# Toorale water management infrastructure operating and maintenance plan

June 2022 – June 2024

**Department of Planning and Environment**

NSW GOVERNMENT

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Cover photo: Flooding of the Western Floodplain at Toorale, 2012. Josh Smith.

Published by:

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ISBN 978-1-922975-92-8
EHG 2022/0659
December 2022

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# Executive summary

The Toorale Water Management Infrastructure Operating and Maintenance Plan (OMP) provides a framework for the operation and maintenance of water infrastructure in Toorale National Park and Toorale State Conservation Area (Toorale).

Management of river flows through Toorale aims to balance the needs and values of local environmental assets and the downstream riverine environment, while minimising impacts to other park and water users.

The OMP addresses relevant statutory and planning matters to ensure operation and maintenance of the water management structures complies with all of these instruments.

The OMP considers how the regulating structures could be operated to prioritise certain environmental assets across a range of river flow scenarios and antecedent conditions. It outlines the management of environmental and other risks, the circumstances when either the Darling River or Warrego Floodplain may be prioritised, and provides flowcharts to guide decisions before, during and after flow events. It does not prescribe the management of individual events; their management is expected to be informed by the context and conditions in which the event occurs and in accordance with annual environmental watering plans prepared in consultation with agency and community stakeholders.

This plan adopts an adaptive management approach to give flexibility for a range of river flow scenarios and to be responsive to flow and ecological observations (including emerging risks and realised benefits) during an event.

The operation of water management structures on Toorale will be reviewed annually and following significant flow events, informed by monitoring and experience gained from each event and improved modelling and other inputs over time. Relevant stakeholder advisory groups will also have an opportunity to provide input into these reviews.

This OMP may be updated at any time to reflect the regulatory framework that is in place, with the approval of Department of Planning and Environment / Water.

# 1. Introduction

## 1.1 Background

Toorale National Park and Toorale State Conservation Area (Toorale), in north-west NSW, were purchased in 2008 and added to the NSW reserve network to protect its significant environmental values. The water access licences acquired with the properties were subsequently transferred to the Commonwealth Environmental Water Holder (CEWH). Water infrastructure on Toorale is now managed to deliver environmental outcomes on both the Western Floodplain of the Warrego River and downstream in the Darling River, consistent with the objectives of the Basin Plan and *Basin-wide Environmental Watering Strategy* (MDBA 2020).

Following the removal of Peebles Dam in 2019, 3 actively managed storages remain in the Warrego River on Toorale: Boera, Booka and Homestead dams (Figure 1). Modified regulating structures and fishways have been constructed on Boera and Homestead dams, replacing gated pipes previously used to manage flows through these structures.

The government objectives to both recover environmental water for the Darling River while maintaining Toorale's environmental values require a revised approach to the operation and maintenance of Toorale's infrastructure. This plan has been prepared to address this need. Boera Dam, in particular, is critical to the management of flows to the Western Floodplain, which comprise both licensed and planned environmental water. Remaining uncertainty around management of flows to the Western Floodplain in the current planning framework will require review and consideration in the remake of the Intersecting Streams water sharing plan.

The management of Warrego River flows through Toorale will increase the passing of flow to the Darling River downstream relative to its former agricultural operations, as was authorised under the water supply approvals and licences before their transfer to public ownership. Extensive studies and consultation have been undertaken to determine how flow management can be improved to benefit the Warrego and Darling rivers and their floodplain environments.

The flow management arrangements are adaptive, recognising that the environmental benefits that can be achieved in any given flow event will depend on antecedent conditions, the characteristics of the flow event, and must consider the relative benefits that may be achieved against a range of environmental flow requirements both on Toorale and downstream.

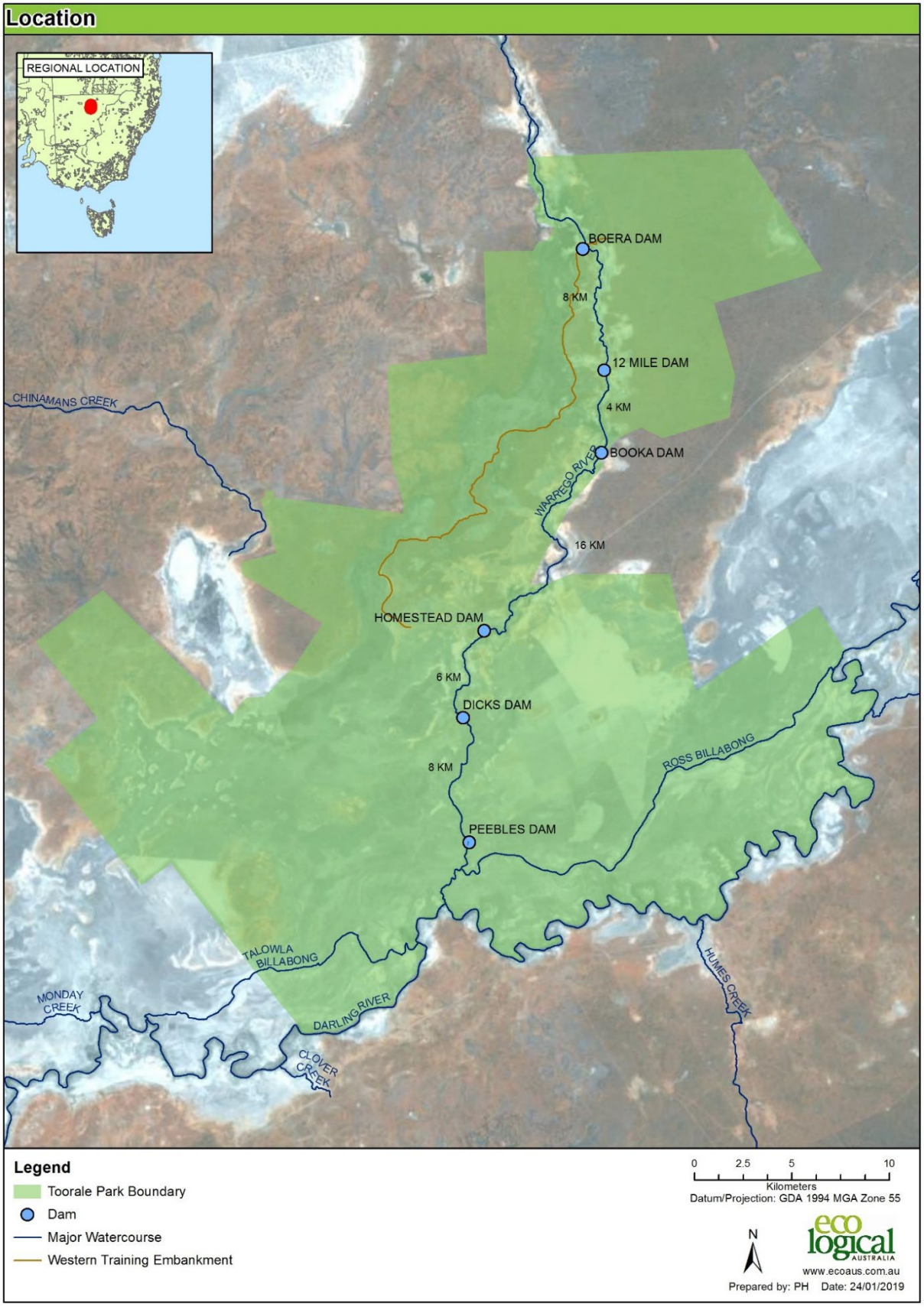


**Figure 1 Toorale boundary and key water infrastructure locations**
(Peebles and 12 Mile dams have been removed)

# 2. Purpose of the operating and maintenance plan

The OMP provides guidance on the operation and maintenance of the water management infrastructure on Toorale.

The OMP expands on the flow management arrangements described for the purpose of preparing the *Toorale Water Infrastructure Project – Phase 2, Review of Environmental Factors* (REF) (Eco Logical Australia 2019), and for modelling undertaken to assess the alignment with project objectives and potential impacts of different flow management scenarios (Alluvium 2020).

The purpose of the OMP is to:

- ensure flow management aligns with, and balances, environmental watering objectives in the Warrego and Darling rivers
- ensure flow management on Toorale complies with statutory requirements
- ensure a responsive and adaptive approach to management based on best available knowledge
- provide a transparent approach to water management decision-making
- identify clear roles and responsibilities for implementing the OMP
- describe operational response to flow-related incidents and emergencies
- describe maintenance requirements for infrastructure.

The OMP is consistent with relevant plans, policies and statutory approvals including:

- Water Sharing Plan for the Intersecting Streams Unregulated River Water Sources 2011
- Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012
- *Intersecting Streams Long-Term Water Plan Parts A and B* (Environment, Energy and Science 2020)
- *Toorale National Park and Toorale State Conservation Area Plan of Management* (Environment, Energy and Science 2021)
- *NSW Non-Urban Water Metering Policy* (Department of Planning, Industry and Environment 2020).

The OMP will come into effect once all works covered by the plan are commissioned and the plan is approved.

# 3. Statutory considerations

Operation of the infrastructure and management of flows on Toorale is subject to various statutes, policies and plans.

## *3.1 Water Management Act 2000*

The NSW *Water Management Act 2000* seeks to protect, enhance and restore water sources and their associated ecosystems while recognising and fostering the social and economic benefits that result from the sustainable and efficient use of water.

Water sharing plans made under the Act establish environmental water and set out rules for the allocation and trading of water. Environmental water comprises both licensed or held environmental water (water access licences held or managed for an environmental purpose) and planned environmental water (committed through a water sharing plan for fundamental ecosystem health or other specified environmental purposes).

### Water Sharing Plan for the Intersecting Streams Unregulated River Water Sources 2011

Management of flows on and through Toorale is subject to the Water Sharing Plan for the Intersecting Streams Unregulated River Water Sources 2011 (Intersecting Streams WSP).

The Intersecting Streams WSP commits planned environmental water by reference to the water protected from extraction or remaining in the water source, resulting from:

- the access rules specified on water access licences
- compliance with the long-term average annual extraction limit and long-term average sustainable diversion limit
- compliance with basic landholder rights provisions, access licences and any other rights under the Act.

Toorale's water management infrastructure influences both held (licensed) water and planned environmental water within the Warrego River water source and is managed in accordance with the conditions attached to approvals issued under the *Water Management Act 2000*.

As outlined above, this OMP sets out the operating scenarios and triggers for the Boera Dam regulator and the method for measuring and accounting for water through Boera storage, consistent with achieving the environmental, economic, Aboriginal cultural, and social and cultural objectives of the Intersecting Streams WSP.

### Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012

Flows from the Warrego River contribute to flow targets set in the Darling River under the Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012.

### Water supply works approvals

A water supply work approval issued under Part 3 of the *Water Management Act 2000* authorises its holder to construct and use a specified water supply work at a specified location. Each approval includes conditions the holder must comply with to minimise adverse impacts.

The Toorale works approvals relevant to this OMP are held by NSW National Parks and Wildlife Service (NPWS) and include:

- 85CA751696 – Boera Dam
- 85WA751691 – Homestead Dam
- 85WA751693 – Booka Dam.

The approval for Boera Dam is a combined approval. The approvals for Booka and Homestead dams relate to supply works only.

The works approvals for Boera and Homestead dams were amended in 2020 to authorise modifications to Boera and Homestead dams. Schedule 4 of the statements of approval includes standard and other conditions that operation of the structures must comply with. Of particular relevance is the condition for Boera Dam which requires that:

> The water management work(s) authorised by this approval must be operated and maintained in accordance with an operations management plan (OMP) approved by the relevant licensor. The OMP must include:
>
> - details of proposed operating scenarios and triggers for the Boera Dam regulator and diversion of water to the Western Floodplain
> - a detailed water balance indicating methods of measuring and accounting for water take and details of how impacts to downstream water users and environments will be minimised or mitigated; and
> - details of ongoing maintenance of works to ensure geomorphic stability within the Warrego River.

and similarly, for Homestead Dam:

> The water supply works authorised by this approval must be operated and maintained in accordance with an operations management plan (OMP) approved by the relevant licensor. The OMP must
>
> - include details of proposed operating scenarios and triggers for Homestead Dam; and
> - details of ongoing maintenance of works to ensure geomorphic stability within the Warrego River.

The approvals also require that:

> water supply works must be constructed and maintained in a way that will:
>
> - ensure the work's safe construction and operation, and
> - prevent the possibility of damage being caused by the work, or resulting from the work, to any public or private interest.

Operation of Booka Dam will continue to comply with 85WA751693 to manage the passage of discharges from Boera Dam through the Warrego River to the Darling River, and to retain its full storage level at the conclusion of an event.

## Water access licences

Water access licences (WALs) issued under the *Water Management Act 2000* entitle licence holders:

- to specified shares (share component) in the available water within a particular water management area or water source
- to take water (extraction component) at specified times, rates or circumstances from specified areas or locations (Water NSW 2021).

The Toorale water access licences (WALs) for the Warrego River, are held by the CEWH and NPWS. The CEWH is responsible for managing the Commonwealth environmental water holdings to protect and restore the environmental assets of Murray–Darling Basin including rivers, lakes, wetlands and floodplains, in the national interest.

Details of the Warrego River WALs held by the CEWH and NPWS are provided in Appendix A.

### Metering requirements

Licensed water users, including the Department of Planning and Environment, are required to comply with the NSW metering framework which includes the:

- *NSW Non-Urban Water Metering Policy*
- metering-related provisions of the Water Management (General) Regulation 2018
- metering-related provisions of the *Water Management Act 2000*.

## 3.2 National Parks and Wildlife Act 1974

Management of Toorale National Park and Toorale State Conservation Area must be consistent with the objects and reserve management principles of, and uses permissible under, the NSW *National Parks and Wildlife Act 1974*.

A plan of management is a statutory document under the *National Parks and Wildlife Act 1974*. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken in relation to the lands to which the plan relates unless the operations are in accordance with the plan.

The Toorale water management infrastructure at Boera, Booka and Homestead dams and its operation has been planned and assessed to comply with the *National Parks and Wildlife Act 1974*.

## 3.3 Fisheries Management Act 1994

The modification of Boera and Homestead dams triggers obligations under section 218 of the NSW *Fisheries Management Act 1994* that require the construction and operation of a fishway to allow fish passage through the site. The fishway designs for Boera and Homestead dams have been endorsed by Department of Primary Industries Fisheries (DPI Fisheries).

A section 219 permit is required if the fishways need to be closed despite there being sufficient inflows to operate it.

## 3.4 Environmental Planning and Assessment Act 1979

*Toorale Water Infrastructure Project – Phase 2, Review of Environmental Factors* assessed that the proposed watering arrangements, as described in the REF and in this OMP, would not have a significant impact on the environment. The project was determined under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* in August 2020.

The determination notice and report for the *Toorale Water Infrastructure Project – Phase 2, Review of Environmental Factors* (Eco Logical Australia 2019), issued in accordance with Part 5 of the NSW *Environmental Planning and Assessment Act 1979*, include conditions relevant to this OMP:

### Condition 47

A fishway management plan and a fishway monitoring plan for the fishways at Boera and Homestead dams must be prepared to the satisfaction of DPI Fisheries and NPWS Director Northern Inland Branch. Specific requirements must be sought from Fisheries before starting to prepare these plans. Both plans must be finalised and approved before commissioning structures which may obstruct fish passage. These plans may be combined as appropriate based on advice from DPI Fisheries. The fishway management plan for Boera and Homestead dams fishways is under development.

Water management arrangements must be undertaken as described and as determined to comply with the *Environmental Planning and Assessment Act 1979*.

### Condition 87

Before operational handover of new structures to NPWS, the applicant is to prepare an asset operational and maintenance plan and all appropriate construction and certification documentation in order to manage the structures as water infrastructure assets. The plan is to be prepared in consultation with NPWS Manager Bourke Area or their delegate. This plan is to:

- detail how the assets will be managed as part of the government (NPWS) asset management system
- specify the inspection schedules and general maintenance requirements
- cover emergency intervention and maintenance requirements based on identified risks and contingency planning.

### Condition 88

Following the issuing of works approvals under Condition 14 of the REF determination notice, the operational strategy for Boera Dam presented in the REF and REF addendum must be expanded to include (at a minimum):

- a description of the statutory and regulatory context governing the management of flows from Boera Dam
- a list of the key agencies and stakeholders involved in managing flows from Boera Dam and a description of their role (including the arrangements described in Conditions 89 and 90).
- an outline of the role of the adaptive management framework required by Condition 91
- a description of how the adaptive management framework will be used to refine the operating strategy, and the proposed review frequency.

This OMP addresses Condition 88 and partially addresses Condition 87.

## 3.5 The *Water Act 2007* and Basin Plan 2012

The Basin Plan 2012, prepared under the Commonwealth *Water Act 2007*, requires the preparation of a long-term watering plan (LTWP) for each water resource plan area. A LTWP must identify priority environmental assets, ecological objectives and ecological targets for those assets, and environmental watering requirements needed to meet those targets in order to achieve those objectives. This OMP has considered the Intersecting Streams LTWP, the *Barwon-Darling Long-Term Water Plan Part A* (Environment, Energy and Science 2020) and the *Barwon-Darling Long-Term Water Plan Part B: Barwon-Darling planning units* (Environment, Energy and Science 2020).

The Basin Plan 2012 also requires the preparation of a water resource plan (WRP) for the Intersecting Streams. The WRP is accredited by the Commonwealth Minister under the *Water Act 2007*. The WRP sets out how the water resource will be managed sustainably to achieve the outcomes of the Basin Plan, including ensuring compliance with the sustainable diversion limits and that there is no net reduction in the protection of planned environmental water compared to that provided for under State water management before the commencement of the Basin Plan.

## 3.6 Work Health and Safety Act 2011

The NSW *Work Health and Safety Act 2011* aims to secure the health and safety of workers and workplaces by eliminating or minimising risks, to provide workers and others with the highest level of protection from hazards and risks, as far as is reasonably practicable.

Operation and maintenance of water infrastructure on Toorale must be planned and undertaken in such a manner to comply with the relevant health and safety requirements.

# 4. Water management infrastructure

The OMP applies to water regulating structures on Boera, Booka and Homestead sites authorised by works approvals. Details of these works are provided in Table 1.

**Table 1 Works approvals for structures at Toorale**

| Site | Component | Value |
|---|---|---|
| Boera | Full supply volume | 1546 megalitres (ML) |
| | Full supply level | Reduced level (RL) 104.85 m Australian Height Datum (AHD) |
| | Western bywash commence to flow (CTF) | RL 104.85 m AHD |
| | Eastern bywash CTF | RL 105.5 m AHD |
| | Water regulating infrastructure | 3 lay-flat regulator gates installed with a vertical slot fishway. Design discharge capacity of 900 ML/day |
| Booka | Full supply volume | 106 ML |
| | Full supply level | RL 100.9 m AHD |
| | Bywash CTF | RL 101.88 m AHD |
| | Water regulating infrastructure | Pipe outlet (2 x 1200 mm dia; invert at RL 100.0 m AHD); existing structure (embankment) at RL 101.4 m AHD |
| Homestead | Full supply volume | 250 ML |
| | Full supply level | RL 98.5 m AHD |
| | Bywash CTF | RL 99.5 m AHD |
| | Water regulating infrastructure | Embankment reconstructed with a spillway installed at RL 98.5 m AHD and rock ramp-style fishway<br>Minimum spillway capacity of 900 ML/day<br>Existing 2 x 600-mm dia pipes (for emergency flow management) |
| Boera block embankment and training embankment | Water regulating infrastructure | 5 x 600-mm dia and 1 x 1220-mm dia pipes and lift gates (Gates A–F) |

## 4.1 Boera Dam

Boera Dam, in the northernmost part of Toorale, is the most significant in terms of water management within Toorale and the downstream environment and is the primary infrastructure for the diversion of water onto the Western Floodplain.

## Overview of structure and operational capacity

Water from Boera Dam is released to the Warrego River through a 3-bay lay-flat regulator arrangement and vertical slot fishway. The regulator gates for Boera Dam have a design discharge capacity (design capacity) of 900 ML/day but may be operated to pass a flow up to 1,650 ML/d in some circumstances. Fish passage functionality may not be effective at flow rates above 900 ML/d. The gates have been designed to control the storage level, nominally set at RL 104.85 m AHD.

Flow spills from the storage to the Western Floodplain via the western bywash when levels reach 104.85 AHD. During high flow/flood events, when inflows exceed the discharge rate of the gates and the western bywash, the eastern bywash channel engages at 105.5 AHD (Figure 2).

The closed gate level has been set at RL 106.2 m AHD. This means the gates will overspill minimising the risk of dam embankment overtopping or failing (embankment at 107.0 m AHD), if the gates are left in the closed position.

Stop boards on the upstream side of the gates provide a failsafe limit on the potential drawdown of the storage. They can also be used to isolate a gate for repair or removal.

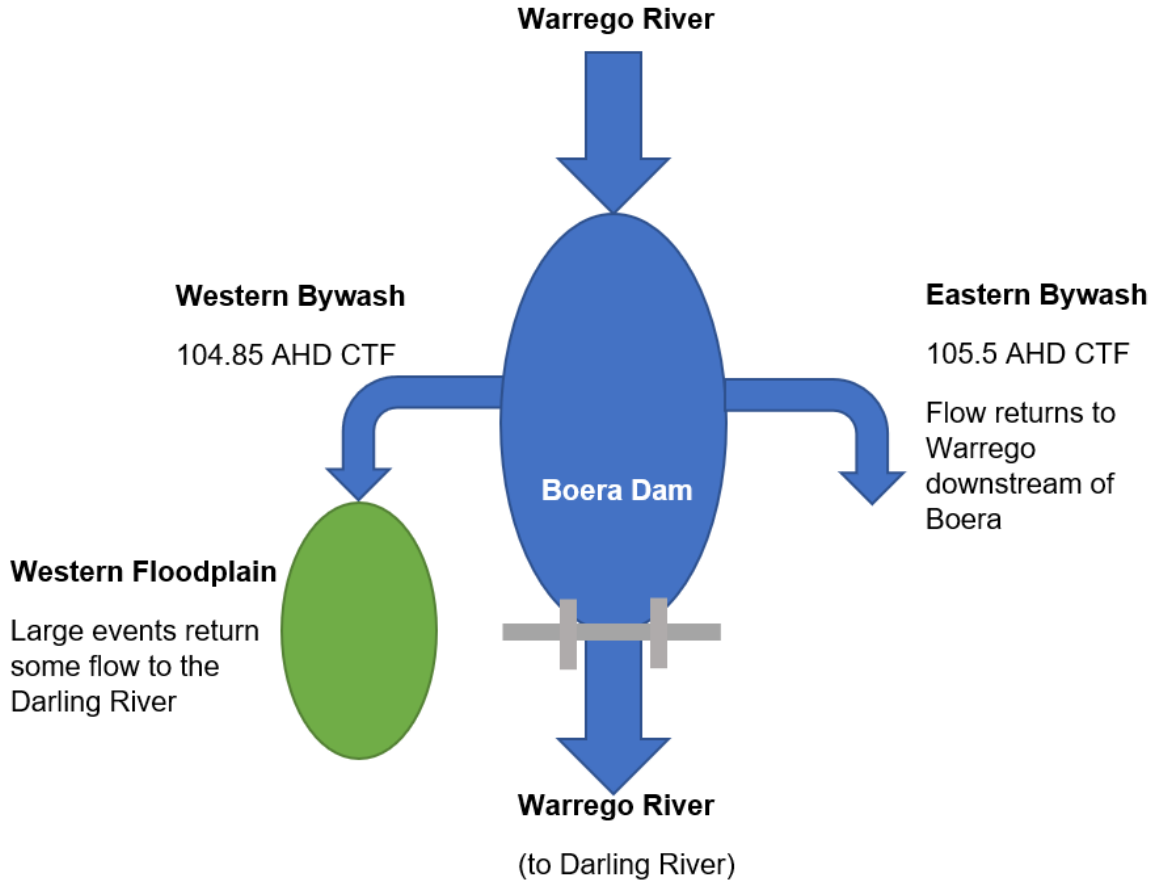


**Figure 2** **Flow pathways from Boera Dam**

## Gate control and automation

The gates at Boera Dam are solar powered and have battery back-up for 7 days. An alarm is sent to the operator if there is a cut to power, giving 7 days to address the issue. The gates have a manual override, and a generator can also be used to maintain operation as an additional fail safe.

The gates are electronically operated and will be programmed to deliver a specified flow rate. The gate settings are adjusted according to inflow rates and flow delivery priorities. The flow rate can be supplied through a single gate or a combination of gates at the discretion of the operator or based on the flow required.

### Fishway

A vertical slot fishway is incorporated in the regulator at Boera. The fishway will require operation of a gate on the upstream end and auxiliary channel to allow flow through.

The operation of the fishway will be covered by a separate fishway management plan.

## 4.2 Booka Dam

Booka Dam contains 2 x 600-mm diameter gated pipes that are manually operated to pass inflows downstream and closed at the end of an event to maintain storage levels. It has a low storage capacity and spills via a western bywash at relatively low flows, even with the gates fully open, reconnecting with the Warrego River downstream.

The department proposes to modify operations at Booka Dam to a passive fill and spill arrangement to efficiently pass 900 ML/day, so that inflows pass around the storage via the existing bywash when the full supply level is reached, and to improve fish passage conditions.

## 4.3 Homestead Dam

Water at Homestead Dam will be regulated under a fill and spill arrangement by opening and closing the weir during and after flow events. Water released from the weir will spill through a concrete ramp-style fishway into the Warrego River downstream.

The spillway for Homestead Dam has a design capacity of 900 ML/day with the weir operated in an open position. Flows above this rate will spill via bywashes to the east of the storage. Once flow begins to bywash, the spillway will continue to pass some flow above the minimum design capacity of 900 ML/day.

A stop log is removed to pass inflows and to provide fish passage during flow events and replaced when flow ceases to maintain the desired full supply level in the Homestead Dam storage (98.5 m AHD). The dam must fill to at least RL 98.3 m AHD before outflows can commence through the spillway and associated fishway.

The stop log arrangement is manually operated and is installed and removed using lifting equipment on the bridge.

Two 600-mm diameter pipes historically used to pass flow through Homestead Dam have been retained and are intended for emergency flow management purposes only.

## 4.4 Boera block embankment and training wall pipes

Five 600-mm diameter and one 1220-mm diameter gated pipes are installed in the Boera block embankment and training embankment. Historically these pipes have not had any licensed operating requirements.

These pipes will remain closed unless permitted to be opened by the OMP.

# 5. Environmental watering

## 5.1 Environmental watering objectives

The environmental objectives for managing flows through Toorale are:

- maintaining connectivity between the Warrego and Darling rivers
- enabling fish passage through the structures and between the Warrego and Darling rivers
- improving the environmental health of the Warrego and Darling rivers on and downstream of Toorale, by contributing to achieving EWRs in the Darling River as described in the Barwon Darling LTWP
- maintaining the ecological values of the Western Floodplain of the Warrego River through Toorale by contributing to achieving Western Floodplain EWRs as described in the Intersecting Streams LTWP
- maintaining aquatic habitat and refugia in the storages.

More details can be found in the Toorale Water Infrastructure Project Phase 2 REF (Eco Logical Australia 2019).

The environmental priorities for flow management determined for Toorale are, in descending order:

1. maintaining instream flow connectivity between the Warrego and Darling rivers, particularly during or following an extended period of low flow or cease-to-flow conditions in the Darling River
2. maintaining lateral connectivity between the Warrego River and its Western Floodplain, particularly following extended dry conditions on the Western Floodplain
3. balancing the environmental water requirements of the Darling and Warrego rivers and the Western Floodplain when neither of the above scenarios are priorities.

Under all priorities, Boera, Booka and Homestead dams will be managed to remain at full supply level when inflows cease.

## 5.2 Determining relative environmental water priorities

### Minimum passing flow – connectivity with the Darling River

Connectivity between the Warrego and Darling rivers is the primary priority (above all other priorities) after any cease-to-flow event in the Warrego River above Boera Dam. When inflows to Boera Dam commence, the regulator gates will be operated to pass flows up to the design capacity of the work until connectivity with the Darling River is achieved and flows at Louth gauge exceed 330 ML/d[1].

This will apply after every cease-to-flow event in the Warrego River above Boera Dam and is integrated into demand priorities 1 and 2 and in adaptive management operating modes as outlined below.

1 This reflects the approval conditions at the time Toorale was acquired by the NSW Government.

## Demand priority 1 – Darling River ecological resilience

Passing of flows to the Darling River will continue to be prioritised when conditions in the Darling River are particularly dry, as indicated by one or more of the following flow threshold conditions occurring before the event commences.

These conditions are relevant to environmental water requirements outlined in the Barwon-Darling LTWP:

1. cease to flow or very low flow: more than 110 days of less than 70 ML/d at Louth gauge, or
2. base flow (BF1 or BF2): more than 135 days of flow less than 450 ML/d at Louth gauge, or
3. small fresh (SF1): more than one year since a small fresh of at least 1,550 ML/d for at least 10 days at the Bourke gauge.

Under these circumstances, the Boera Dam regulator gates will be operated to pass inflows up to the design capacity of the regulator gates, at least until Bourke gauge has exceeded 1,500 ML/d.

The passing of inflows to the Darling River will also be prioritised when a 'no flow class' declaration is applied to River Section 4 of the Barwon-Darling River under the Water Sharing Plan for the Barwon-Darling Unregulated River Water Source 2012 (the Barwon-Darling WSP).

## Demand priority 2 – Western Floodplain

Delivery of flows from Boera Dam to the Western Floodplain (demand priority 2) is considered a priority only:

- after connectivity has been established with the Darling River (minimum passing flow), and
- when demand priority 1 is not triggered by flow conditions in the Darling River, and
- the Western Floodplain is particularly dry, as indicated by the following flow threshold conditions relevant to environmental water requirements outlined in the Intersecting Streams LTWP:
    - small wetland inundation: more than 2 years since 7 GL/month flowed to the Western Floodplain, or
    - small wetland inundation: more than 3 years since 16 GL/month flowed to the Western Floodplain, or
    - medium wetland inundation: more than 6 years since 33 GL/month flowed to the Western Floodplain.

Demand priority 2 is deemed to have been met when the Western Floodplain has received 75 GL of total flow from planned or licensed environmental water, or a combination of both. This represents a medium-sized watering event typically occurring about once every 5 years.

The Boera Dam regulator gates will not be operated to divert water to the Western Floodplain until demand priority 1 is satisfied, ensuring that connectivity between the Warrego and Darling rivers is improved relative to historic practice, benefiting the downstream environment and communities.

While demand priority 2 is active, a flow of at least 50 ML/d will be maintained through the Warrego River fishways until inflows to Boera Dam cease, maintaining connectivity between the Warrego and Darling rivers for native fish. The regulator gates may be partially or fully closed to enhance the flow of water to the Western Floodplain. The

measurement and accounting of water to the floodplain in these circumstances is specified in Section 7 of this OMP.

While demand priority 2 is active, and the gates on Boera Dam are closed, any water diverted onto the Western Floodplain must be accounted for against a held environmental water entitlement. Once this entitlement is exhausted, the gates will remain open. This arrangement will remain in place unless any changes to the water sharing plan for the Intersecting Streams further clarifies environmental water.

### Adaptive operations

If neither demand priority 1 (the Darling River) nor demand priority 2 (the Western Floodplain) are triggered by the flow threshold conditions defined above, and subject to the minimum passing flow being satisfied, the relevant environmental water advisory group (EWAG) will advise on flow management priorities. This may occur through a real-time meeting of the EWAG or by the inclusion of recommendations made by the EWAG in the annual environmental water plan (AEWP).

The Boera Dam regulator gates will be managed in accordance with advice from the EWAG which will be tasked with balancing the ecological needs of the Warrego and Darling rivers and Western Floodplain. The EWAG will be provided with information on antecedent conditions, including the ecological condition and function of specific assets on Toorale and in the Darling River downstream, analysis of EWRs and the potential to achieve specific ecological objectives, water available in relevant licence accounts and flow event characteristics (peak rate, volume and duration forecasts).

Under adaptive operations, a flow of at least 50 ML/d will be maintained through the Warrego River fishways until inflows to Boera Dam cease. The Boera Dam regulator gates may be partially or fully closed to enhance the flow of water to the Western Floodplain. The measurement and accounting of water to the floodplain in these circumstances is specified in Section 7 of this OMP.

## 5.3 Annual environmental water plans

Annual environmental water plans (AEWPs) for each catchment are developed by the department in partnership with the Commonwealth Environmental Water Office (CEWO). AEWPs consider the objectives and targets of the Basin Plan Environmental Watering Strategy, and outline the objectives and priorities for use of water for the environment for the water year (July to June), depending on climatic factors and forecasts. AEWPs also consider advice received from the relevant EWAG. For the Warrego River, this will factor in EWRs from the Barwon-Darling and Intersecting Streams LTWPs.

The EWAG will provide input for the AEWP at an annual planning meeting and on an as-needs basis as events unfold during the water year. The Intersecting Streams AEWP and EWAG will have greatest influence during adaptive operations when there is not a determined priority for the Darling River or Western Floodplain.

The AEWP for the Intersecting Streams will incorporate the demand priorities outlined in Section 4 of this OMP and Condition 90 of the Toorale water infrastructure REF determination notice outlined in Table 2.

**Table 2 Condition 90 of the REF determination notice**

| | |
|---|---|
| **1.** | **The North West Biodiversity Conservation Division, in consultation with the Commonwealth Environmental Water Office, will produce an Annual Environmental Water Plan (AEWP) for the Intersecting Streams. For flow management decisions at the Boera outlet, development of the AEWP will take into account (at a minimum):** |
| | a. the operational strategy set out in the REF (or as updated under Condition 92(c)) |
| | b. the adaptive management framework under Condition 91 of this determination |
| | c. available results of monitoring under Condition 93(i) and any other relevant data |
| | d. the desired outcomes and management directions set out in the Toorale Plan of Management. |
| 2. | North West Biodiversity Conservation Division will work with the Commonwealth Environmental Water Office, National Parks and any relevant stakeholder advisory forum established to advise on operations and environmental water use in the Warrego River. |

# 6. Operation of water management infrastructure

## 6.1 Defining flow events in the Warrego River

Warrego River flow events have been defined as follows:

> An event only commences once inflows to the Boera Dam storage exceed 100 ML/day (for a minimum of 1 day).

An event finishes once the daily inflow rate at Boera has been less than 50 ML/d for 30 days.

The above approach has been adopted to ensure small inflows with peaks < 100 ML/day do not trigger an event and, where an event peaks, drops to < 50 ML/d and then restarts within 30 days, it is considered a single event.

The regulators may be opened ahead of a rise in storage levels if a sustained flow is known to be imminent, having regard to estimated flow travel times of 2–4 days signalled by the gauge at Fords Bridge.

Similarly, information on daily flow rates at Fords Bridge may be used to inform the closure of the regulator, noting inflows may also result from other sources, such as localised rainfall.

## 6.2 Standard operating procedures

### Operation of Boera Dam regulating structures

The initiation of demand priorities 1 or 2 will be determined at the beginning of an event and will apply until the flow condition thresholds specified have been met. If demand priorities 1 or 2 are not triggered by the specified flow condition thresholds, adaptive operations (informed by the AEWP and advice of the EWAG) will occur.

Delivery of a minimum flow requirement is incorporated into the standard operating procedures for demand priorities 1 and 2 and adaptive operations. As outlined in Table 3, standard operating procedures must take into account the following:

**Scour protection release**

Under all operating modes, and if required, an initial release of no greater than 50 ML/d must be made through the Boera fishway or auxiliary channel until the downstream pool is filled (estimated fill capacity = 1.25 ML).

Flows of up to 30 ML/d can pass through the fishway. The fishway and the auxiliary channel together can be operated to pass 70 ML/d.

**Maintaining Boera storage levels**

Under all operating modes, closure of the Boera Dam regulator will be managed to ensure that Boera Dam is at full supply level (104.85 m AHD) at the end of an event.

**Fish passage**

Under all operating modes for flows up to 900 ML/d, the discharge rates through the fishway, auxiliary channel and gates will be programmed to maximise fish passage performance as set out in the fishway management plan, once completed.

**Table 3 Standard Boera regulator operating arrangements for demand priorities 1 and 2 and adaptive operations**

| Operating mode | Objective | Operating approach | Operating mode triggers[1] |
|---|---|---|---|
| Demand priority 1<br>(Darling River ecological resilience) | Maximise flows to the Darling River when there have been extended dry conditions in the Darling River | On arrival of flow event to Boera Dam, gates should be operated so the outflow rate from Boera Dam (to the Warrego River) matches the rate of inflow to Boera Dam up to the design capacity of the work.<br>A gradual increase of flow rate at the beginning of the event may be necessary to reduce the risk of downstream channel erosion.<br>Discharge rates may need to be reduced if monitoring determines that downstream erosion is compromising the stability of the structure or Aboriginal cultural heritage is at risk of harm.<br>Continue until a trigger flow event occurs in the Darling River (taken as more than 1,500 ML/d at Bourke gauge – small fresh threshold), or any 'no flow class' announcement under the resumption of flow rule is lifted.<br>If 1,500 ML/d occurs at Bourke gauge and any 'no flow class' announcement is lifted, review priority and adjust operations accordingly.<br>Close gates gradually to provide a recession flow when inflows to Boera cease to maintain full storage level. | If one or more of the following are met (or close to being met):<br>• very low flow – greater than 110 days of < 70 ML/d at Louth<br>• base flows – more than 135 days of flow < 450 ML/d at Louth<br>• small freshes – more than 1 year since 1,550 ML/d for 10 days at Bourke<br>or<br>• if a 'no flow class' declaration is applied to River Section 4 of the Barwon-Darling River. |
| Demand priority 2<br>(Western Floodplain) | Maximise flows to the Western Floodplain when there have been extended dry conditions on the Western Floodplain | On arrival of flow event to Boera Dam, gates should be operated so the outflow rate from Boera Dam (to the Warrego River) matches the rate of inflow up to the design capacity of the work until connectivity with the Darling River is achieved and flows at Louth gauge exceed 330 ML/d (minimum passing flow requirement).<br>The rate of release is to be determined based on flow rates and travel times from Fords Bridge gauges. The discharge rate from Boera Dam should not exceed that of predicted inflows based on Fords Bridge and storage height.<br>A gradual increase of flow rate at the beginning of the event may be necessary to reduce the risk of downstream channel erosion.<br>Once connection to the Darling and the Louth flow target are achieved, | If one or more of the following are met (or close to being met):<br>• more than 2 years since 7 GL/month total flow to Western Floodplain (WL1)<br>• more than 3 years since 16 GL/month total flow to Western Floodplain (WL2)<br>• more than 6 years since 33 GL/month total flow to Western Floodplain (WL3). |

| Operating mode | Objective | Operating approach | Operating mode triggers[1] |
|---|---|---|---|
| | | gradually close Boera gates and water the Western Floodplain[2]. Maintain a fish connectivity flow of at least 50 ML/d through the fishway and gate 1 to enable fish passage until inflows cease.<br>Discharge rates through the Boera regulator and fishway may be increased to preferentially pass flow through the main river channel when the storage level is at or above 105.5 m AHD (commence to flow for the eastern bywash).<br>If Western Floodplain EWRs are met (taken as a total flow of 75 GL over 30 days by planned or licensed environmental water (or a combination of both), manage in accordance with EWAG advice and the AEWP, depending on available account volumes and inflows.<br>When inflows to Boera cease to maintain full storage level, gates will be closed. | |
| Adaptive operations | Share delivery of water between the Warrego and Darling rivers and Western Floodplain | On arrival of a flow event at Boera Dam, when the Warrego and Darling rivers or Western Floodplain are not a priority, program regulator to pass flows up to the design capacity of the work for at least 14 days[3] to encourage fish movement and spawning.<br>After a 14-day fresh has been passed, operate the regulator and fishway in line with AEWP and advice from the EWAG, subject to available account volumes and inflows.<br>In the circumstances where management reverts to Adaptive Operations after the finishing triggers for Western Floodplain and Darling River have been satisfied, operate regulator and fishway in line with AEWP.<br>The actual rate of release is to be determined based on flow rates and travel times from Fords Bridge and Boera gauges. The discharge rate from Boera Dam should not exceed that of predicted inflows based on Fords Bridge and storage height.<br>A gradual increase of flow rate at the beginning of the event may be necessary to reduce the risk of downstream channel erosion. | All other times – when none of the above triggers are met |

| Operating mode | Objective | Operating approach | Operating mode triggers[1] |
|---|---|---|---|
| | | Gradually close gates when inflows to Boera cease to maintain full storage level | |

Notes:

1. These triggers are sourced from the respective long term water plans for the Barwon Darling and Intersecting Streams.
2. Water diverted to the Western Floodplain as a consequence of the operation of the Boera work passing less than its design capacity will be accounted for against an appropriate WAL, until a clearer definition of planned environmental water is developed through the replacement of the Intersecting Streams WSP. Under these circumstances, if account water is exhausted the gates will be opened to their design capacity.
3. Small to large fresh based on advice from DPI Fisheries.

### Operation of Homestead Dam regulating structures

When the regulator gates at Boera Dam are opened, the stop log at Homestead Dam is removed. The stop log will be put back in place when the gates at Boera are closed to maintain full storage level.

### Operation of Booka Dam regulating structures

#### Before modification

Existing pipes will be managed in accordance with the current work approval to discharge flows consistent with delivery of the environmental demand priority for any given event. Pipes will be closed when the gates at Boera Dam are closed. Inflows that exceed capacity of pipes will continue to bywash around the storage and reconnect with the Warrego River downstream.

#### After modification

Subject to approval, there will be no active management of flows through this storage except under exceptional circumstances.

## 6.3 Exceptional circumstances

Standard operating arrangements may be modified or suspended under exceptional circumstances. All exceptional circumstances cannot be identified but may include:

- declared temporary water restrictions to cope with water shortages or a threat to public health or safety downstream of Toorale
- adverse ecological incidents such as algal blooms or fish kill conditions
- major flood events or risk of failure of infrastructure
- safety of park personnel and visitors.

### Temporary water restrictions

The Boera Dam regulator will be operated to its design capacity when an order under section 324 of the *Water Management Act 2000* relevant to the Warrego River is in place.

Releases of flow at the beginning of the event will be made in such a way as to reduce the potential for downstream channel erosion impacts.

The pipes in Homestead Dam may be partially or fully opened to facilitate the passage of flow downstream.

One or more of the pipes in the western training embankment (Pipes A–F) may be operated to assist in mitigating a declared water shortage, threat to public health or safety or to manage water for environmental purposes in the Darling River.

NPWS Director Northern Inland is to implement exceptional circumstances operations and should approve any change to operational priorities or discharge rates from Boera Dam while a section 324 order is in place.

In all circumstances, operation of structures must comply with the directions of any declaration made by the NSW Minister for Water.

## Adverse ecological incidents

Approval to prioritise flow downstream may be provided in the event of an adverse ecological incident in the Warrego or Darling rivers outside any temporary water restriction made under section 324 of the *Water Management Act 2000*. This may include but is not limited to algal blooms and fish kills.

A plan outlining the operational response is to be submitted to NPWS Director Northern Inland for approval before responding to the incident. The plan will take into account advice from stakeholders through the EWAG.

Prior approval from NPWS Director Northern Inland is required to implement exceptional circumstances operations to manage ecological incidents.

## Major flood events or risk of failure of infrastructure

Water management infrastructure may be operated to mitigate the risk of flooding to infrastructure and fixed assets on Toorale.

The risk of failure of Boera and Homestead dams has been mitigated by increasing the maximum passing flow capacity from 600 ML/d to up to 1,650 ML/d and 900 ML/d respectively.

Operation of the regulating structures on Toorale may deviate from planned arrangements to reduce the risk or severity of failure of Boera, Homestead or Booka dams and their associated works where such a failure is considered likely as a consequence of flooding. This may include:

- modified operation of the regulator gates at Boera Dam, and/or
- operation of one or both of the pipes in Booka Dam, and/or
- operation of one or both of the pipes in Homestead Dam.

One or more of the pipes (A–F) on the Western Floodplain training embankment or block embankment may be operated to reduce the risk or severity of failure of this structure where such a failure is considered likely as a consequence of flooding.

The approval of the National Parks Area Manager Bourke is required to implement modified operations to manage risk of failure to park assets.

## Safety of park personnel and visitors

The water management infrastructure on Toorale may be operated as necessary when there is an imminent risk to the safety of park personnel, contractors or visitors, where such operation will reduce or remove this risk.

## 6.4 Operational constraints

The following limitations have been identified and applied in preparation of this plan:

- The design capacity of the Boera work, including the regulator gates and fishway, is 900 ML/d. The fishway performance is not optimised at flows above 900 ML/d. Flows above 1,200 ML/d cannot be reliably measured.
- An initial minimal release rate from Boera Dam will be required to ensure the downstream pool fills before higher release rates to reduce the risk of scouring.
- The erosion risk for the Warrego River immediately downstream of Boera Dam at flows higher than 900 ML/d is uncertain.
- When inflow exceeds the discharge capacity of the Boera Dam gates, it bywashes to the Western Floodplain, where it may or may not connect to the Darling River or reconnect with the Warrego River downstream. During significant floods, when the discharge capacity of Boera is exceeded, water flowing to the Western Floodplain is considered planned environmental water.
- Until a clearer definition of planned environmental water is developed through the replacement of the Intersecting Streams WSP, water diverted to the Western Floodplain as a consequence of the operation of the Boera work passing less than its design capacity will be accounted for against an appropriate WAL. Under these circumstances, if account water is exhausted the gates will be opened to their design capacity. Measurement and accounting of water through Toorale is further outlined in Section 7 of this OMP.
- At higher flows, the eastern bywash of Boera Dam engages returning flow to the Warrego River downstream of the storage.
- The passing flow capacity for Homestead Dam is 900 ML/d. Flows above this rate will bywash around the storage.
- The risks associated with Homestead Dam passing flows above 900 ML/d is uncertain. However, the recent changes to the storage have increased the passing flow capacity and the existing pipes will be retained, providing additional capacity to release flows if the dam is at risk of failure.
- The risk of failure of Booka Dam at flows above 600 ML/d is not known. Returning flows from the eastern bywash and/or the Western Floodplain upstream of the dam have historically caused inflow to Booka to exceed the passing capacity of the existing pipes. The dam embankment is known to have breached in the past. The risk of future failure of the dam will be mitigated by works to allow a higher rate of flow to bywash from the storage. The existing pipes will be retained providing additional capacity to release flows if the dam is at risk of failure.
- Access to all sites is frequently constrained, or not possible at all, following rain or during major flooding events.
- The Warrego River and its surrounds are known to contain significant Aboriginal cultural heritage which may be at risk from changed flow management.

## 6.5 Operational risks

**Table 4 Risks for the operation of Toorale water infrastructure**

| Risk ID | Risk description | Consequence | Response |
|---|---|---|---|
| R1 | Loss of asset (regulators, fishways or training embankments) | Water bypassing regulating structure; loss of flow regulation; loss of storage | Pre-event maintenance<br>Monitoring during event<br>Implement emergency response |
| R2 | Damage to asset (regulators, fishways or training embankments) | Repair required; loss of flow regulation; loss of storage | As above |
| R3 | Inability to operate asset (regulators, fishways or pipes) - access | Environmental priorities not watered; risk to asset integrity; loss of storage; breach of approval | Remote operation of Boera<br>Operate using failsafe stop boards |
| R4 | Power failure at Boera | Loss of ability to operate structure | Power will be safeguarded with a 7-day battery backup<br>Alarm will be sent to operator<br>Gates will have a manual override function<br>Generator can be used to supply power |
| R5 | Incorrect operation of regulators | Flows not managed as required | Training to be provided to all operators<br>Compliance with operating and maintenance plan and manual, and annual water plan<br>Approval from NPWS Manager Bourke Area, Director Northern Inland required for any deviation from standard operations |
| R6 | Channel flows impact embankment integrity | Embankment erosion; embankment failure | Gradual increase of flow rate at beginning of event, and then provide a recession flow<br>Modify passing flow rate if channel instability observed |

# 7. Flow measurement and accounting

## 7.1 Flow measurement constraints

Warrego River flows on and through Toorale have not been metered since modified flow management practices were introduced in the late 1880s.

Measurement of flows into and through Toorale National Park and Toorale State Conservation Area is in the context of:

- the nearest upstream flow discharge gauge being approximately 40 km upstream of Toorale (Fords Bridge)
- broad, flat terrain at the point where water spills from Boera Dam via the western bywash, resulting in no feasible option to install a meter to measure flows to the Western Floodplain
- limited ability to measure flows that return to the Warrego River downstream of Boera Dam via the eastern bywash and Western Floodplain
- flow measurement through the Boera regulator gates losing accuracy at discharges above 1,200 ML/d.

## 7.2 River gauges on or near Toorale

Flow measuring instrumentation currently available to assist in measuring flows to and through Toorale includes the following river gauging stations:

- 423001 – Warrego River at Fords Bridge main channel (height and discharge)
  - partial inflows to Boera
- 423002 – Warrego River at Fords Bridge bywash (height and discharge)
  - partial inflows to Boera
- 423007 – Warrego River at Dicks Dam (height and discharge)
  - measurement accuracy to be verified before incorporating into a mass balance of gauged river flows
- 423008 – Warrego River at Boera Dam (height only)
  - used in the flow measurement method with digital elevation model (DEM) to calculate inflows
- 425003 – Darling River at Bourke
  - used to check conditions for use of WALs are met
  - potential future mass balance to estimate return flows
- 425004 – Darling River at Louth
  - same as 425003.

### Flows to the Western Floodplain

Flows to the Western Floodplain at the commencement of the Basin Plan were a combination of licensed take and planned environmental water (including natural floodwater). The Natural Resources Commission considers that flows to the Western Floodplain could be described, at least in part, as planned environmental water reflecting the environmental objectives associated with the government acquisition of the property. This would also assist in water accounting and to demonstrate no net reduction in planned environmental water relative to the commencement of the Basin Plan.

Until this occurs, and for the purposes of measuring and accounting flows to the floodplain, flows are not taken when:

- operation of the gates as described by this OMP is not controlling flows to the floodplain
- Boera gates are releasing at least the design capacity flow
- the flows are natural flood flows or are returned to the Warrego or Darling rivers downstream.

## 7.3 Metering and measurement arrangements

### Current flow measurement tool

Water take from Boera Dam will be measured using a flow measuring tool that has been approved as an alternate flow measurement method in accordance with the requirements of the *NSW Non-Urban Water Metering Policy*.

The tool is a water balance approach centred around gauged water levels in Boera Dam. Calculations are made using rating curves derived from modelling for the 3 main outflows from the dam:

- the regulator gates for Warrego downstream flows (variable depending on the gate setting)
- the Western Floodplain bywash
- the eastern floodplain bywash.

Inflow is calculated using the change in water level in Boera Dam and a digital elevation model, accounting for climatic inputs such as rainfall and evaporation within the dam and an estimate of seepage. The water level also determines when the outflow routes mentioned above are engaged. Calculated inflows can then be compared to an inflow calculated by routing the upstream inflows from Fords Bridge, accounting for estimated losses and travel time (Figure 3).

The department will provide a summary of inflows and outflows periodically throughout an event via a departmental webpage. Full datasets will be maintained via a secure data storage system for auditing and regulatory reporting.

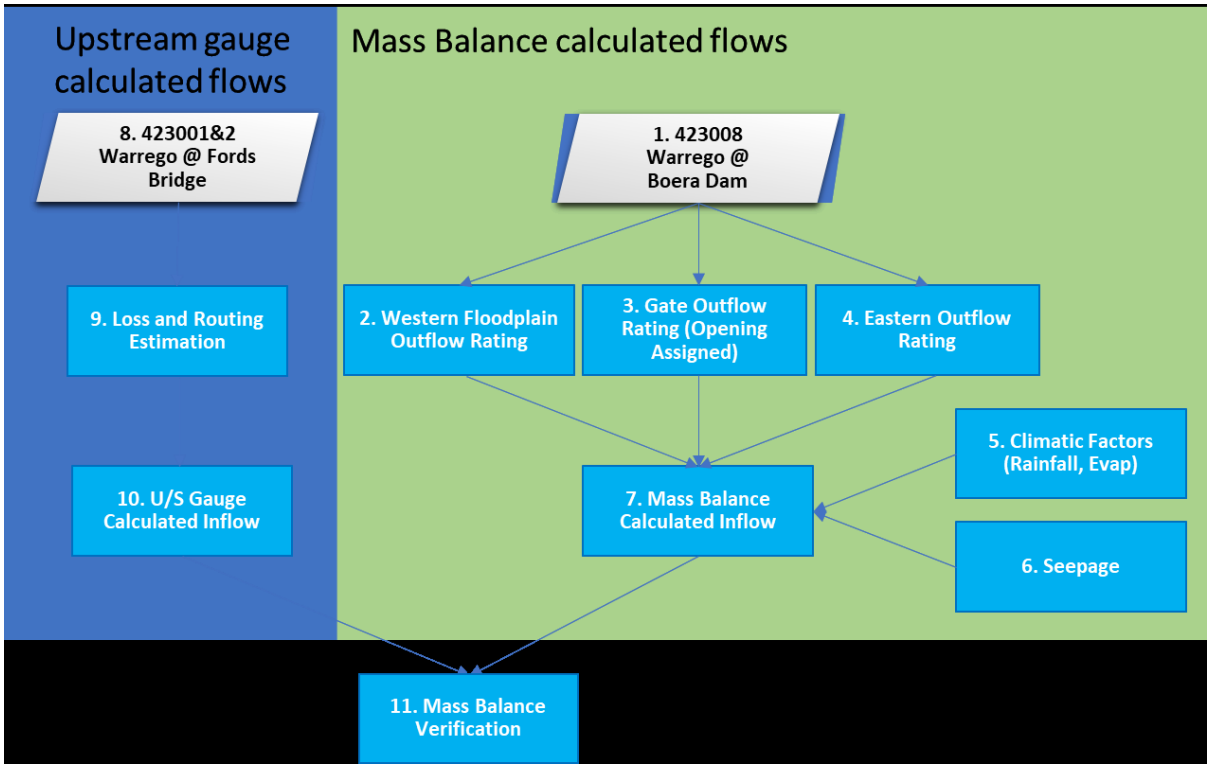


**Figure 3** **Water balance estimation flow chart**

### Accuracy of take measurement

It is not possible to determine precisely the volume of flows across an area as large and complex as that covered by Boera Dam outflows. However, comparison of the back-calculated inflows into Boera Dam using the tool with the Fords Bridge gauged flow data (with routing and losses applied) indicates an accuracy within 3% of gauged flows.

Over time, the accuracy of flow measurement to the Western Floodplain and the Darling River will be improved as flow events allow for ongoing calibration of the tool.

Future gauging and testing of the new Boera Dam regulator will enable the ratings applied to be continuously updated as presently occurs with other flow gauges in the NSW river network.

## 7.4 Accounting for use of water access licences

The CEWH holds 3 unregulated WALs at Toorale with a combined long-term average annual yield of 8,106 ML, and a high flow licence for 9,720 ML. NPWS holds 2 small WALs for stock and domestic purposes. Further details on the Toorale Warrego River WALs are included in Appendix A.

Any ‘take’, or use, of Warrego River water will continue to be in accordance with the conditions attached to each of the Toorale WALs and associated approvals. The CEWH will make decisions relating to use of the Toorale licences consistent with the Toorale OMP and informed by the advice of the environmental water advisory group.

NSW is implementing 'active management' to protect active environmental water (AEW) from extraction in unregulated rivers so it remains in the water source for environmental purposes. An active management framework is not yet in place for the Warrego River water source, so there is no formal mechanism to protect or account for instream water use as allocation (or 'take') against the environmental water access licences. As such, there will be no account debiting in the Warrego River until such a framework is implemented through the remake of the Intersecting Streams WSP.

When this is possible, account debiting for water left instream will be according to a finalised Active Management Procedures Manual for the Intersecting Streams Unregulated River Water Sources, currently under development. In the interim, the CEWH may continue to report the water being left instream as 'water use' consistent with the intended ecological outcomes on the CEWO website. Reports on Commonwealth water use are also published annually as part of the Australian Government's monitoring and research program.

### Accounting for water used on the Western Floodplain

When the gates at Boera are open to their design capacity, any flow of water to the Warrego River floodplain is not considered 'take' and should be regarded as planned environmental water under the current legislative framework.

Water diverted to the Western Floodplain as a consequence of the operation of the Boera work passing less than its design capacity will be accounted for against an appropriate WAL, in consultation with the CEWO. Until a clearer definition of planned environmental water is developed through the replacement of the Intersecting Streams WSP, if account water is exhausted the gates will be opened to their design capacity. All flows will be measured by the alternative flow measurement tool.

Uncertainties regarding take of water from Toorale under current management arrangements need to be resolved through the remake of the Water Sharing Plan for the Intersecting Streams Unregulated River Water Sources 2011, which expires in June 2022.

## 7.5 Recording and water accounting

The following recording and water accounting practices will occur:

- A logbook detailing operation of Boera and Homestead dam regulating infrastructure will be kept and updated by NPWS Bourke Area.
- During an event the department will provide details on its website of regulator gate settings and discharge rates.
- At the conclusion of an event the department will provide flow measurement results to the Natural Resource Access Regulator (NRAR) using the approved method. The results will be published on the department's website.
- The EWAG will be provided with any relevant recording and water accounting information necessary to help it in providing timely advice.
- Licensed accounts will be debited in the WaterNSW licensing system.

# 8. Infrastructure monitoring and maintenance

Note: Infrastructure at Boera and Homestead dams will be inspected and maintained in accordance with manufacturer requirements.

## 8.1 Before an event

All water management infrastructure and associated equipment subject to this OMP (Table 1) will be checked and maintained to ensure full functionality at least one week before the arrival of inflows to Boera Dam.

## 8.2 During an event

During an event, NPWS will:

- monitor releases from Boera Dam and address any operational issues
- undertake physical monitoring of Boera Dam structure at least once per week where possible for effective functioning and storage stability
- undertake physical monitoring of Homestead Dam structure at least twice per week where possible for effective functioning, clearing of debris and storage stability
- undertake physical monitoring or use a drone to monitor the stability of the western training embankment at least once per week where possible when the western bywash engages.

## 8.3 After an event

Following an event, water management infrastructure and associated equipment on Toorale will be checked and maintained to ensure full functionality and identify any damage that may have occurred during the event. This is particularly important following larger events and should allow ample time for maintenance and repairs before the next event.

# 9. Roles and responsibilities

NPWS Bourke Area manages Toorale and holds the works approvals for Boera, Booka and Homestead structures. NPWS staff will be responsible for operation and maintenance of infrastructure on Toorale.

The department will be responsible for planning, co-ordinating, communicating, monitoring and reporting on operations during each event in consultation with stakeholders. Following an event, the department will provide flow measurement results to NRAR. The results will be published on the department's website.

The CEWH holds the Toorale water access licences and manages the use of this water to achieve its stated environmental priorities. The CEWH liaises with NPWS and the department with regard to operation of the structures on Toorale to meet its environmental watering objectives.

The EWAG will provide advice for how events should be managed during adaptive operations as described above. The department will provide information about antecedent conditions to help inform the group's advice.

# 10. Reviewing and updating the OMP

The OMP will be reviewed upon the remake of the Intersecting Streams WSP (no later than June 2024) and then every 5 years, having regard to the Toorale Monitoring and Adaptive Management Framework that will be completed before commissioning of the Boera and Homestead dam structures in 2022. The EWAG will provide input into these reviews.

Details of the matters to be considered during the reviews are provided in Appendix B.

The OMP will be assessed annually and following a significant flow event to determine whether it is providing appropriate and clear guidance to operators as required and delivering environmental flow outcomes as intended.

# 11. References


Alluvium (2020) *Water Balance Modelling and Hydrologic Assessment Report: Toorale water infrastructure project – Survey and design*, final report prepared for Environment, Energy and Science, NSW Department of Planning, Industry and Environment, Dubbo, NSW.

Department of Planning, Industry and Environment (2020) *NSW Non-Urban Water Metering Policy*, Department reference number: PUB20/447.

Eco Logical Australia (2019) *Toorale Water Infrastructure Project – Phase 2, Review of Environmental Factors*, prepared for NSW Department of Planning, Industry and Environment.

Environment, Energy and Science (2020) *Intersecting Streams Long-Term Water Plan Parts A and B*, Department of Planning, Industry and Environment, ISBN 978-1-922317-87-2.

Environment, Energy and Science (2020) *Barwon-Darling Long-Term Water Plan Part A.*

Environment, Energy and Science (2020) *Barwon-Darling Long-Term Water Plan Part B: Barwon-Darling planning units.*

Environment, Energy and Science (2021) *Toorale National Park and Toorale State Conservation Area Plan of Management*, Department of Planning, Industry and Environment, ISBN 978-1-922558-16-9.

MDBA (2020) *Basin-wide environmental watering strategy*, second edition, Murray Darling Basin Authority.

Water NSW (2021) *Water access licences*, Water NSW website.

# Appendix A: Toorale water access licences

| Location | Holder | Water access licence no. | Volume (ML) | Nominated works approval no. |
|---|---|---|---|---|
| Boera Dam | CEWH | WAL27552 | 6,000 | 85CA751696* |
| Boera Dam | CEWH | WAL27555 | 972 | 85CA751696* |
| Boera Dam | CEWH | WAL27558 | 1,134 | 85CA751696 |
| Western Floodplain (special high flow) | CEWH | WAL31152 | 9,720 | 85CA751696* (works)<br>85AL752845 (use) |
| Boera Dam | NPWS | WAL27556 | 7 (stock) | |
| Peebles Dam | NPWS | WAL27551 | 9 (stock and domestic) | |

*Pending – CEWH is in the process of applying to amend the WALs 25552, 27555 and 31152 to add water supply work 85CA751696 under section 71W of the *Water Management Act 2000*.

# Appendix B: Condition 91 of Toorale water infrastructure Phase 2 REF determination notice

**The applicant must prepare a monitoring and adaptive management framework[1] in consultation with the National Parks Manager – Bourke Area (or delegate) and the North West Biodiversity Conservation Division (Environmental Water and Floodplains Team). The initial framework is to be finalised and approved by the National Parks Director – Northern Inland prior to the commissioning of the new Boera Dam structure.**

The monitoring and adaptive management framework must:

a. consider the broader water management legislation, planning and policy context

b. demonstrate consistency with the desired outcomes and management directions for the site and infrastructure management in the Toorale Plan of Management as relevant to the matters listed under Condition 92(f)

c. facilitate adaptive management of the Boera outlet over time, including refinement of the initial operational strategy set out in the REF, to meet the environmental watering requirements of Toorale's wetland[2] environments

d. facilitate effective responses to adverse environmental impacts

e. address (but not necessarily be limited to) the following matters:

   i. rehabilitation/revegetation of the direct disturbance areas, including weed management and soil erosion/stability issues for a minimum 5-year period from completion of construction works

   ii. minimising any adverse water quality impacts from the operation of structures on Toorale

   iii. maintenance of natural and cultural values associated with the wetland environments of the Toorale National Park and State Conservation Area

   iv. optimisation of native fish passage

   v. changes in the composition and abundance of the fish community

   vi. minimising adverse impacts on park neighbours from operational decisions.

The monitoring and adaptive management framework must identify:

a. how the following will be defined, quantified, tracked and reported on over time, with specific reference to desired outcomes and management directions expressed in the Toorale Plan of Management:
   i. the net environmental benefit of the project
   ii. delivery of a maintain or improve outcome for natural and cultural values on Toorale

b. the key natural values to be prioritised in the monitoring program. At a minimum this must consider (but not necessarily be limited to):

   i. threatened ecological communities as listed under the *Biodiversity Conservation Act 2016*, *Fisheries Management Act 1994* and *Environment Protection and Biodiversity Conservation Act 1999*

   ii. key plant community types (PCTs) recognised as important wetland associations and waterbird habitat, including at-risk lignum communities

| | |
|---|---|
| iii. | known populations of threatened or locally or regionally significant flora and fauna most at risk from predicted inundation changes |
| iv. | the riparian environments of the Warrego River |
| v. | ecosystem diversity on Toorale, particularly any ecosystems remaining under-reserved in the bioregion |
| c. | in consultation with the Toorale Joint Management Committee, where key cultural resources/cultural landscape values intersect with natural values and adequately represent these in the monitoring program. |
| 93. The monitoring and adaptive management framework must include specific and measurable: | |
| a. | performance targets and annual targets |
| b. | completion criteria (for Condition 92 e)i ) |
| c. | performance measures |
| d. | trigger, action, response plan(s) which set out the triggers and subsequent corrective actions to be recommended for implementation if monitoring identifies that performance targets are not being met |
| for (but not necessarily limited to) the matters listed in Condition 92e) and 93. | |

1. The monitoring and adaptive management framework requirements need not be addressed within a single plan. The requirements of these conditions can be met within other individual plans described within this approval as necessary. A single overarching document can direct reviewers to the documents within which conditions 91 to 99 are addressed. The applicant must comply with all measures identified in the approved documents.

2. All references to 'wetland' in the determination conditions refer to the definition provided in the DECCW (2010) NSW Wetlands Policy. i.e. areas of land that are wet by surface or groundwater, or both, for a long enough period that the plants and animals in them are adapted to, and depend on, moist conditions for at least part of their life cycle. They include areas that are inundated cyclically, intermittently or permanently with fresh, brackish or saline water, which is generally still or slow moving except in distributary channels which may have high peak flows. Examples of wetlands (relevant to Western NSW) include lakes, lagoons, rivers, floodplains, swamps, bogs, billabongs and marshes.