events or responding to natural inflows. An Operational Matrix is outlined in Table 7.

The structures will be operated to achieve environmental watering targets under three scenarios;

- Under normal flow conditions (when no environmental watering is occurring) the regulators will be open.
- When a flow peak is anticipated, the regulators will remain open. As river levels fall, the regulators will be closed to store flood water. The level at which water is stored will depend on the ecological objectives of the event. When the hydrological targets of the watering events are met, water will be released through the regulators.
- If peak in river flow are too infrequent to meet managed inundation targets, parts or all of the system may be flooded by temporary pumps installed on the river bank (Ecological Associates, 2015).

7.1 Watering Regimes

The wetland watering regime has been derived from the ecological and hydrological objectives. To allow for adaptive and integrated management, the watering regime is framed using the seasonally adaptive approach. This means that a watering regime is identified for the optimal conditions, as well as the maximum and minimum tolerable watering scenarios. The minimum watering regime is likely to be provided in drought or dry years, the optimum watering regime in average conditions and the maximum watering regime in wet or flood years (MCMA, 2015).

The optimal, minimum and maximum watering regimes are described in Table 5 below.

Table 5: Target water regime in response to climatic condition (MCMA, 2015)

Dry/drought	Median	Wet
Seasonal Wetland	Seasonal Wetland Ref Gum Swamp Forest	Seasonal Wetland Red Gum Swamp Forest Red Gum Forest and Woodland Black Box Woodland

7.2 Operational Scenarios

The Vinifera works have been designed to replicate key components of the natural hydrology of the system. The infrastructure has been designed to be operated in several possible flow regimes consistent with the requirements set out in the Business Case (MCMA, 2014).

Transitioning between scenarios is possible and provides a high level of operational flexibility when delivering planned watering events or responding to natural inflows. Water will be delivered to the Vinifera floodplain area using gravity and occasional temporary pumping when required, as further described in

Table 6. The works will provide for the inundation of up to 353.5 ha of floodplain.

Table 6 – Operating Scenarios (Jacobs, 2016) (Ecological Associates, 2015)

Scenario	Precondition	Structure Operation	Maximum design inundation level (m)	Preferred Frequency	Threshold (depth, level or discharge)	Duration	Preferred Timing	Maximum Interval Between Events	Water Regime Classes Targeted
Capture Low Flood Peak (Scenario 2)	River levels exceed 15,000 ML/d	Close upstream and downstream regulators when the flood peak starts to recede Regulators are opened when flood duration target is met	63.56	9 years in 10	River discharge exceeds 15,000 ML/d	4 to 6 months	June to February	2.5 years	Seasonal Wetlands
Pump to Low Floodplain Areas (Scenario 4)	None	Upstream and downstream regulators are closed. Water is pumped into storage area. Regulators are opened when flood duration target is met.		9 years in 10	River discharge exceeds 15,000 ML/d	4 to 6 months	June to February	2.5 years	Seasonal Wetlands

Capture Moderate Flood Peak (Scenario 2)	River levels exceed 17,500 ML/d	Close upstream and downstream regulators when the flood peak starts to recede. Regulators are opened when flood duration target is met.	64.15	9 years in 10	River discharge exceeds 17,500 ML/d	6 of these events to last more than 4 months. 3 of these events to last more than 7 months.	July to February	5 years	Seasonal Wetlands Red Gum Swamp Forest
Pump to Moderate Floodplain Areas (Scenario 4)	None	Upstream and downstream regulators are closed. Water is pumped into storage area. Regulators are opened when flood duration target is met.		9 years in 10	River discharge exceeds 17,500 ML/d	6 of these events to last more than 4 months. 3 of these events to last more than 7 months	July to February	5 years	Seasonal Wetlands Red Gum Swamp Forest
Capture High Flood Peak (Scenario 3)	River levels exceed 20,000 ML/d (approximately equivalent to 64.2 m AHD)	Close upstream and downstream regulators when the flood peak starts to recede. Regulators are opened when flood duration target is met.	64.92	9 years in 10	River discharge exceeds 20,000 ML/d	5 of these events to be 4 months long 4 of these events to be 6 months long	July to February	5 years	Seasonal Wetlands Red Gum Swamp Forest Red Gum Forest and Woodland
Pump to High Floodplain Areas (Scenario 4)	None	Upstream and downstream regulators are closed. Water is pumped into storage area. Regulators are opened when flood duration target is met		9 years in 10	River discharge exceeds 20,000 ML/d	5 of these events to be 4 months long 4 of these events to be 6 months long	July to February	5 years	Seasonal Wetlands Red Gum Swamp Forest Red Gum Forest and Woodland

Table 7 – Operational Matrix. Transition between VMFRP Operating Scenarios at Vinifera (MCMA, 2014)

Scenario	To Default	To Seasonal Fresh	To Vinifera Intermediate	To Vinifera Maximum	To Natural Flows
From Default	Condition during Scenario All structures open	No change	V1, V2, V4 – set to height required to achieve operation objectives (between open and 64.4 m AHD), with through flow maintained. V3 closed	V1, V2, V4 – set to maximum operating level 64.4 m AHD, with through flow maintained. V3 closed	No change
From Seasonal Fresh	No change	Condition during Scenario All structures open	V1, V2, V4 – set to height required to achieve operation objectives (between open and 64.4 m AHD), with through flow maintained. V3 closed	V1, V2, V4 – set to maximum operating level 64.4 m AHD, with through flow maintained. V3 closed	No change
From Vinifera Intermediate	All structures open	All structures open	Condition during Scenario V1, V2, V4 – set to height required to achieve operation objectives (between open and 64.4 m AHD), with through flow maintained. V3 closed	V1, V2, V4 – set to maximum operating level 64.4 m AHD, with through flow maintained. V3 closed	All structures open
From Vinifera Maximum	All structures open	All structures open	V1, V2, V4 – set to height required to achieve operation objectives (between open and 64.4 m AHD), with through flow maintained. V3 closed	Condition during Scenario V1, V2, V4 – set to maximum operating level 64.4 m AHD, with	All structures open

				through flow maintained. V3 closed	
From Natural Flows	No change	No change	V1, V2, V4 – set to height required to achieve operation objectives (between open and 64.4 m AHD), with through flow maintained. V3 closed	V1, V2, V4 – set to maximum operating level 64.4 m AHD, with through flow maintained. V3 closed	Condition during Scenario All structures open

8 External Considerations for Operations

8.1 Upstream and Downstream Considerations

- Murray River flow of 12,500 ML/d minimum is required to restore flow to Vinifera Park
- Working through SCBEWEC during strategic planning and the MDBA River Murray operation team during operation to facilitate re-use of net flows from upstream and downstream to optimise timing of e-water delivery; time environmental water events at Nyah Park. Water quality of inflows to the Vinifera Park
- Water quality of return flows to the River Murray particularly with regard to water quality targets outlined in the Basin Plan, including targets for salinity, blackwater and cyanobacteria
- Dilution flows required in the advent of the release of water from the lakes impacted by a blackwater event

8.2 Temporary Pumps

Provision for the installation of temporary pumps up to provide up to 40ML/day flow is required.

This is to be achieved by gate slots in the river side headwall to allow bulkheads to be fitted on this side. It would be the responsibility of the pump contractor to design and install a bulkhead consistent with the design of their pumping equipment.

The temporary pump can be installed at the designated pump hardstand area adjacent to the V4 structure.

9 Water Use

9.1 Flow Types

There are four general operating scenarios (plus maintenance):

- Natural inflows/outflows – Scenario 1
- Enhance natural (extend duration) – Scenario 2
- Enhance natural (extend duration and extent) – Scenario 3
- Managed event (pumped event) – Scenario 4
- Maintenance (in years with and without a watering operation to prepare for an event, or post and event)

These Scenarios are described in detail in Section 7 Table 6.

Based on inflow types, the scenarios fit into three groups for water measurement purposes: natural inflows (includes Scenarios 1 and 2), a hybrid event (a combination of natural and pumped flows (Scenarios 3)), or pumped only flows (Scenario 4).

9.2 Water Requirements

The water requirements for managed inundation of the Vinifera Park are detailed in Sections 6, Section 7, and Table 6.

To restore flow to Seasonal Wetland, the river will need to be operated at flows exceeding 15,000 ML/d. Environmental water reserves are potentially available for this purpose and will best meet the requirements of Vinifera Park if they are provided annually over 2 to 4 months, centred on the months of June to February (Ecological Associates, 2015).

9.3 Measuring Water Used in Managed Inundation Events

Water use will be measured through the VMFRP infrastructure.

The key aspect to consider with water delivery for the Vinifera floodplain is that it is a storage system with controlled inflows and outflows at the Vinifera Creek West and East. While significant volumes of water can be stored on the floodplain during pumping and natural large events (due to the lakes in the system), up to 50% of flows entering the Vinifera floodplain could potentially return to the River Murray.

The key conditions for water delivery purposes are:

- commencement of natural inflows require 12,500 ML/d or greater.
- water can be stored in the Vinifera floodplain and may be released to the river.
- not all inflows can be measured i.e. overbank flows.
- being possible to calculate the initial volume held in the lakes by gauge boards/stations and capacity tables. This approach will be consistent with volumes held in large storages (such as Hume Dam, Dartmouth Dam, Lake Victoria and Menindee).
- Water may switch from regulated flow to unregulated flow and vice versa during an event.

9.4 Measuring Water Used in Managed Inundation Events

The measurement types and location for the Vinifera Works are outlined in **Error! Reference source not found.**; Table 7 provides a matrix for the operating scenarios as well as the transitional periods between operating scenarios.

Table 8: Summary of flow measurement types and location at Vinifera

Site	Flow Measurement	Purpose
V1 Regulator	Height and Flow	For use during managed and hybrid events.
V2 Regulator	Height and Flow	For use during managed and hybrid events.
V3 Regulator	Height and Flow	For use during managed and hybrid events.
V4 Regulator	Height and Flow	For use during managed and hybrid events.

10 Operating Risks and Mitigation Measures

10.1 Ecological, Cultural Heritage and Socio-Economic Threats

Ecological Assessments and a Cultural Heritage Management Plan are being undertaken as part of the project.

Shared operational risks associated with environmental watering are managed through an annual process that Mallee CMA participates in. This process includes discussion of risk learnings of from the previous year, risk assessment for the coming year, and improving risk management processes.

In addition to the above measures, a monitoring, evaluation and reporting (MER) framework is being put together for the VMFRP project that includes ecological, cultural and socio-economic outcomes of managed inundation events at the VMFRP sites.

10.2 Impact on Salinity, Water Environments, and Fish Passage

The in-river salinity impacts (at Morgan, South Australia) potentially caused by the proposed actions at Vinifera were assessed relative to a base case scenario by SKM (2014).

The assessment concluded that the magnitude of the salinity impacts of the proposed watering scenarios was negligible or insignificant. The largest component of the salinity impact is associated with the displacement of groundwater due to diffuse recharge following inundation, but the impact is insignificant. This calculation is considered conservative as it assumes uniform salinity and assumes a significant percentage of the recharged water is returned the Murray River (SKM, 2014).

SKM (2014, p. 207). expects that multiple managed inundation events will raise groundwater levels which may increase the salt load impact on the floodplain and river system.

Based on the uncertainty of the inundation events on salinity over time, SKM have recommended a monitoring program. This would comprise of groundwater and surface water monitoring. The MCMA monitors an existing network of bores within the Vinifera vicinity and undertakes a long-term salinity monitoring program to assess the impact of inundation events on groundwater levels and groundwater quality.

To assist in the monitoring of salinity impacts of Vinifera inundation the VMFRP, with assessment and recommendations from SKM (2014) and Jacobs (Jacobs, 2019), has proposed new bores within the proposed project inundation area.

These will be integrated into the existing MCMA monitoring network and monitoring program. Monitoring and ongoing assessment of risks will occur consistent with the Basin Salinity Management Strategy (MDBA, 2015). In addition to the regular groundwater monitoring, Mallee CMA will manage the monitoring of surface water quality within the Park, during operations. These monitoring activities are critical to verify modelled salinity impacts and to provide timely advice for management of any water quality issues arising during operation of the works.

The following mitigation measures are proposed to minimise and avoid impacts on water environments, salinity, and fish passage during operation of the project:

- Continue to undertake water quality monitoring before, during and after watering events to inform adaptive management strategies and real-time operational decision making.
- Commence watering as early as possible to move organic matter off the floodplain while temperatures are low. Maintain a through-flow where possible in other areas to maximise exchange rates and movement of organic material. Monitor dissolved oxygen and water temperature to identify hypoxic areas to inform consequence management.
- Schedule watering events to make use of dilution flows where possible and optimise timing of releases from Vinifera Creek. Ensure dilution of low dissolved oxygen water by managing

outflow rates and river flows: delay outflows if river flows are too low; dispose of hypoxic water by pumping to higher wetlands where possible; agitate water using infrastructure to increase aeration.

- Integrate water management with other sites in seasonal water planning process. Maintain good relationships with other water managers.
- Tailor watering regimes to provide competitive advantage for native fish over carp. Dry wetlands that contain carp. Manage drawdown following managed events to provide triggers for native fish to move off the floodplain, and where possible, strand carp.
- Mitigation measures would be implemented to minimise risks associated with barriers to fish passage, including:
    - Design of regulating structures to satisfy fish passage requirements including those described in the Vinifera Fish Management Plan (Institute, 2018).
    - Continuing to build on knowledge and understanding through current studies relating to fish movement in response to environmental watering and cues to further develop and refine a fish exit strategy.

- Monitor the salinity of ground and surface water salinity before, during and after watering events to inform management and ensure sufficient volumes are available for mitigation such as:
    - Developing a understanding of potential river flow requirements to dilute higher than expected salinity impacts and provision of contingency estimates in environmental water bidding process for initial operation events. Diluting saline water on the floodplain by delivering more fresh water to these areas.
    - Reduce the frequency and/or extent of planned watering events if sufficient volumes not available.

10.3 Risks Associated with Pest Plants and Animals

Mitigation measures would be implemented to minimise risks associated with pest plants and animals, including:

- Timing water manipulations to drown seedlings, minimise growth, germination and seed set. Time water manipulations to promote native species.
- Controlling current populations and eradicate/control new infestations via existing management strategies (e.g. Parks Victoria pest management action plans/strategies). Support partner agencies to seek further funding for targeted weed control programs if necessary.

10.4 Risks Associated with Structures

The owner and operator have responsibility for management of risks to the integrity of the structures themselves. These risks are managed through operation of the structures within their design capabilities, monitoring of structural integrity and through maintenance.

Risk frameworks are being put together for the management and operation of the structures.

11 Operational Costs

The operations and maintenance (O&M) arrangements considers all activities to operate, maintain, monitor and report on the Vinifera works.

The funding arrangements for ongoing management costs have not formally been established at this time. Funding arrangements could involve cost sharing with the Commonwealth, or partially or in whole funding by Victoria. There are multiple funding options currently being considered and will require further deliberation by DELWP, DTF, and the Commonwealth.

The estimated operations and maintenance costs (Table 9) for the project are provided in the Business Case, summarised in Table 9. The precise operating procedures of the project will be detailed in the operations planning to be finalised as part of Stage 2 which includes the scope of works, schedule and cost estimate for the project. Stage 2 addresses the matters listed in the most recent guidance on the content of proposals for Supply and Constraint Measures. The operating costs in Table 9 are provided as an average annual cost and maximum annual cost to reflect the environmental water delivery via temporary pumping and will be updated as part of Stage 2 works for the Vinifera project. Environmental water entitlement storage and works licencing costs are not included in this cost estimate.

Operation and maintenance are based on a 30-year timeframe and excludes asset refurbishment and replacement expenses. Major refurbishment and replacement costs for VMFRP assets would need to be funded by government and be subject to normal funding practices.

Table 9 – Vinifera Operating and maintenance costs, and responsible party (MCMA, 2014)

Item	Average Cost ($/year)	Maximum Cost ($/year)	Responsible party	Notes
Capital maintenance and operating	$159,987	$159,987	Asset owner	Assumes 3% of construction capital value. This figure is adopted based on advice from GMW regarding industry standard for similar works. LMW O&M guidelines range from 2-7% dependent on materials.
Temporary pumping	$11,201	$112,005	Mallee CMA	Temporary pumping costs Assumes one event every 10 years. Maximum cost assumes 2.7 GL pumped into Nyah
Ecological monitoring	$120,000	$120,000	Mallee CMA	Based on TLM monitoring requirements for Mallee CMA
Salinity monitoring	$23,200	$23,200	Mallee CMA	Based on current monitoring and proposed monitoring framework
Compliance monitoring	$20,000	$20,000	Mallee CMA	Based on TLM post construction compliance monitoring

Project management	$37,500	$37,500	Project partners	Based on TLM experience
Total	$371,887	$472,692		

12 Communications

12.1 Community Communication and Engagement Strategy

The Vinifera Site has a Community Communication and Engagement Strategy. A Stakeholder Engagement and Communication Plan was developed to ensure awareness amongst all stakeholders and the wider community of the Vinifera environmental watering operations.

The VMFRP Stakeholder Engagement & Communication Plan is attached as Appendix 1 and will be updated as appropriate as part of the Stage 2 works for the Vinifera project.

The Site Manager, LMW, and the Mallee CMA are committed to establishing and maintaining strong relationships within the local community during watering operations. A vital tool in the consultation process is structured engagement with the community through engagement with key stakeholders and advisory groups.

12.2 Indigenous Engagement

Indigenous stakeholders are consulted to ensure the Indigenous community has an opportunity to provide input into water management and a chance to raise and identify their cultural and spiritual links to Vinifera. These stakeholders are representatives of each of the Aboriginal parties who have a vested interest in the Vinifera area.

Indigenous consultation is managed via the Mallee CMA Indigenous Facilitator and through the Mallee CMA Aboriginal Reference Group. This group provides a valuable single source for Indigenous engagement, advice, input and recommendation.

The reference group has Indigenous representatives who ensure that cultural heritage and values are considered and incorporated by the Site Manager and Mallee CMA. The representatives also distribute information about Site management into the Aboriginal communities.

The development of an Indigenous engagement framework will be developed during Stage 2 works.

12.3 Communication during managed events.

Mallee CMA and Lower Murray Water will coordinate communication activities for upcoming and ongoing watering events via the Vinifera Operations Group. The Mallee CMA prepares a Communications Plan each year that covers environmental watering events for the entire Mallee CMA region, including Vinifera.

The plan is a high-level framework for communication and engagement activities, relating to that years' environmental watering. It addresses all wetlands listed in the Mallee CMA Seasonal Watering Proposals and will incorporate watering proposals for Vinifera Park under the VMFRP.

The plan does not cover government agencies as a stakeholder as the Communication Plan and Engagement occurs at an operational level, predominantly via the Vinifera Operations Group for the Vinifera site.

Parks Victoria will be responsible for communicating with its stakeholders and visitors regarding any impacts on visitor experience such as road closures, access restrictions to areas of the park and water quality issues.

During routine river operations or in the event of a broad, basin scale event such as blackwater, the MDBA, Water Authorities, and CMAs will work together to communicate with local agencies.

12.4 Complaints and Enquiries

Complaints and enquiries relating to the environmental watering process shall be directed to MCMA. Parks Victoria will be responsible for dealing with complaints and enquiries regarding visitor access to the park and water quality concerns within the park.

13 Water Management Operations Record

A record of water management operations is maintained as part of this Operations Plan.

The purpose of the record is to document how well the infrastructure and management arrangements at Vinifera meet environmental watering needs and manage risk. The record documents watering plans, actions and outcomes. An entry is made at the conclusion of each watering event and includes analysis of the strengths and weaknesses of operating arrangements.

The record is used to revise and refine the Vinifera Operations Plan as well as to inform annual watering actions, to ensure that water delivery is as efficient and effective as possible and that risks are managed appropriately.

The Water Management Operations Record comprises the following information:

- Event Water Year
- Watering Objective – This identifies the primary objective(s) of the watering event. Detailed rationales are provided in the Annual Watering Proposal.
- Operational Targets – The key thresholds that were set for operations, such as wetland water levels, watercourse discharge or structure settings (fish screens) and the dates on which they were to be achieved. This can be presented as a target hydrograph or a table. Operational targets will be required for each watercourse and wetland.
- External Factors – External factors that influenced operations are presented. These could include river flows, rain events, risk management or structure malfunction. Their influence on operations is described.
- Operational Outcomes – The actual water levels / flow rates / total water volume used/structure settings achieved and dates. This can be presented as an annotated hydrograph or table. Operational outcomes will be required for each watercourse and wetland.
- Performance – How well were the watering objectives met?
- Risk Management – How well were known risks monitored? How well were they managed?
- Considerations for future operations

14 References

Arthur Rylah Institute, 2020. *Preliminary Draft VMFRP Ecological Monitoring Evaluation & Reporting Plan,* Melbourne: s.n.

Commonwealth of Australia, 2007. *Water Act 2007,* s.l.: s.n.

Ecological Associates, 2014. *SDL Rationale and Outcomes. Ecological Associates report AL040-1D. Report for the Mallee CMA,* s.l.: s.n.

Ecological Associates, 2015. *SDL Floodplain Watering Projects: Operating Plan, Report AL048-1-B,* Adelaide: Ecological Associates.

Institute, A. R., 2018. *SDL Fish Management Plan Vinifera,* Melbourne: s.n.

Jacobs, 2016. *SDL Offset Sites Hydrodynamic Modelling Nyah and Vinifera,* Melbourne: Jacobs.

Jacobs, 2018. *Finalisation of Advanced Concept Design for Nyah - Vinifera - Burra SDL project: Advanced Concept Design Vinifera,* s.l.: s.n.

Jacobs, 2019. *Groundwater salinity monitoring bore specification for SDL projects.* s.l.:s.n.

MCMA, 2014. *Sustainable Diversion Limit Adjustment Phase 2 Assessment Suply Measures Business Case: Vinifera Floodplain Management Project,* Irymple: Mallee Catchment Management Authority.

MCMA, 2014. *Sustainable Diversion Limit Adjustment Phase 2 Assessment Supply Measure Business Case: Nyah Floodplain Managament Project,* Irymple: MCMA.

MCMA, 2015. *Nyah and Vinifera Environmental Water Management Plan.* s.l.:s.n.

MDBA, 2015. *Basin Salinity Management Strategy 2030 (BSM2030),* Canberra: Murray-Darling Basin Ministerial Council.

MDBA, 2017. *Weirs and locks.* [Online]
Available at: https://www.mdba.gov.au/river-information/running-river-murray/weirs-locks
[Accessed 21 February 2020].

R8, In prep. *Vinifera Detailed Design Report,* s.l.: s.n.

SKM, 2014. *Prelimiary Salinity impact Assessment for Mallee Environmental Watering Projects - Wallpolla, Hattah Lakes, Belsar-Yungera, Burray Creek, Nyah and Vinifera,* s.l.: s.n.

VMFRP Project Team, 2020. *Nyah Environmental Watering Management Plan Addendum ,* Mildura: VMFRP.

VMFRP Project Team, 2020. *Nyah Environmental Watering Management Plan Addendum 2019 ,* Mildura: VMFRP.

Appendix 1: VMFRP Stakeholder Engagement & Communication Plan