2026
Barren Box Project
Annual Environmental Management Report



GENERAL

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Executive Summary

The Barren Box Storage Project Annual Environmental Management Report (AEMP) for the financial year (FY) 2025/26 has been prepared by Murrumbidgee Irrigation Limited (MI) to meet the reporting requirements of Development Approval DA 101-4-2004-i. MI received feedback from the Department regarding MI's 2024/25 AEMR on 15 November 2025. The Department considered that the Annual Report generally satisfied Condition 7.4 of the consent. Any future comments received from the Department will be incorporated into future Barren Box Storage (BBS) Project AEMRs.

During the 2025/26 reporting period, MI continued to make progress towards meeting the operational requirements of Development Approval (DA 101-4-2004-i). No additional non-compliances were identified. MI is also continuing to address feedback received from the Department following the submission of the Operational Environmental Management Plan (OEMP) and associated documentation in 2025/26. In addition to updates to MI's OEMP, since 2024/25, a dedicated flood management plan has been created, and feedback has been received from the Department on survey methodology programs for Barren Box Storage Wetland Cell and the Lower Mirrool Creek Floodway (LMCF). Subsequent updates in response to this feedback are now underway.

The reporting period was characterised by very dry conditions and low water-storage requirements. The BBS Active Cell was not operational, and no releases or inundation of the BBS wetland cell or Lower Mirrool Creek Floodway occurred. Water-quality monitoring continued, although the absence of Active Cell operation limited the availability of monitoring data.

Rehabilitation planning and ecological monitoring continued during the reporting period. MI submitted the proposed ecological methodology to the Department for review; further amendments are required before implementation.

No variations to the BBS Project approval were obtained during FY2025/26. Key actions for the next reporting period include completing the remaining fencing, continuing weed and pest management, finalising ecological monitoring methods, undertaking field assessments when approved, maintaining water-quality monitoring and updating the OEMP in response to Departmental feedback. MI also intend to carry out stakeholder consultation relating to LMCF hydrology and biodiversity and Barren Box cultural heritage to further improve the environmental and cultural sensitivity of the project.

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Abbreviations

Abbreviation	Description
ACR	Annual Compliance Report
Act	Environmental Planning and Assessment Act 1979 (NSW)
AEMR	Annual Environmental Management Report
ANZECC	Australian and New Zealand Environment and Conservation Council
Applicant/ Consent owner	Murrumbidgee Irrigation Limited
BBO	Barren Box Outfall channel
BBOW	BBS Outflow Water
BBS	Barren Box Storage
BBST	Water within BBS
BBSW	Barren Box Storage and Wetland
BBWRP	Barren Box Wetland Rehabilitation Plan
Brays Dam	Current name for En-route Storage (term used in EIS)
CHMP	Cultural Heritage Management Plan
CSC	Carrathool Shire Council
CSIRO	Commonwealth Scientific Industrial and Research Organisation
Department/DPHI	NSW Department of Infrastructure, Planning and Natural Resources (for original consent); subsequently: Department of Planning, Housing and Infrastructure (current)
DCCEEW	NSW Department of Environment and Conservation (incorporating the EPA and former National Parks and Wildlife Service); now called the Department of Climate Change, Energy, the Environment and Water (formerly Department Planning and Environment, DPE).
Development	The Development as described in DA-101-4-2004-i, and all additional information submitted in support of that application. This includes the works associated with Barren Box Swamp, the Wah Wah main and the En-route Storage Facility
DIPNR/ Natural Resources	Department of Infrastructure, Planning and Natural Resources
Director-General/ D-G	Director-General of the NSW Department of Infrastructure, Planning and Natural Resources, or delegate (now Department of Planning, Housing and Infrastructure)

DPHI	NSW Department of Planning, Housing and Infrastructure
DCCEEW BCS	Biodiversity, Conservation and Science (part of the DCCEEW)
EC	Electrical Conductivity
En route storage	EIS terminology – now known as Brays Dam
EPA	NSW Environment Protection Authority (formerly part of the Department of Environment and Conservation)
EIS	Amended Environmental Impact Statement: Barren Box Swamp Project, NSW, Volumes One, Two and Three prepared by URS Australia Pty Ltd and dated December 2004
EM	Electromagnetic survey
EPL	Environment Protection Licence issued under the *Protection of the Environment Operations Act 1997* (NSW)
ER	Environmental Representative
ETo	Evapotranspiration (crop reference)
EWO	Environmental Water Officers (DCCEEW)
EWR	Environmental Water Requirements
FY	Financial Year
FYE	Financial Year Ending
GCC	Griffith City Council
GIS	Geographic Information System
GPWSD	Gunbar Private Water Supply District
ha	hectare(s)
HSC	Hay Shire Council
IREC	Irrigation Research and Extension Committee
LMCF	Lower Mirrool Creek Floodway
LCR	Licence Compliance Report
LWMP	Land and Water Management Plan
Minister	NSW Minister for Infrastructure and Planning (now DPHI), or delegate
MCMA	NSW Government's Murrumbidgee Catchment Management Authority
MDBA	Murray Darling Basin Authority

MDFRC	Murray Darling Freshwater Research Centre
MI	Murrumbidgee Irrigation Limited
MIA	Murrumbidgee Irrigation Area
MIRFLD	Mirrool Creek Floodway
ML	Megalitre
MIRMCN	Upstream from BBS
NAP	National Action Plan for Salinity and Water Quality
NPW Act	*National Parks and Wildlife Act 1974*
NRAR	Natural Resources Access Regulator
OEMP	Operational Environmental Management Plan
Operation	Any activity that results in the use of the Barren Box Swamp Project as described in DA-101-4-2004-i, including the use of the Intermediate and Active Storage Areas of Barren Box Swamp, the enlarged Wah Wah Main and En-route storage facility for the purposes of capturing, storing or diverting water
NSW SES	NSW State Emergency Services
SILO	Queensland Government Long Paddock Initiative
site	The land to which this consent applies
t	tonnes
µS/cm	micro siemens per centimetre
µg/L	micrograms per litre
WoNS	Weed of national significance as identified under NSW's Weedwise and supporting legislation.
WWID	Wah Wah Irrigation District
WWM	Wah Wah Main – a channel system downstream of BBSW
WWO	Willow Dam Regulator
WWSD	Wah Wah Stock & Domestic

1 Project details

Project Name:	Barren Box Swamp Project
Project Application Number:	DA-101-4-2004-i
Description of Project:	The construction and operation of the Barren Box Swamp Project "the development" as part of the operation of an integrated irrigation scheme within the Murrumbidgee Irrigation Area, and including: the splitting of the Barren Box Swamp into three distinct cells; an active storage cell covering 1,230 hectares with a storage volume of 24,000ML at full supply level (30% of the current Swamp storage volume); an intermediate storage cell covering 320 hectares with an effective storage volume of 4,000ML (10% of the current storage volume); the restoration of a more natural flooding regime to the remaining 1,500 hectare area of the cell for the purposes of rehabilitating this area as an ephemeral wetland; widening of the Wah Wah main channel; construction and use of a 2,500 ML En-route storage facility on Mirrool Creek, which is located upstream of Barren Box Swamp.
Project Address:	Shaw Road, Tabbita, NSW
Proponent:	Murrumbidgee Irrigation Limited

2 Requirements

The Barren Box Annual Environmental Management Report (AEMR) for the financial year 2025/26 has been prepared to meet the reporting requirements of MI's development approval (101-4-2004-i).

This report has been prepared for the 2025/26 financial period and is submitted annually by 30 October to satisfy Condition 7.5 of the Development Approval. The reporting schedule is aligned with MI's Annual Compliance Report obligations for Environmental Protection Licence (EPL 4651) and Combined Approval (40CA403245) under the Monitoring and Reporting Plan.

The 2025/26 AEMR addresses conditions 7.4 a-m of the development approval DA 101-4-2004-I (see Appendix A); plus any matters identified by the Director-General under Condition 7.6. The AEMR must be submitted to the Director-General, Council (i.e., Griffith City) and DCCEEW annually under Condition 7.5.

MI received feedback from the Department regarding MI's 2024/25 AEMR on 15 November 2025. The Department considered that the 2024/25 AEMR generally satisfied Condition 7.4 of the consent.

2.1 Clause 7.4 Annual performance reporting requirements

This report is structured to address the requirements of an Annual Environmental Management Report as required under Condition 7.4 of DA 101-4-2004-I. These reporting requirements have been summarised in **Table 1**.

Table 1 - Annual Environmental Management Report requirements

Condition	Report section
7.4 The Applicant must, throughout the life of the development, prepare and submit for the approval of the Director-General, an AEMR. The AEMR shall review the performance of the development against the Operation Environmental Management Plan (condition 6.4), the conditions of this consent and other licences and approvals relating to the development.	This report
The AEMR shall include, but not necessarily be limited to; a) details of compliance with the conditions of this consent;	This report **Section 3** **Appendix A**
b) a copy of the Complaints Register (refer to condition 5.3 of this consent) for the preceding twelve month period (exclusive of personal details), and details of how these complaints were addressed and resolved. This must include details of any environmental surplus flow related complaints;	**Section 4**
c) a comparison of the environmental impacts and performance of the development against the environmental impacts and performance predicted in the EIS and the additional information listed condition 1.1;	**Section 7**
d) results of all environmental monitoring required under this consent and other approvals, including interpretations and discussions by a suitably qualified person;	**Sections 7, 8, 9** **Appendix B** **Appendix C** **Appendix D** **Appendix E** **Appendix F** **Appendix G**
e) a list of all occasions in the preceding twelve-month period when environmental performance goals for the development have not been achieved, indicating the reason for failure to meet the goals and the action taken to prevent recurrence of that type of incident;	**Section 10**
f) demonstration and documentary evidence that a minimum average of 20,000 Megalitres of water savings have been made for the twelve month period, including evidence that the water savings have been returned to Water for Rivers. Should a minimum average of 20,000 Megalitres of water savings not be achieved for the reporting period, the Applicant shall provide detailed justification as to why the level of savings was not made;	**Appendix A**
g) details of the total volume of water savings that have been made for the reporting period	**Appendix A**
h) details of the health of the Lower Mirrool Creek Floodway Wetland System. This is to include details of the condition of vegetation, duration and extent of inundation and quality of the water discharged through the system;	**Section 7.1.2, 9** **Appendix C** **Appendix G**

i) details of any deliberate releases: refer to condition 6.5d) xv);	**Section 7.1.2,** **Section 9.2** **Appendix A**
j) outline the number of occasions and estimate of water volume that was made available as off-allocation / environmental surplus to licence holders in Barren Box, Mirrool Creek and the Wah Wah District in the twelve-month period;	**Appendix A**
k) identification of trends in monitoring data over the life of the development to date;	**Sections 7, 8, 9**
l) a list of variations obtained to approvals applicable to the development and to the site during the preceding twelve-month period; and	**Section 11**
m) environmental management targets and strategies for the following twelve-month period, taking into account identified trends in monitoring results.	**Section 12**
7.5 The Applicant must submit a copy of the AEMR to the Director-General, Council and the DEC (now DCCEEW) every year, with the first AEMR to be submitted no later than twelve months after the commencement of operation of the development. The second and subsequent AEMRs are to be submitted every 12 months from the first AEMP or concurrently with the EPA's annual reporting period established for the site under its EPL for the site. [Note: EPL4651 annual report due 30 October]	Noted. Report will be issued to DPHI & DCCEEW (via Major Projects portal), and Griffith City Council
7.6 The Director-General may require the Applicant to address certain matters in relation to the environmental performance of the development, in response to review of the Annual Environmental Report and any comments received from the EPA and Council. Any action required to be undertaken shall be completed within such period as the Director-General may agree.	Noted

3 Compliance status summary (7.4a)

A compliance table, including references to relevant sections of this report, is included in **Appendix A**. The compliance table (**Table 13** in **Appendix A**) outlines the exceptions and/or nonconformances against the conditions of consent applicable to the operational phase of the development and progress or response undertaken to date by MI. A summary of compliance is outlined below in **Table 2.**

Table 2 - Operational conditions – compliance summary

Compliance status	Conditions	Summary	Proposed actions
Compliant	1.3, 1.8, 1.9; 2.1, 2.3; 3.1, 3.6, 3.11, 3.12, 3.13, 3.14, 3.39, 3.40, 3.52; 4.1, 4.2; 4.3, 5.1, 5.4; 6.1a-e; 6.4b-k; 6.5a, 6.5b, 6.5c, 6.5di-dii, 6.5div-vi, 6.5dviii-xiii, 6.5xv; 6.5ei 6.5eiii-vi; 7.1, 7.3a-d, 7.4a-m, 7.6		
Partially compliant	6.4, 6.4a	6.4a – OEMP requires updating with all statutory and other obligations.	OEMP to be updated to include Department feedback and consultation outcomes.
	6.5d	Wetland Rehabilitation and Management Plan:	
		diii – Financial commitment	Environmental Planning budget includes ecological surveys. MI are to establish an advisory group to inform the ecological methodology and rehabilitation plans. Once finalised, ecological field assessments are to be completed.
		dvii – Salt and nutrient accretion	See **Section 12**
		dxiv – Ongoing monitoring of LMCF	See **Section 12**. MI working collaboratively with DPE EHG EWO and DPE BCD to define monitoring program.
	6.5e, 6.5ei-vi	6.5 Flood Management Plan:	
		6.5e – Consultation with Council and DNR	See **Section 12**. Flood Management Plan 2026 has been developed and submitted to the Department for review. Requires further update to incorporate the outcomes of the advisory groups and Department feedback. Establish hydrological and ecological advisory groups.
		6.5eii - Program for assessment of water requirements for LMCF	See **Section 12**
	6.6	OEMP – 3 yearly review and notification to D-G, EPA and Council	Submit revised OEMP in response to 2026 feedback.

Conditions which have been reported in previous BBS Annual Environmental Management Reports as fully satisfied or no longer relevant to the ongoing operation of Barren Box Storage, have not been addressed in the body of this report. Information relating to the fulfilment of these conditions has been retained in **Appendix A**.

4 Complaints (7.4b)

MI's Customer Services team responds to customer and community enquiries, requests, and complaints. Where required, environmental staff and/or other subject matter experts within MI will be consulted to investigate and/or respond.

No complaints were received for the financial year 2025/26 as summarised in **Table 3** as required under condition 7.4b.

Table 3 - Summary of complaint numbers for 2025/26 financial year.

Year	Number
2025-2026	0

5 Meteorology

The weather conditions between the completion of construction of the BBS project (August 2006) and current climatic conditions up to 2026 have varied significantly. This period included the end of the Millennium drought and floods in 2012, 2016/17, and 2022 (**Figure 1, Appendix B**).

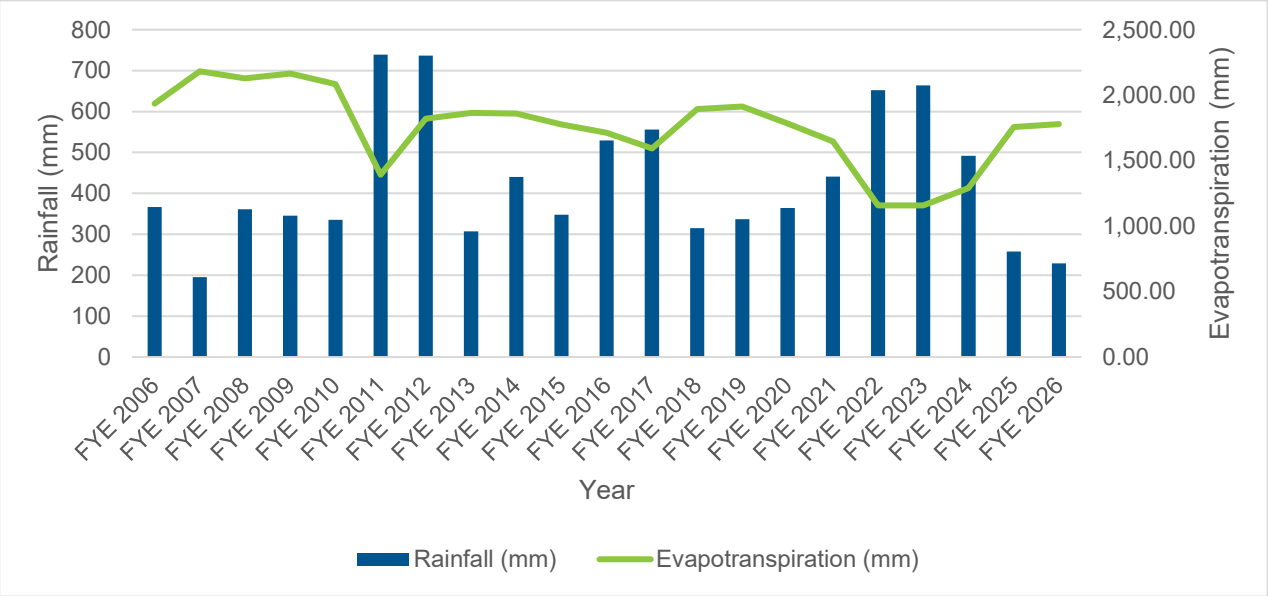

Figure 1 - Rainfall and evapotranspiration for financial years 2006-2026

Rainfall has continued to decline over the past three years, with 2025/26 recording well below-average rainfall. This is the lowest rainfall Griffith has experienced since 2007. There was a decrease of 28.8 mm compared to 2024/25, and 262.4 mm compared to 2023/24.

Evapotranspiration remained relatively consistent with the prior reporting year, increasing in 2025/26 by only 22.3 mm compared to the evapotranspiration recorded in 2024/25.

6 Operational Environmental Management Plan (6.4-6.6)

An Operational Environmental Management Plan (OEMP) for the project was developed and approved by the Department of Planning in 2008, following MI addressing Departmental comments after the initial submission in July 2006.

The OEMP was reviewed and provided to the Department in 2023, with the Department subsequently providing MI with comments. The OEMP was amended in January and May 2026 to include actions from the 2024/25 AEMR and feedback from the following Government Agencies:

- NSW Department of Primary Industries and Regional Development, Agriculture and Biosecurity Heritage NSW
- NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) Water Group

While most feedback has now been addressed, MI continue to carry out consultation activities to inform the OEMP and associated documents, including the Flood Management Plan, Cultural Heritage Procedure and survey methodology in response to Department feedback. Once all feedback has been addressed, notification will be provided as required under Condition 6.6.

7 Environmental performance (7.4c)

The following sections detail the environmental impacts and performance predicted in the EIS and compares them with the performance of the project as required under condition 7.4c of the development consent (101-4-2004-i).

Figure 2 and **Figure 3** are the maps for locality and BBS structural changes as provided in the EIS.

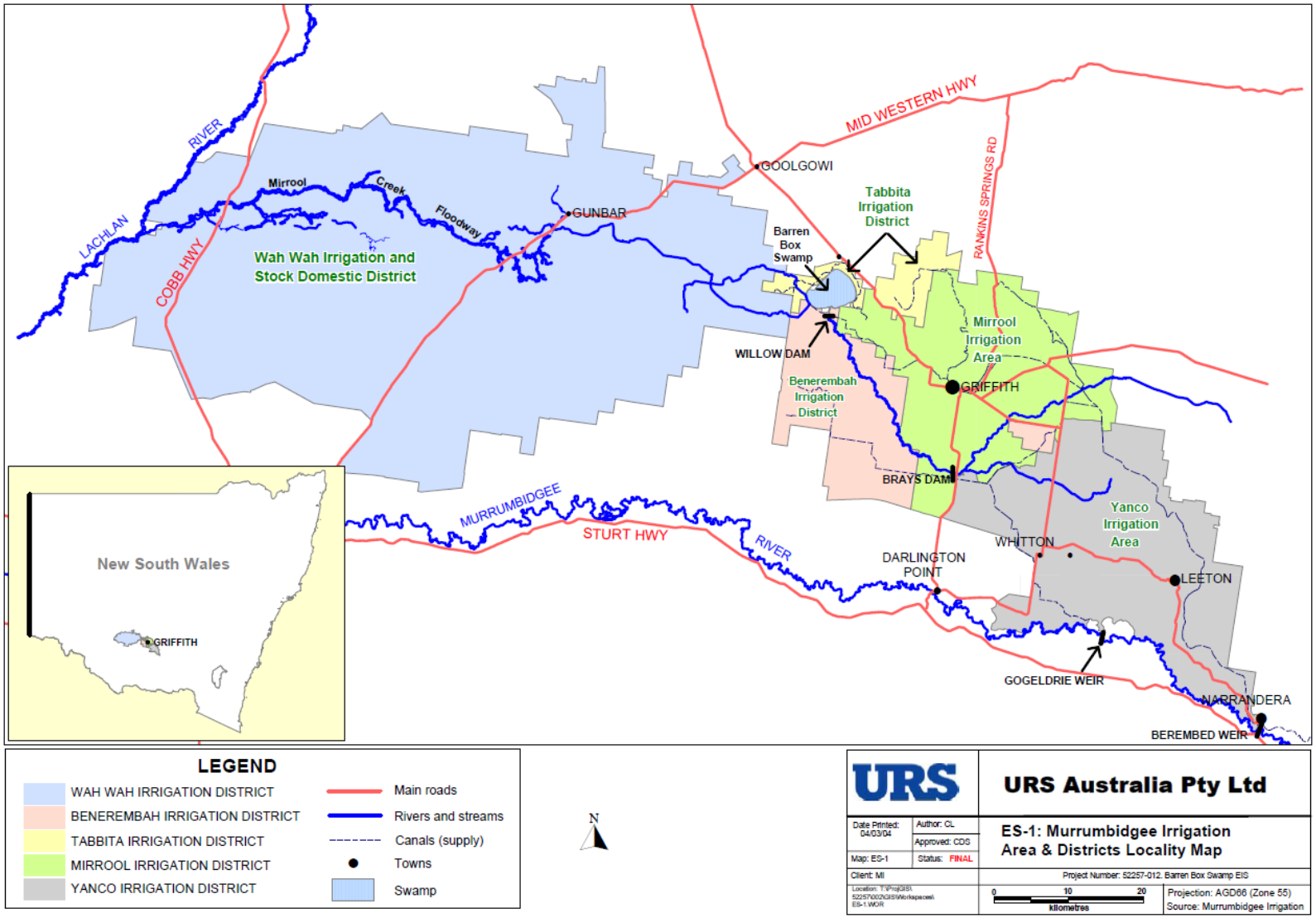

Figure 2 - Murrumbidgee Irrigation Area and Districts 2004 Locality Map (EIS ES-1)

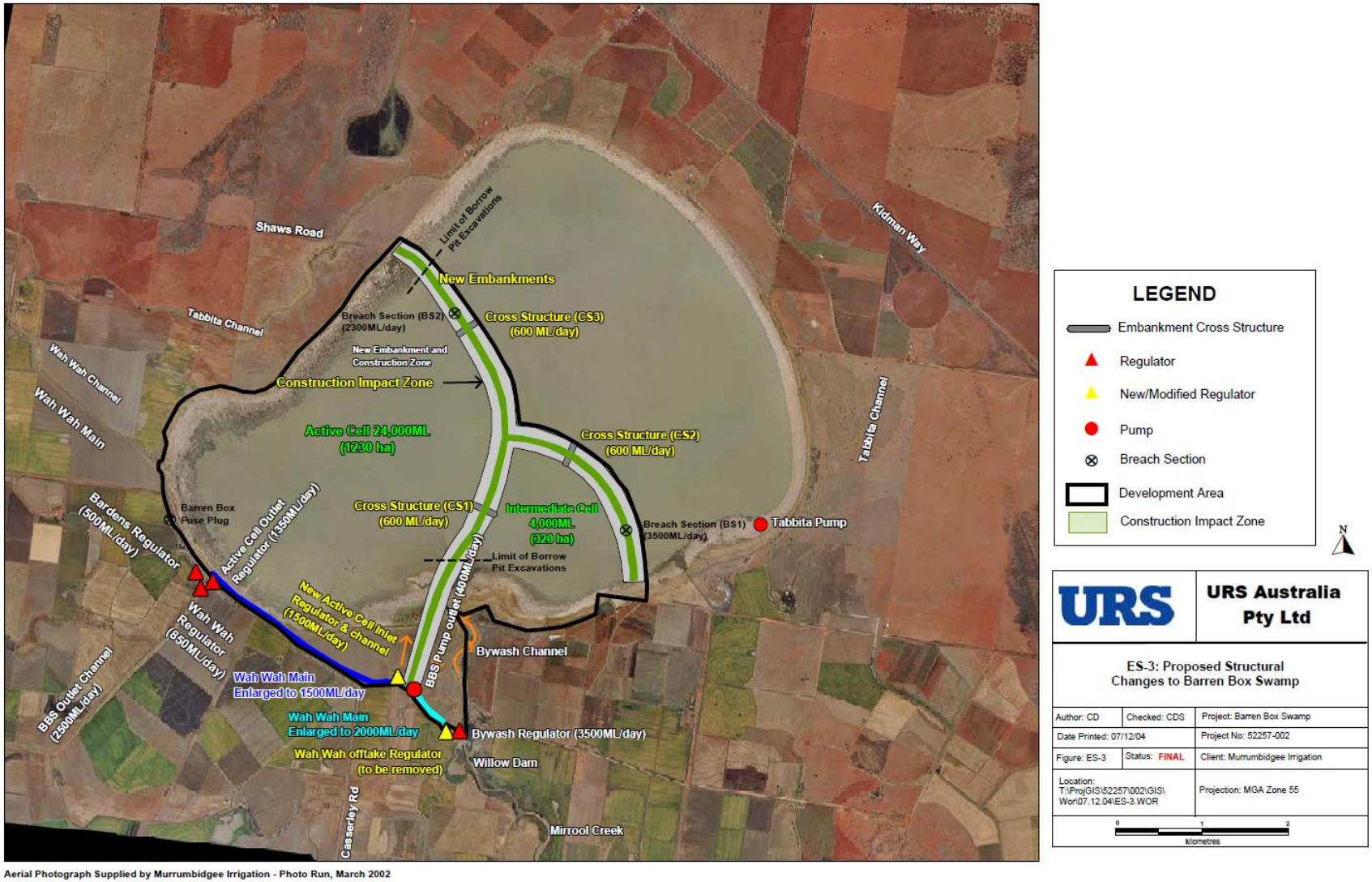

Figure 3 - Structural changes to BBS (EIS ES-3)

7.1 Surface hydrology and flooding (EIS Chapter 11)

The BBS EIS covered surface hydrology and flooding under Chapter 11, supported by EIS Appendix C: Resources Modelling and Flooding.

The EIS identified several potential impacts associated with the proposed changes to the water regimes in the MIA as a result of the BBS Project. They were:

- reduction in MIA water entitlement;
- reliability of supply to the WWID;
- impact on water access licences;
- water regime for ephemeral wetland and Mirrool Creek Floodway; and
- effect on flood mitigation capacity and flood levels.

The potential impacts associated with each of the above are discussed below, with supporting data provided in **Appendix C.**

7.1.1 Water balance model and hydrological changes

7.1.1.1 *EIS impacts or predictions*

The EIS determined the average annual water savings expected from the project, by modelling the existing and proposed system, with the reduction in the calculated river diversion volumes deemed as water savings.

The model showed predicted water savings principally resulted from reduced evaporation from Barren Box Swamp through the creation of smaller, more responsive storage, and the ability to capture and reuse excess water from Mirrool Creek upstream of BBS, that may be discharged as forced releases to the Lower Mirrool Creek Floodway (LMCF).

The consequence of these water savings would be a reduction in river diversions to the Sturt Canal and a slight increase in diversions to the Main Canal.

The EIS schematic model is shown in **Figure 4** (EIS Figure 11-3), the summary of modelled average annual water savings (Submissions Report Figure 4-1) is shown in **Figure 5** and the summary of Hydrological Changes in the MIA (EIS Table 12.3, Submission Report revision Table 4.4) is shown in **Table 4**.

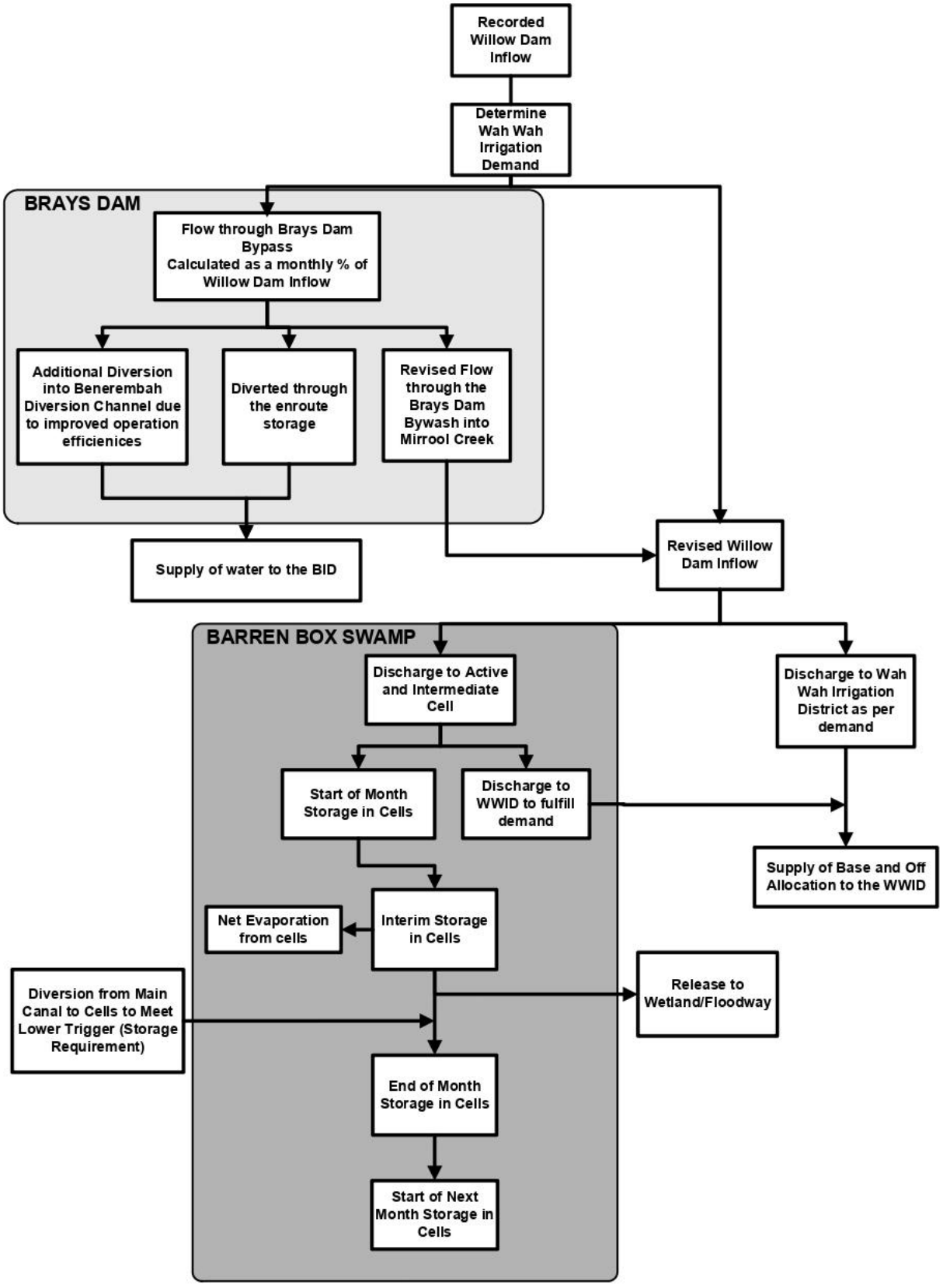

Figure 11-3 Schematic Model for Proposed Conditions

Figure 4 - EIS Model for predicted/ proposed conditions

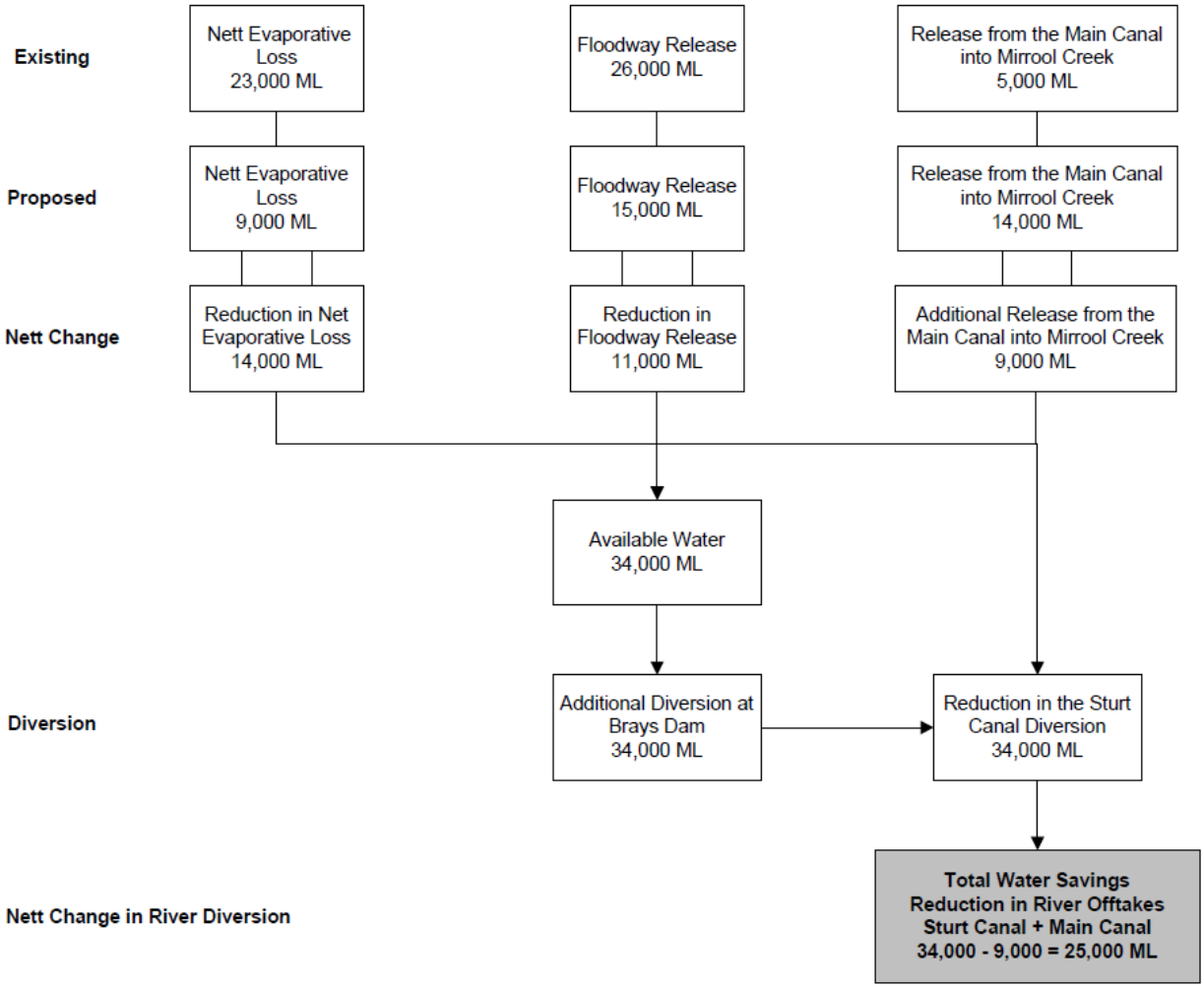

Figure 4-1 Revised Figure 5.6 and C17

Figure 5 - Summary of modelled average annual water savings (Submissions Report Figure 4-1)

Table 4 below (based on EIS Table 11-3, revised in the Submissions Report as Table 4-4) outlines the proposed hydrological changes in the MIA due to the BBS project.

Table 4 - Summary of hydrological changes in the MIA

ID	Description	Annual average flows (ML)		
		Existing conditions	Proposed conditions	Difference
MAIN	Main Canal at East Mirrool regulator	165,000	174,000	+9,000
EMR	Diversion from the Main Canal into Mirrool Creek	5,000	14,000	+9,000
BRAYS	Flow into Brays Dam	90,000	99,000	+9,000
BDC	Total flow diverted to BID	25,000	58,500	+33,500
	Via diversion channel	*25,000*	*35,500*	*+10,500*

ID	Description	Annual average flows (ML)		
		Existing conditions	Proposed conditions	Difference
	Via en-route storage (Brays Dam)	*0*	*23,000*	*+23,000*
MIR	Flow through Brays Dam bywash	65,000	40,500	-24,500
STURT	Diversion from Murrumbidgee River in Sturt Canal (into Gogeldrie Weir)	160,000	126,500	-33,500
WILL	Flow into Willow Dam	192,000	167,500	-24,500
WWID	Water delivered into the WWID	144,000	144,000	0
EVAP	Net evaporative losses from BBS	23,000	9,000	-14,000
FLOOD	Release to Lower Mirrool Creek Floodway	26,000	15,000	-11,000

7.1.1.2 *Current performance*

The key hydrological changes from the Water Balance Model provided in the EIS are:

- Releases to the LMCF: see **Section 7.1.2**
- Water savings from the project: Permanent transfer of 20,000 ML, see **Appendix A**.
- Water delivered to the WWID: see **Section 7.1.3** and
- Net evaporative losses from BBS: see **Section 7.4**.

Net evaporative losses from BBS were estimated to reduce by an annual average of 14,000 ML from the project. This was predicted based on the reduction in surface area of stored water due to the construction of storage cells and the improved flexibility to move water within the storage system to respond to both customer demand and seasonal volumes.

Evaporation for the 2025/26 period was higher than the 2024/25 period. This is likely a result of sustained dry conditions throughout the reporting period, resulting in higher rates of evaporation and reduced replenishment through rainfall. Hydrological results of the lock-up test are discussed further in **Section 7.4.**

7.1.2 Discharges to BBS and Lower Mirrool Creek Floodway

7.1.2.1 *EIS impacts or predictions*

7.1.2.1.1 BBS and Lower Mirrool Creek Floodway discharges

The results of the EIS water balance model indicated the average annual discharge of excess drainage waters to the LMCF would be reduced from an average of 26,000 ML per year, to 15,000 ML per year. The predicted 40% reduction occurs because of the proposed improvements in the efficiency of the water supply and drainage system. Under the EIS proposed conditions, a portion or all this water could be released into the section of BBS dedicated for flood mitigation as a continuation of the existing use.

7.1.2.2 *Current performance*

During the 2025/26 reporting year, total water discharges remained lower than in previous reporting years. This reduction was primarily due to below average annual rainfall, continued improvements in on-farm water-use efficiency and increased water reuse. MI endeavours to minimise releases to the floodway wherever practicable to reduce potential impacts on landholders in the surrounding area. This is supported by recycling irrigation drainage water within the MIA and by assisting customers to improve on-farm water efficiency and reuse.

7.1.2.2.1 BBS wetland cell

There was no water was released to the BBS wetland cell during the 2025/26 reporting period due to dry conditions and low water storage requirements. A summary of monthly releases in comparison to prior years is provided in **Table 16** in **Appendix C**. The Active cell remained dry and non-operational throughout 2025/26.

The absence of releases during 2025/26 is consistent with the predictions of the Environmental Impact Statement (EIS), which anticipated that inundation of the wetland would occur periodically rather than on an annual basis, in response to climatic conditions, flood events and operational water management requirements. Likewise, the rehabilitation strategy anticipated that inundation of the Wetland Cell would occur on average once every four years for 2 – 8 months (MI 2008). This aligns with current operations, with the last major inundation occurring in 2022/23, and smaller releases occuring in 2023/24 and 2024/25.

7.1.2.2.2 Lower Mirrool Creek Floodway

There was no water released to the LMCF during 2025/26. A summary of the monthly releases in comparison to prior years is provided in **Table 17** in **Appendix C**.

Since the commissioning of the BBS project discharges to the LMCF have been mainly driven by flood events and following directions from Flood Management Authorities, with smaller releases occurring due to operational needs. The low frequency of these operational releases is broadly consistent with the predictions of the EIS, which anticipated that improvements in the efficiency of the water supply and drainage system would reduce overall discharge volumes to the LMCF.

Accordingly, the 2025/26 reporting year was subject to below average annual rainfall, and continued efforts to improve water efficiency, contributing to an absence of floodway releases. By minimising releases to the floodway where practical, MI also endeavours to reduce impacts on landholders in the surrounding area.

There was no water released to the LMCF during 2025/26 as shown in **Table 17**.

To support long-term environmental water management at Barren Box Swamp, an advisory group is proposed to be established to investigate and discuss floodplain hydrology, environmental watering objectives, and the minimum watering requirements necessary to maintain the environmental values of the site.

7.1.3 Reliability of the supply to Wah Wah Irrigation District (WWID)

7.1.3.1 *EIS impacts or predictions*

EIS modelling of the proposed changes to BBS (and the En-route Storage) provided for an annual average flow of 162,500 ML through Willow Dam (i.e., water to supply the WWID), which is 132% of the base allocation of the WWID. This amount was used as the 95 % confidence limit to determine the optimum storage requirement in BBS. The modelling is therefore conservative in ensuring that the storage and supply system can satisfy the demand in the WWID when water is available.

The results of the EIS modelling showed the reduction in available water storage capacity at BBS, because of the splitting of the swamp and the increase in diversions at Brays Dam as a result of the proposed En-route Storage, would not have a significant impact on the delivery of the stated water volume objectives to the WWID.

7.1.3.2 *Current performance*

7.1.3.2.1 Original concept for BBSW operation

The original concept for the operation of BBS outlined in the EIS included the expectation of high drainage flows arriving at Willow Dam. The original guidelines included upper and lower trigger volumes for the combined volume of the Active and Intermediate Cells. Whilst no longer relevant, the lower monthly trigger volumes were developed for supply to WWID and included an assumed diversion pattern from Brays Dam.

These operating volumes were based on an annual demand for WWID of 165,000 ML and assumed a guaranteed inflow arriving at Willow Dam during the peak months. This inflow was to be from farm drainage, rainfall and escape flows to meet the required water to be diverted from the river throughout the season to meet the monthly trigger levels proposed.

The upper trigger volumes were developed to support the determination of internal surplus events for WWID customers. These upper triggers remain as the BBS surplus trigger volumes and are included in MI's Surplus Water Rules available on MI's website: Surplus Water Rules.pdf.aspx (mirrigation.com.au).

7.1.3.2.2 Current operating guidelines

Significant changes to MI's integrated water-delivery system, together with changes in customer demand and water-use patterns, mean that the original operating concepts for the Barren Box Storage and Wetland (BBSW) are no longer appropriate. Key changes from the original operating concept include:

Annual metered usage to WWID customers has not exceeded 95,000 ML - **Table 5** (FYE 2010-2026).

MI modernisation and automation works have reduced drainage and inadvertent flows to Willow Dam.

Changes in water allocations, land use, management practices and climate conditions have made the original trigger levels outdated. Surplus water triggers now must consider:

- water allocation %
- annual and seasonal changes in land use and associated practices
- annual and long-term climate forecasts
- BBS storage volumes, including the Wet Cell
- flows arriving at Willow Dam
- current WWID demand

Increased permanent plantings on the WWM channel system have increased reliance on BBS Intermediate Cell pumps.

Expanded irrigation and changing land use have increased demand on the Main and Sturt channels. Planned diversions to BBS may be required during peak demand periods to reduce pressure on the channel system.

BBSW operations now need to adapt to seasonal conditions while maintaining the Intermediate and Active Cells at or below their designed full supply levels.

The operation of BBS now accounts for individual seasonal variability including water allocation, land use changes and annual climate forecasts to accurately determine fill times and volumes (whilst maintaining water delivery efficiencies) to secure water delivery to WWID.

Table 5 - Water delivered to WWID customers during 2009-2026 irrigation seasons

Season	Wah Wah metered usage (ML)	Season	Wah Wah metered usage (ML)
2009-10	30,224	2018-19	42,080
2010-11	40,989	2019-20	27,910
2011-12	82,842	2020-21	60,908
2012-13	93,999	2021-22	63,212
2013-14	65,008	2022-23	43,292
2014-15	66,542	2023-24	74,092
2015-16	51,642	2024-25	65,419
2016-17	59,870	2025-26	53,797
2017-18	66,467		

The metered usage shown in **Table 5** does not include water supplied up to and including October 2019 for Wah Wah Stock and Domestic (WWSD) users, or WWID conveyance which was accounted for in the EIS

water balance. In December 2018, the Gunbar Water Pipeline was gazetted and subsequently, MI handed over control of this area of supply to the Gunbar Private Water Supply District (GPWSD). Consequently, MI's Area of Operations decreased by 192,202 ha as displayed in **Figure 6** below. The GPWSD covers the stock and domestic requirements via pipeline directly from the Murrumbidgee River and not via the MIA network.

As part of the negotiations for this project, including the Review of Environmental Factors (GHD 2017) a total of 9 GL (9,000 ML) of MI's water entitlement was handed back to the Commonwealth Environmental Water Holder.

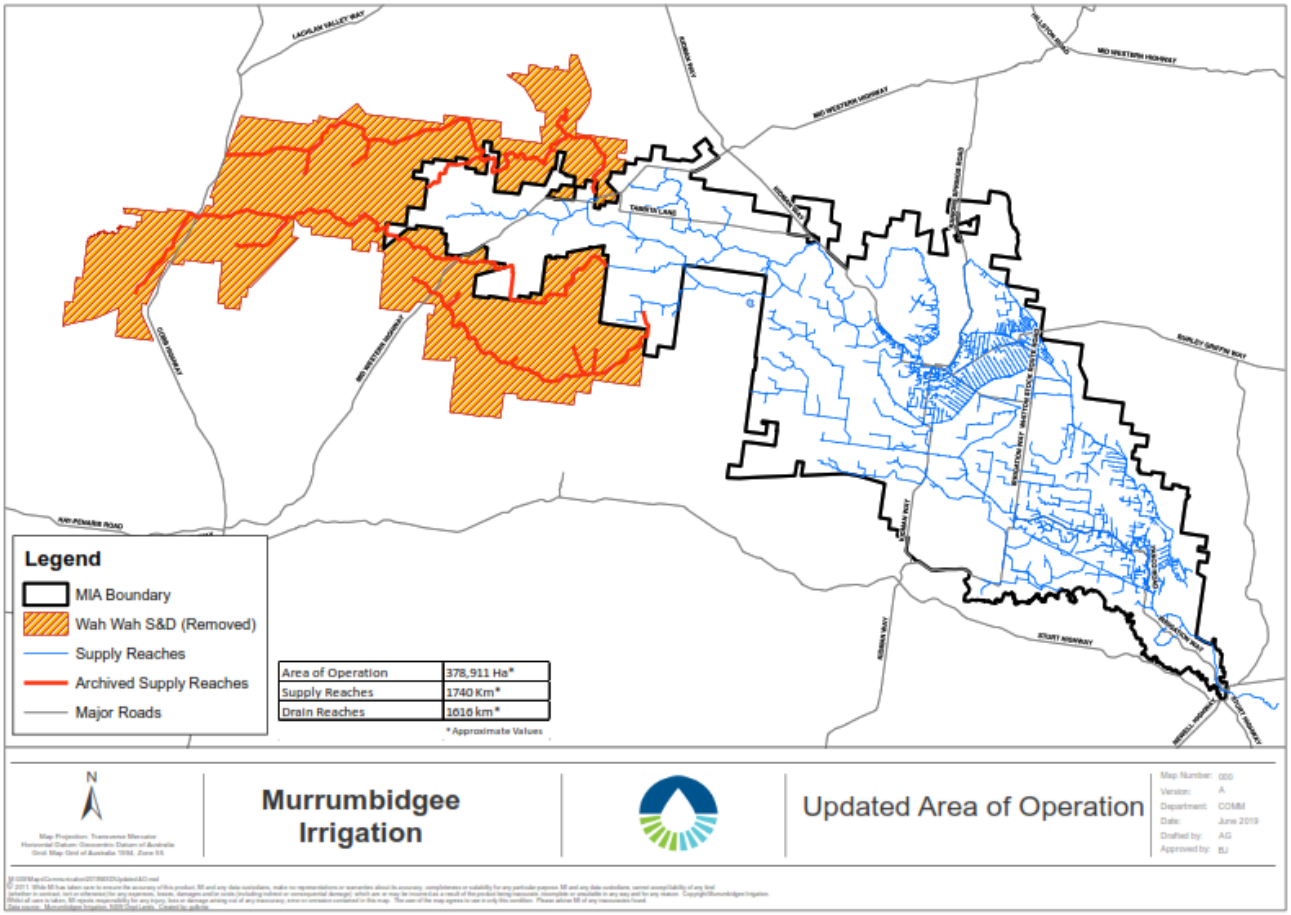

Figure 6 - MI Area of Operation change in 2019

7.1.4 Water Access Licenses

7.1.4.1 *EIS impacts or predictions*

Six water access licences are associated with Barren Box Swamp, three within the development area and three outside it that would have been most affected by changes to the water regime. The water access licences, originally established under the *Water Act 1912*, were transferred to MI following the deproclamation of associated Crown land. Consultation and draft licence agreements were undertaken before implementation of the *Water Management Act 2000* and the Murrumbidgee Regulated River Water Sharing Plan in 2004. Given the proposed operation of BBS, it was predicted that these licences could not be relied upon for a continuous supply of water. Affected landowners would therefore hold an allocation with MI to meet the majority of their water requirements.

7.1.4.2 *Current performance*

MI negotiated new agreements with the licensees of the water access licences relevant to the BBS, with the terms now captured in MI's Surplus Water Rules. The current Surplus Water Rules are in effect from 1 July 2026 to 30 June 2027.

7.1.5 Flood handling capacity

7.1.5.1 *EIS impacts or predictions*

7.1.5.1.1 BBS

The EIS determined the proposed BBS development would improve the ability of the swamp to pass and store flood waters. A summary of the proposed changes and their implications for the control of flood water was presented in EIS Table 11-4.

Under the proposed operation of BBS, a total of 5,000 ML per day could be passed as controlled channel flow through Willow Dam, of which 1,500 ML per day would bypass the swamp via the WWM, 3,500ML per day could enter the swamp via the BBS Bywash Channel. If the Active Cell has storage space, a further 1,500 ML per day would enter the swamp via the new Active Cell inlet structure. Overtopping of the bywash and inlet regulators under the proposed conditions was therefore unlikely to occur below 5,000 ML per day (EIS Figures 5-2 and 5-3 showed the location of the structures).

The existing capacity of the BBS to release floodwaters was 1,350 ML per day (through the outlet regulator) and the outfall channel capacity (2,250 ML per day) remained unchanged.

The EIS anticipated that some of the operational levels of BBS would be revised in accordance with the capacity of the proposed cells and the available mitigation storage space within BBS through consultation with government agencies and affected landholders.

7.1.5.1.2 En-route Storage

The EIS stated that the proposed En-route Storage would provide limited flood-mitigation benefits because of its relatively small capacity. However, it may reduce peak flows during moderate flood events and improve the efficiency and reliability of irrigation-water delivery throughout the MIA system.

7.1.5.2 *Current performance*

7.1.5.2.1 BBS

The Flood Management Plan (MI 2026b) has been prepared in accordance with Condition 6.5 of the Department of Planning Conditions of Consent, dated 16 June 2005. It supports the existing BBSW Operational Environmental Management Plan (OEMP) (URS 2006, updated 2026) and does not override instructions from emergency authorities such as councils, NSW SES, or other flood management agencies.

MI is involved as a stakeholder on GCC's Floodplain Management Committee as well as being involved in any Local Emergency Management Committee meetings when serious flooding is expected or occurring within the GCC area. Consistent with the original BBS Project commitments, MI works collaboratively with flood management authorities, government agencies and local stakeholders to support effective flood preparedness, response and recovery.

MI is committed to working with all flood authorities to share information on our system and past flood experience and to allow the best approach for managing future floods to be adopted for both the MIA and downstream communities and environmental values. This is broadly consistent with the predictions within the EIS. MI will undertake further consultation to through the establishment of advisory groups to investigate and discuss floodplain hydrology, and this will be reflected in the Flood Management Plan.

Flooding at BBSW usually comes from heavy rainfall upstream, which flows through Mirrool Creek and the surrounding floodplains before reaching the MI system and BBSW. The Flood Management Plan is informed by the Griffith Main Drain J and Mirrool Creek Flood Study, which provides flood flow pathways, timing and management of floodwaters reaching Yenda and further downstream (including BBSW).

MI observes weather and river conditions as part of day-to-day operations. Flood warnings are based on:

- Bureau of Meteorology (BoM) rainfall forecasts and flood warnings
- River and creek gauges, especially:
    - Mirrool Creek at Barellan

- Mirrool Creek at East Mirrool Regulator

The Flood Management Plan includes the BBSW Flood Management Guidelines (Appendix 1), which are applied during flood preparedness, response and recovery phases. These guidelines provide an operational framework for managing floodwaters entering the BBSW system, including storage management, floodway operation and discharge capacity improvements during major flood events.

Figure 7 presents the BBSW Operational Guidelines for Flood Risk Management (Appendix B) and summarises the decision-making process used to manage inflows, storage levels and floodway releases during flood events.

The Flood Management Plan is consistent with the flood management framework and outcomes predicted in the BBS Project Environmental Impact Statement.

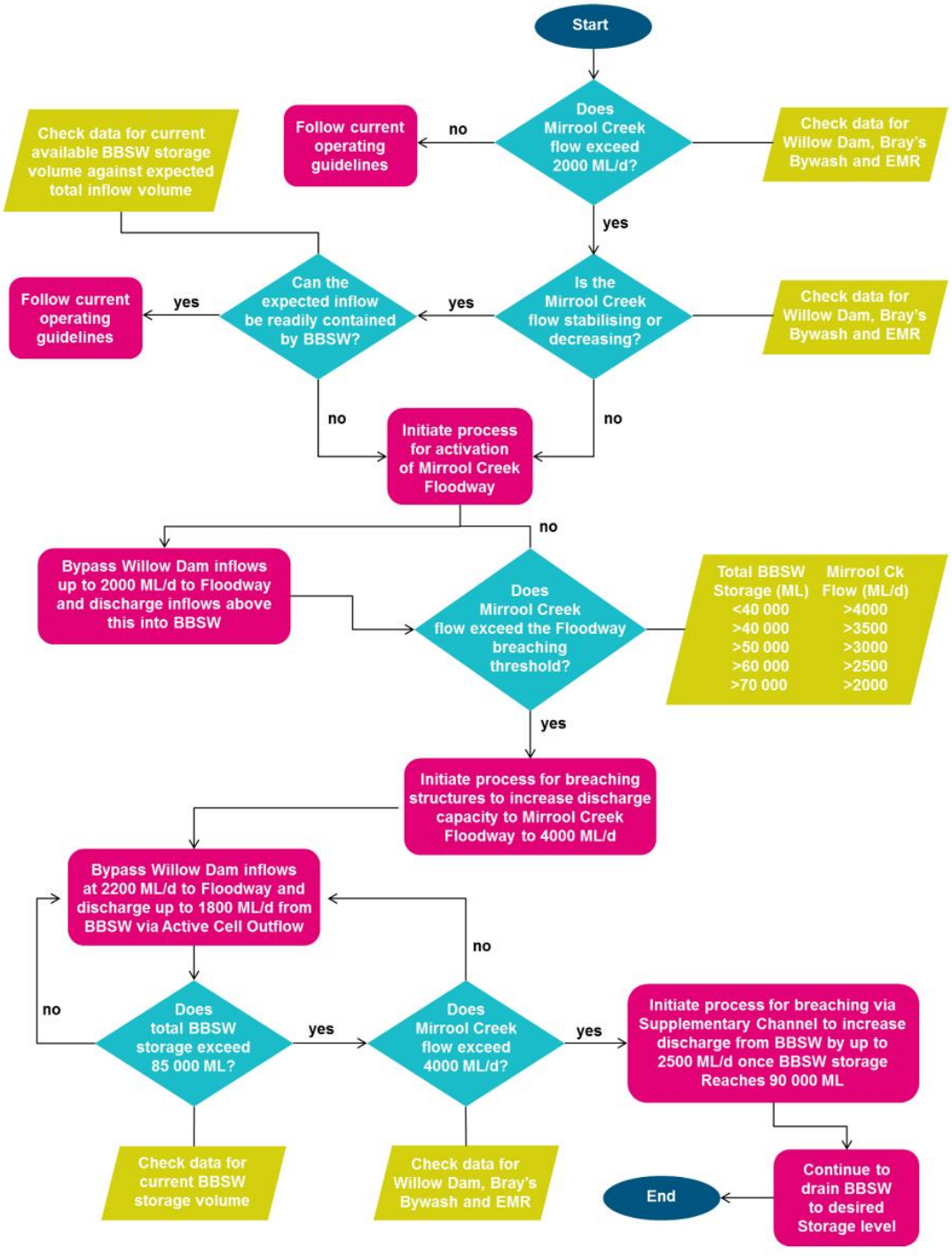

Figure 5-3 BBSW Operational Guidelines for Flood Risk Management

Figure 7 - BBSW Operational Guidelines for Flood Risk Management

7.1.5.2.2 En-route Storage

The EIS summarised that the incremental increase in flooding associated with the construction of the En-route Storage on the floodplain would be negligible.

The BBS Operational Guidelines and studies include consideration of the 2,500 ML capacity of Brays Dam and its use during smaller flood events. During larger flood events, e.g. 2012 and 2016 Brays Dam had negligible effect on flood levels arriving at BBSW.

7.2 Water quality (EIS Chapter 12)

7.2.1 EIS impacts or predictions

7.2.1.1 *Barren Box Swamp*

The EIS Section 12 identified the controlling factor in determining the quality of the water in BBS at a point in time and therefore the quality of the outflow, is the quality of the water entering the swamp and the volume and quality of water in the storage prior to that. The quality of inflow water would be the same for the proposed conditions, as the quality of inflows is not affected by this project.

The EIS concluded the operation of the modified BBS, using a smaller Active Cell, would be expected to improve on average the quality of water discharged from the swamp, with respect to salinity concentrations. This is primarily due to the reduced evaporation from the swamp. Other water quality indicators were unlikely to be significantly affected by the developments at BBS. The operation of the En-route storage (Brays Dam) was unlikely to affect the quality of water passing through the proposed storage cell.

The EIS stated it was expected that MI would continue with its water quality monitoring program as part of the EPL4651 and would assess the need to include the monitoring of water quality in the ephemeral wetland as part of the overall program.

The EIS recognised the splitting of the BBS and its operation under the new arrangement would result in significantly lower evaporation rates (from 23,000 ML to 9,000 ML per year), due to a reduced surface area in the Active Cell, and a higher turnover of water in the Active Cell. These two factors were identified as reducing the concentrating effect of salts in the water that has entered the storage. Therefore, it was expected that on average water discharged from the proposed Active Cell in BBS would have lower salinity than under the current condition, provided the quality of inflows does not change. It was noted that the proposed conditions would not affect the total salt load passing through the overall MIA system.

Table 6 - Median (and range) of electrical conductivity (EC) for 2002-2003

Monitoring site (and sample size)	EC median (µS/cm)	EC range (µS/cm)
ANZECC 2000 POAE guideline value	*125-2200*	
MIRMCN (12:48 for EC) - upstream from BBS	251	177-783
BBST (6:24 for EC) - BBS water	455	344-729
BBOW (10: 20 for EC) - BBS outflow water	321	175-453
BBO (0: 50 for EC) - BBS outfall channel	429	187-998

Source: MI's Environmental Performance Report 2002-2003 & extract from EIS Table 12-1

7.2.1.2 *En-route storage (Brays Dam)*

The EIS concluded that, given the size and residence time of water in the proposed En-Route Storage at Brays Dam, the temporary retention of water (for up to two weeks at a time) is unlikely to result in any significant deterioration of downstream water quality.

7.2.2 Current performance

MI regularly monitors water quality in key areas around the MIA, including any discharges out of the MIA as required by the EPL (Licence Number 4651).

7.2.2.1 *BBS salinity results*

Salinity was the main parameter of concern identified in the EIS as it impacts directly on the suitability of water for irrigation. MI monitors salinity, using EC via a hand-held water quality multiprobe meter throughout key

locations within the MIA system, including during discharges out of the MIA, when safe to access the Barren Box Swamp Outfall monitoring site. There is a total of 22 monitoring sites (15 licence sites and 7 additional) included in MI's water quality monitoring program.

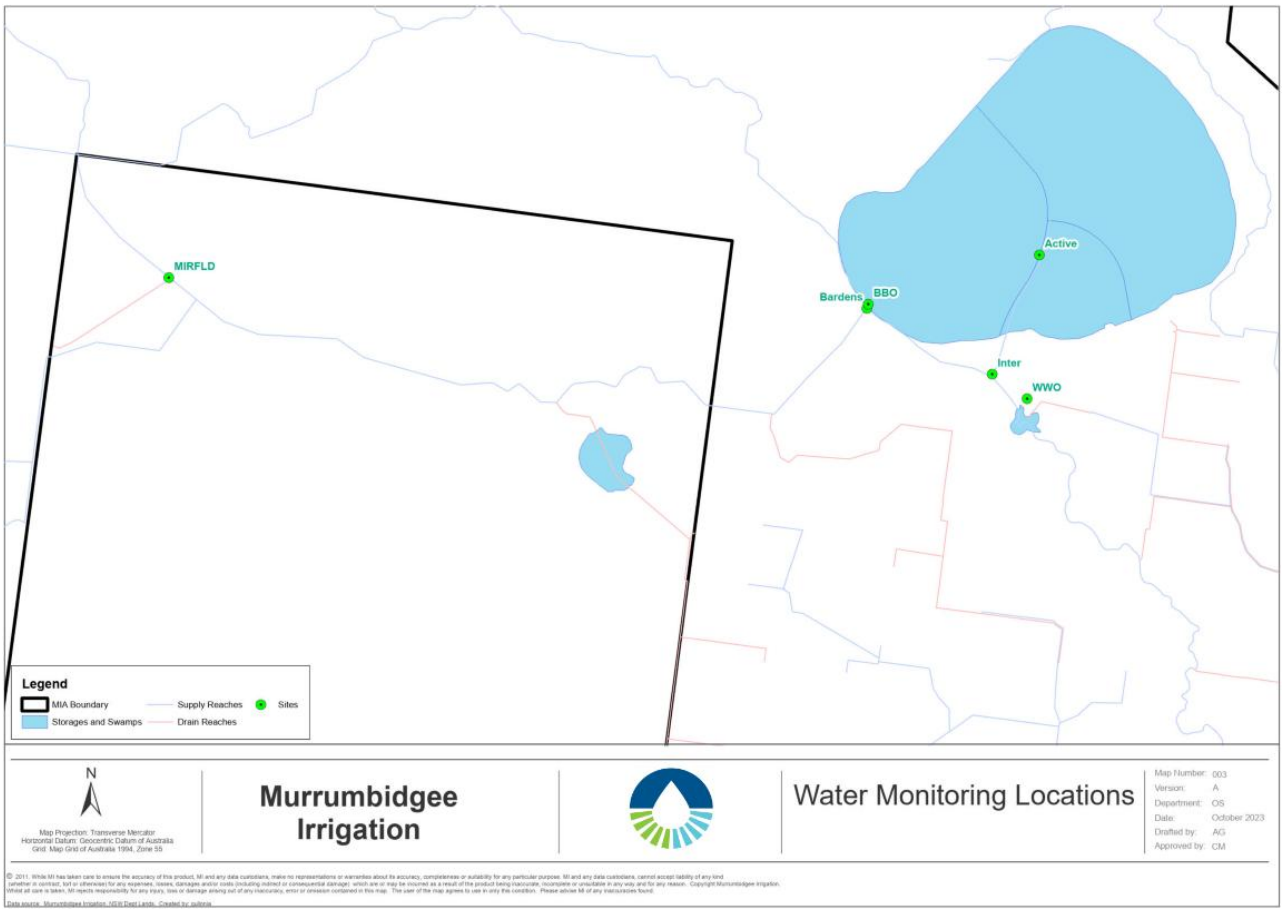

Figure 8 - Water monitoring locations around Barren Box Storage

The locations where water is monitored and/or sampled under MI's Water Monitoring Plan are presented in **Figure 8**. The locations are described below, and graphs of the EC are provided from **Figure 9** to **Figure 13** .

- WWO – Willow Dam Regulator – flows can be directed to BBS cells and to downstream supply channels via WWM.
- Inter – BBS Intermediate cell.
- Active – BBS Active cell. Note: No water volumes were stored in this cell in 2025/26 due to low water allocation/ drought conditions.
- Bardens – Bardens Regulator – flows can be directed to the Barren Box outfall channel (which also can lead to the Mirrool Creek Floodway), continue down the WWM to western supply channels and can also allow management of flows into or out of BBS Active cell. Site monitored from 2008.
- BBO – Barren Box Swamp Outfall (monitors the salinity and quantity of water diverted out of the swamp)
- MIRFLD – Mirrool Creek Floodway: also, a discharge point under MI's EPL4651.

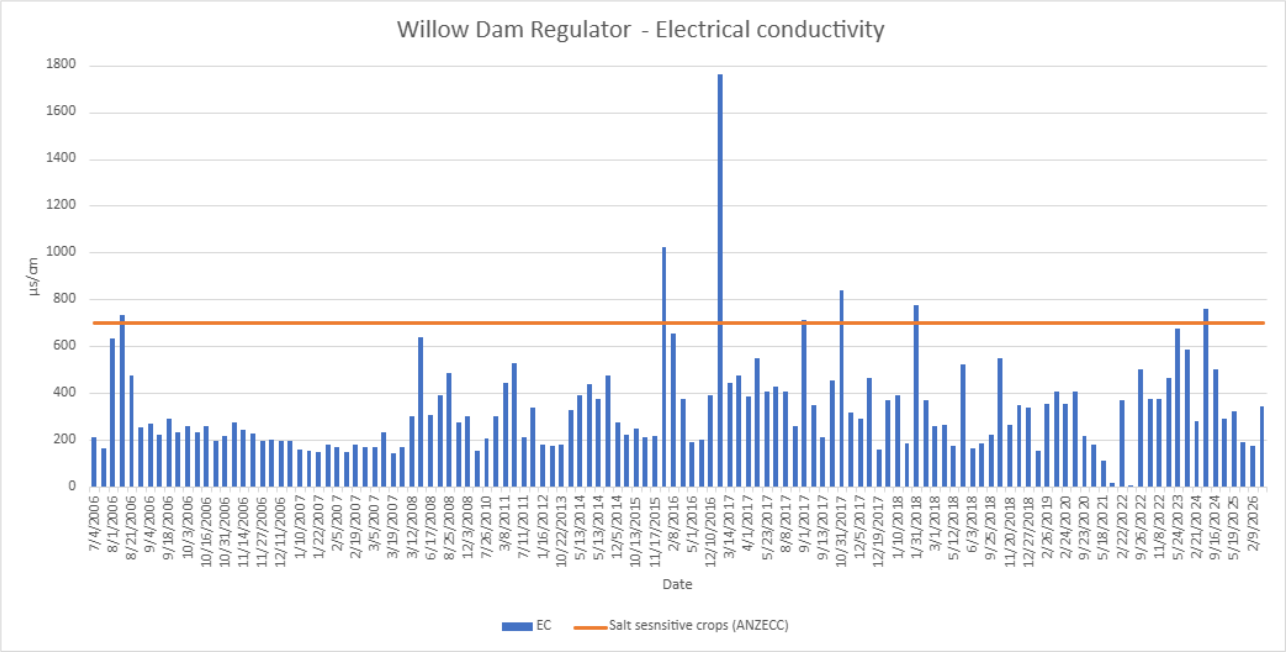

Figure 9 - Electrical conductivity at Willow Dam Regulator – 2006 to 2026

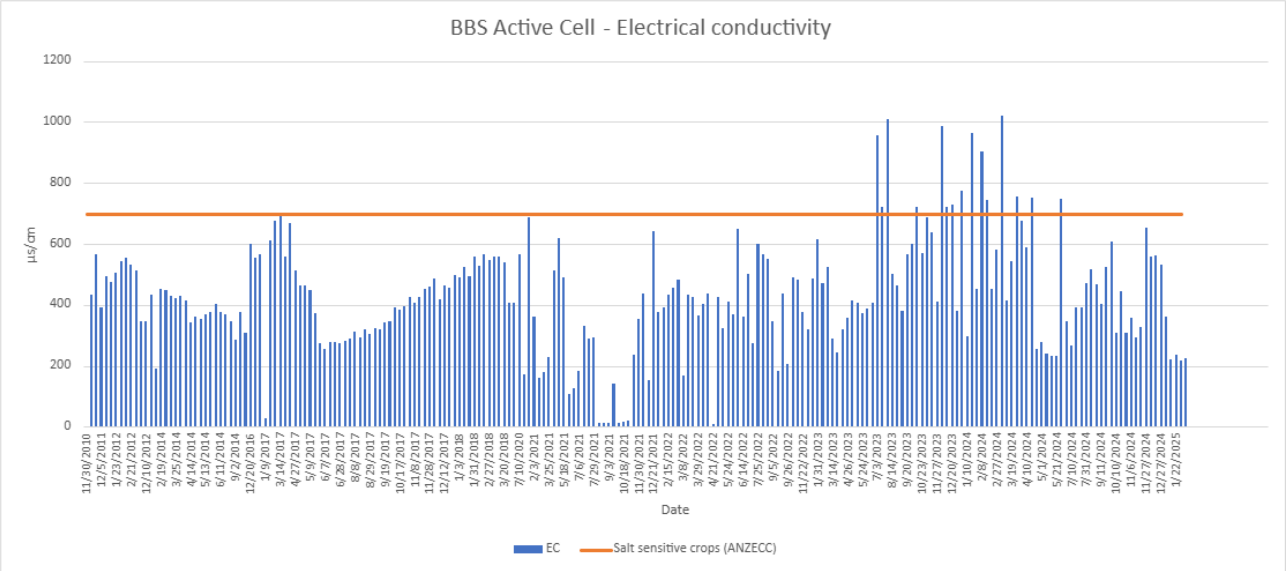

Figure 10 - Electrical conductivity in BBS Active Cell – 2010 to 2026

*The Active cell was not operational due to dry conditions and low water storage requirements throughout FY2025/26. No water quality samples were taken during this time.

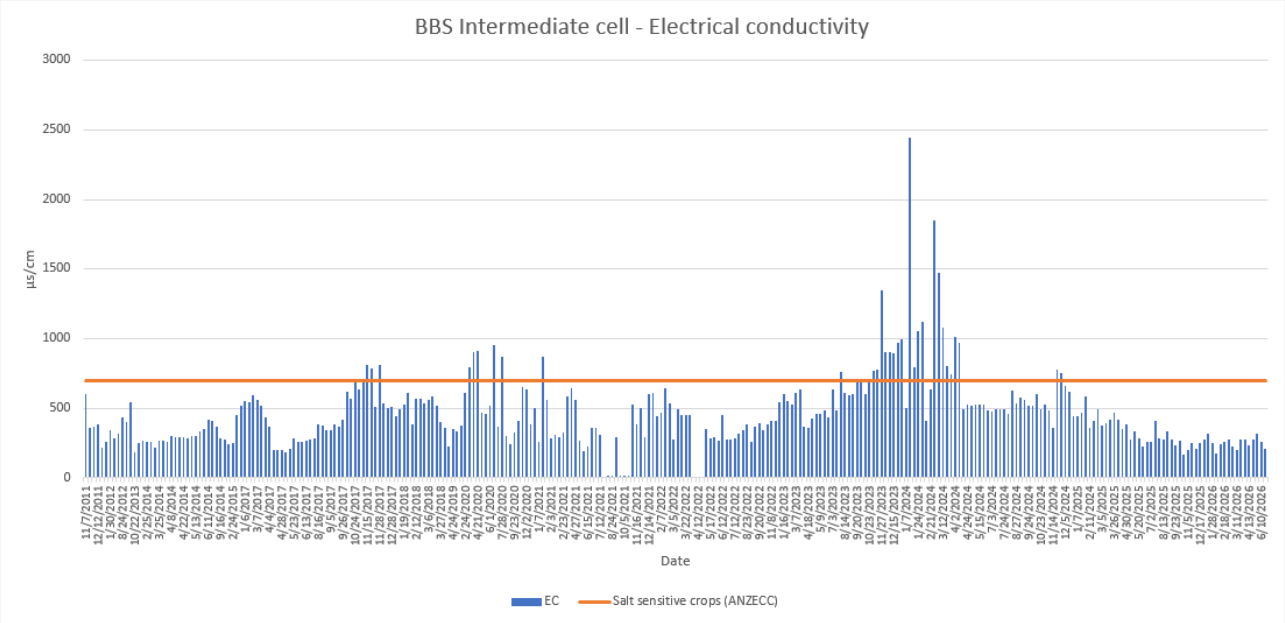

Figure 11 - Electrical conductivity in BBS Intermediate Cell – 2011 to 2026

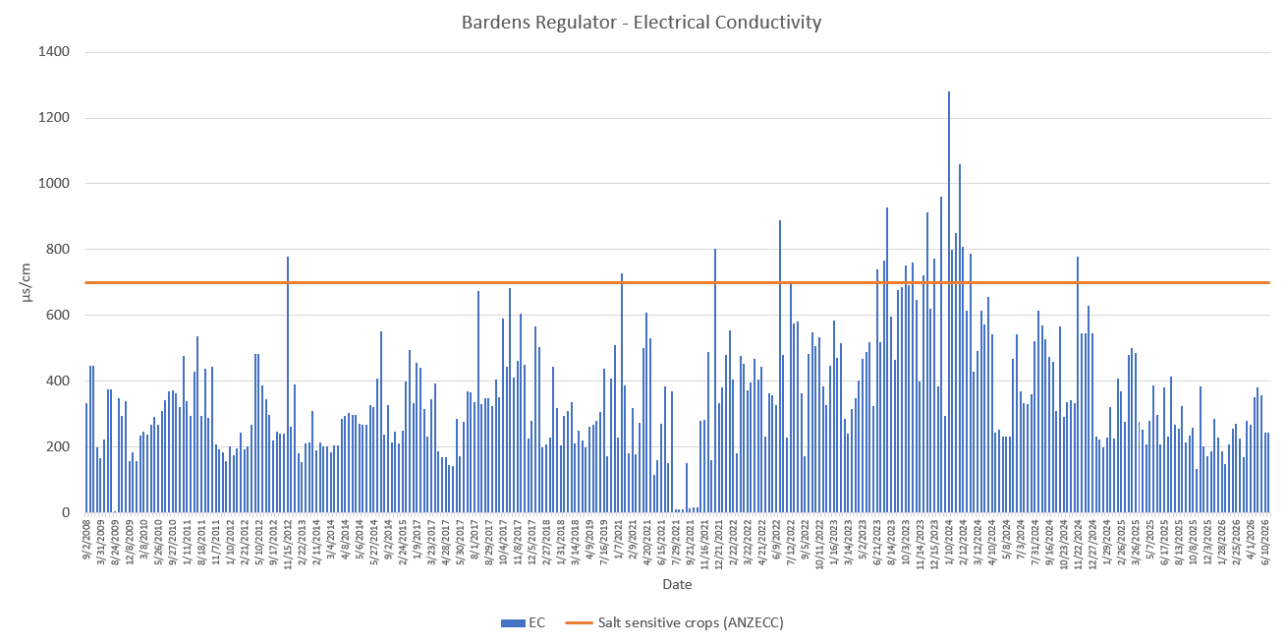

Figure 12 - Electrical conductivity at Bardens Regulator (on WWM) – 2008 to 2026

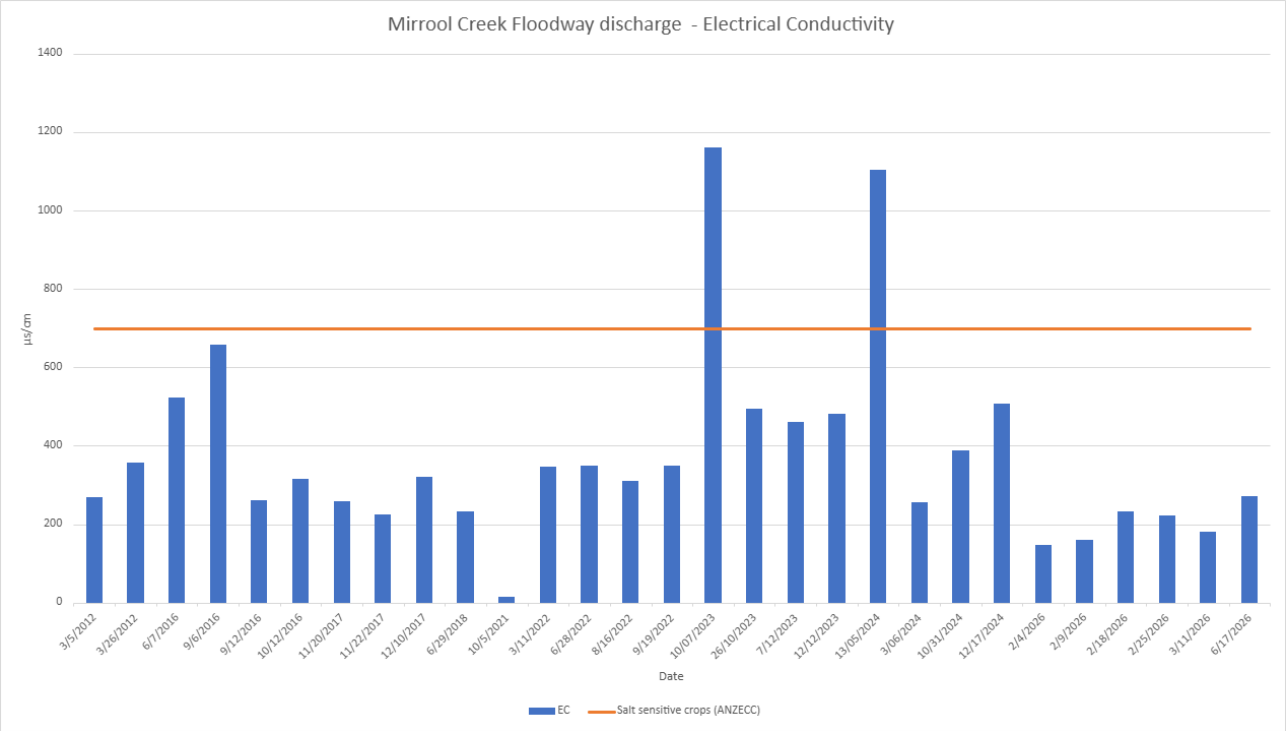

Figure 13 - Electrical conductivity at Mirrool Creek Floodway for release events– 2012 to 2026

The EIS provided some EC data, however, it was only for one year (2002-2003) and therefore would not reflect the many operating conditions experienced by the MIA, e.g. drought, supply volume variations, weather and floods. No volumes stored post-construction until FY2011 (July 10 - June11) due to low water / drought conditions.

The EIS Table 12-1 (see **Table 6** and MI's Licence Compliance Reports (LCRs) provided the following information relevant to the graphs above.

- BBST – water within BBS – EIS: EC range 344-729 µs/cm.
- BBOW – BBS outflow water – EIS: EC Range 175-453; LCR: 2005-2006: 151-1296; 2006-07: 162-293; 2007/08: 150-471; FY 2009 - 2015 <700, 2015/16: 11 days in Feb/ Mar 17 exceeding 700 with max 732.
- BBO – Barren Box Outfall channel – EC Range 187-998

A key performance indicator for salinity in an irrigation setting is based on the ANZECC guidelines (2000) for salt tolerant crops of 650 µs/cm adjusted based on the Land and Water Management Plan (LWMP) benchmark of 700 µs/cm used for BBOW sampling results to monitor water salinity supplied to Wah Wah customers.

MI's annual reporting and the graphs provided above show salinity in and downstream of BBS has EC levels below this benchmark for the majority of the time. Exceedances reflect the variability of the generally closed irrigation system within the MIA, which is influenced by drainage water reuse throughout the system, water allocation and flood or severe wet weather events.

7.2.2.1.1 Results above benchmark

During FY2025/26, the BBS Active Cell was not operational due to dry conditions and low water-storage requirements. Consequently, no water-quality samples were collected at the BBS Active Cell during the 2025/26 reporting period. The results from the other monitoring locations should therefore be interpreted in the context of the limited water movement and low storage requirements experienced during the reporting period.

During the 2024/25 reporting period, EC results generally showed an improvement across the monitoring network compared to previous reporting periods, with fewer elevated results recorded overall. This reduction is likely attributable to frequent water mixing and extraction associated with dry conditions and increased

downstream water demand. Monitoring of the Active Cell was undertaken from June 2024 to February 2025, after which its operational use as a storage ceased temporarily due to low water levels. No benchmark exceedances for EC were recorded at any monitoring location during the 2025/26 reporting period. A summary of historic exceedances is provided in **Table 7**, with detailed monitoring data provided in **Appendix D**.

MI's annual reporting and the long-term monitoring record indicate that salinity levels in and downstream of BBS have generally remained below the 700 µS/cm benchmark. Occasional exceedances are consistent with the variable operating conditions of the MIA's largely closed irrigation system, including the reuse of drainage water, changes in water allocations, drought conditions, floods and periods of severe wet weather. For FY2025/26 specifically, dry conditions and the non-operation of the Active Cell limited the availability of EC monitoring data.

Table 7 - Summary of samples above 700 µS/cm EC relating to BBS

Monitoring location	Financial year end	Number
Willow Dam (BBS and WWM inflows)	2015	1
	2017	2
	2018	1
	2024	1
	2025	0
	2026	0
BBS Active cell	2023	1
	2024	14
	2025	0
	2026	N/A – no samples
BBS Intermediate cell	2017	5
	2020	5
	2021	1
	2023	10
	2024	12
	2025	2
	2026	0
Barden's Regulator (flows to BBS outfall and LMCF if releasing and WWM)	2012	1
	2021	2
	2022	2
	2023	1
	2024	14
	2025	1
	2026	0
Mirrool Creek Floodway	2023	1
	2024	1
	2025	N/A - no samples
	2026	N/A - no samples

Detailed results above the benchmark recorded since the BBS operations commenced are provided in **Appendix D.**

Further water quality information is provided under **Section 8.3.4** for the BBS wetland cell and **Section 9.2.2** for the water discharged to the LMCF.

7.3 Flora and fauna (EIS Chapter 13)

7.3.1 Barren Box Swamp

The EIS determined the reduction and alteration of the flow regime at BBS would result in increased diversity of wetland plants including a range of submerged, emergent and woody perennial native taxa endemic to the region. Habitat diversity at BBS would also be increased for native fauna.

Positive impacts for waterbirds, for instance, would include:

- increased feeding grounds for wading species provided in the gilgai regions due to rainfall and incident runoff, and in the ephemeral shallows on the southern shore of the active cell;
- deep water feeding environment for birds such as ducks and cormorants in the active cell;
- increased diversity in nesting habitat with dead trees, live woody vegetation, lignum shrubs and reed bed systems; and
- increased food sources due to the predicted increased productivity of intermittent systems compared with those that have a permanent water regime.

The restoration of a more natural flow regime across BBS was expected to improve habitat for native fish and other aquatic species. The Active Cell would provide permanent aquatic habitat, while the ephemeral wetland would support aquatic vegetation, macroinvertebrates, small fish and breeding areas. The permanent deep-water areas would also provide habitat for turtles and crustaceans, while intermittently inundated zones could support terrestrial mammals, reptiles and frogs.

As shown in **Section 8.3.1** there has been a relatively consistent increase of birds observed in the BBSW since data collection began in 2004.

7.3.2 Lower Mirrool Creek Floodway

During the EIS process, it was noted there was insufficient information to determine what the environmental water requirements (EWR) of the LMCF should be. The EIS stated it had been suggested that it currently (i.e. 2004-5) received too much water and that flows into this ephemeral system should be reduced. This nationally significant wetland is the subject of a number of investigations and contains remnant vegetation, although the extent, condition and floristics have not been surveyed.

The EIS acknowledged that in the absence of this knowledge, MI would continue its current practice of releasing flows into the LMCF, at a reduced rate. Ecological field assessment of LMCF and subsequent reporting will be undertaken in 2027/28 after the methodology has been finalised.

7.3.3 Brays Dam

The EIS determined the hydrology of Mirrool Creek and Bray's Dam would not significantly alter with the addition of the En-route Storage, with water levels remaining similar to those of current operations. There would therefore not be any significant changes to flora or fauna at the site. Revegetation post construction was identified as a mitigation measure due to vegetation clearance requirements for the construction of the storage. Revegetation efforts to date have been deemed satisfactory by GCC.

7.3.4 Current performance

The permanent and ephemeral wetland areas of the BBS support waterbirds, native fish, turtles, crustaceans, frogs and other wetland-dependent species. Revegetation works, including the planting of approximately 2,300 native plants around Bray's Dam and along Mirrool Creek, have also improved habitat connectivity and ecological function. BBS and its surrounding areas continue to provide important habitat and refuge for

waterbirds. Monitoring indicates that bird numbers have generally increased since surveys commenced in 2004, with protected and listed species continuing to be recorded. The varied flow regime and wetland conditions are expected to support a diversity of vegetation communities and associated fauna.

The BBS contains remnant vegetation and wetland habitats of regional and national significance. However, its current ecological condition, extent and floristic composition have not been comprehensively assessed. Further field surveys are therefore required to establish a consistent baseline and improve understanding of changes in vegetation and habitat condition over time.

Water quality within the BBS wetland has generally been suitable, with key parameters within acceptable ranges. No evidence of salt accumulation or salt-related damage has been observed since the BBS project commenced. These conditions support the ongoing ecological function of the wetland.

Feral pigs, foxes, European carp and feral cats are known or have historically occurred at BBS and are subject to ongoing control programs. Alligator weed remains a significant biosecurity risk, with inspections, mapping and treatment continuing across BBS and surrounding areas.

7.3.4.1 *Barren Box Swamp Wetland*

Details on the current performance of the BBSW cell rehabilitation are detailed in Section 8.

7.3.4.2 *LMCF*

Details on the current performance of the LMCF are detailed in Section 9.

7.3.4.3 *Brays Dam*

Brays Dam forms a part of the MIA subject to the Rehabilitation Plan. The area has undergone a series of plantings to revegetate the area which have been recognised by Council as satisfying the relevant condition (3.39).

7.4 Groundwater (EIS Chapter 14)

7.4.1 EIS predictions

7.4.1.1 *Barren Box Swamp*

The EIS Chapter 14 determined the modifications to the BBS could result in an overall reduction in the rate of water seepage. The seepage flux for the widened WWM could increase along the length of the channel alignment. However, while this may have resulted in an increase in seepage, the volume was considered insignificant when compared to seepage water savings resulting from the nearby modifications to BBS. Therefore, in combination, the EIS concluded works could be expected to produce an overall beneficial impact on the local groundwater regime.

7.4.1.2 *En-route storage (Brays Dam)*

The EIS concluded the combined steady state seepage from the proposed pumped En-route Storage was likely to occur above the rate that occurs under the existing site conditions which could further contribute to what appeared to be an existing high groundwater level in the area.

The EIS noted, that if seepage were to occur, waterlogging of land between the northern side of the proposed En-route Storage and Mirrool Creek would be the likely area where a partially enclosed groundwater basin could be created. The need for the installation of a groundwater cut-off drain in this area would be investigated following the installation of a more rigorous groundwater monitoring network. Engineering methods to reduce seepage were also considered in EIS Section 15 Geology, Soils and Geotechnical.

7.4.2 Current performance

7.4.2.1 *Monitoring and management – BBS and WWM*

Groundwater monitoring at BBS has continued since commissioning, in line with MI's Combined Approval 40CA403245. The number of monitoring bores in active use has decreased over time due to rationalisation. Standing water levels of BBS piezometers pre-commissioning and post-commissioning are shown below in **Figure 14** and **Figure 15** respectively.

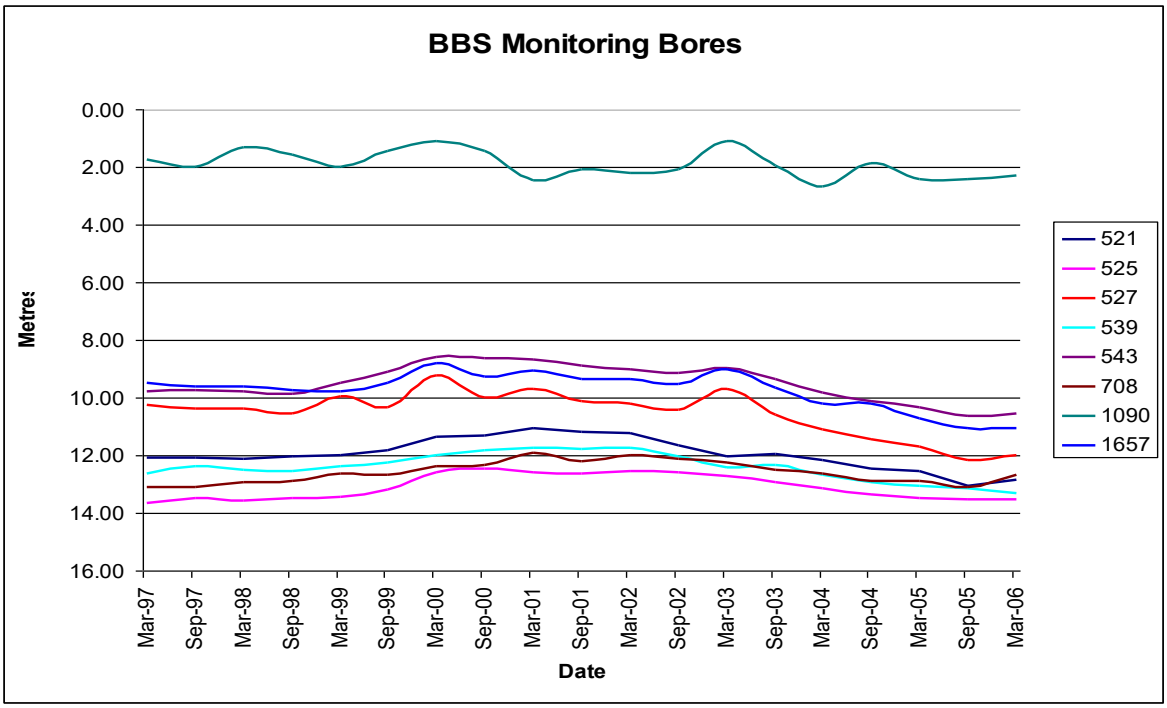

Figure 14 - Standing water levels of BBS piezometers (pre-commissioning)

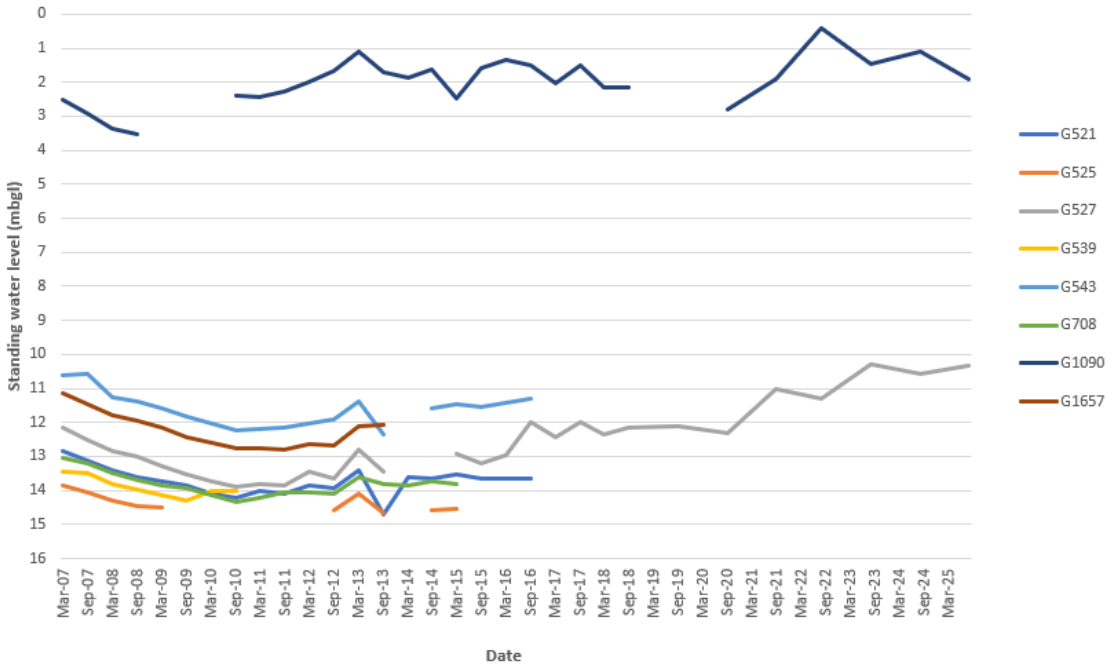

Figure 15 - Standing water levels of BBS piezometers (post-commissioning)

The graphs above indicate that groundwater levels around BBS are generally in line with baseline levels, and in some cases are lower. No seepage evidence and/or complaints have occurred adjacent to the WWM since the project was commissioned.

7.4.2.1.1 Seepage estimation BBS

MI can estimate if there is a seepage risk by monitoring levels during a 'lock-up pondage test'. This is where inflow and outflow are stopped or not occurring for a particular storage or length of channel. The preferred minimum period for a lock-up test is 72 hours.

Rainfall, evaporation and seepage are assumed to be the primary fluxes that contribute to the observed changes in water levels during a pondage test. Weather data was sourced from SILO (Queensland Government Long Paddock initiative) for Griffith Airport (station 75041) to estimate the individual contributions of rainfall, seepage and evaporation to the total loss rate. Seepage is estimated as the rate of level fall, less Morton's shallow lake evaporation, plus rainfall, all expressed in mm/day. Because every term is a depth, no assumption about the surface area of the cell is required.

For 2025/26 the lock-up periods were identified directly from SCADA telemetry. A period qualifies when every structure on the cell boundary reports zero flow: the Willow Dam inlet (BR-3-254), the culvert regulator to the Active Cell (RC-3-368), the BBS pump station (PS-3-BBS), the culvert regulator to the Wetland Cell (RC-3-369) and the three metered outlets (MO-2-2373-03, MO-2-2373-04 and MO-3-HR42-03). The level fit uses every recorded reading of the Intermediate Cell level (WW01 BBS PUMPS BBS Int AHD Level, 0.1 mm resolution, approximately 280 readings per day) across the full lock-up, with a robust linear regression (Huber) so that short-lived wind set-up does not bias the trend. This replaces the 24-hour median filter and four daily points used in 2024/25 and reduces the uncertainty of the loss rate from ±0.9 mm/day to ±0.3 mm/day.

Figure 16 shows the change in water level during the lock-up pondage test conducted on the BBS Intermediate Cell from 12 March 2026 at 5:54 pm to 17 March 2026 at 9:09 am (111 hours, 2,538 readings). The average rate of loss during this test was 6.9 ± 0.3 mm/day. For the lock-up period no rainfall was recorded, and the mean Morton's shallow lake evaporation was 4.47 ± 0.82 mm/day. This indicates the estimated seepage rate during the pondage test was 2.4 ± 0.3 mm/day. In general, MI uses 5 mm/day as an average expected seepage loss through channel banks and beds, indicating that seepage losses from the BBS Intermediate Cell remain within expected tolerances.

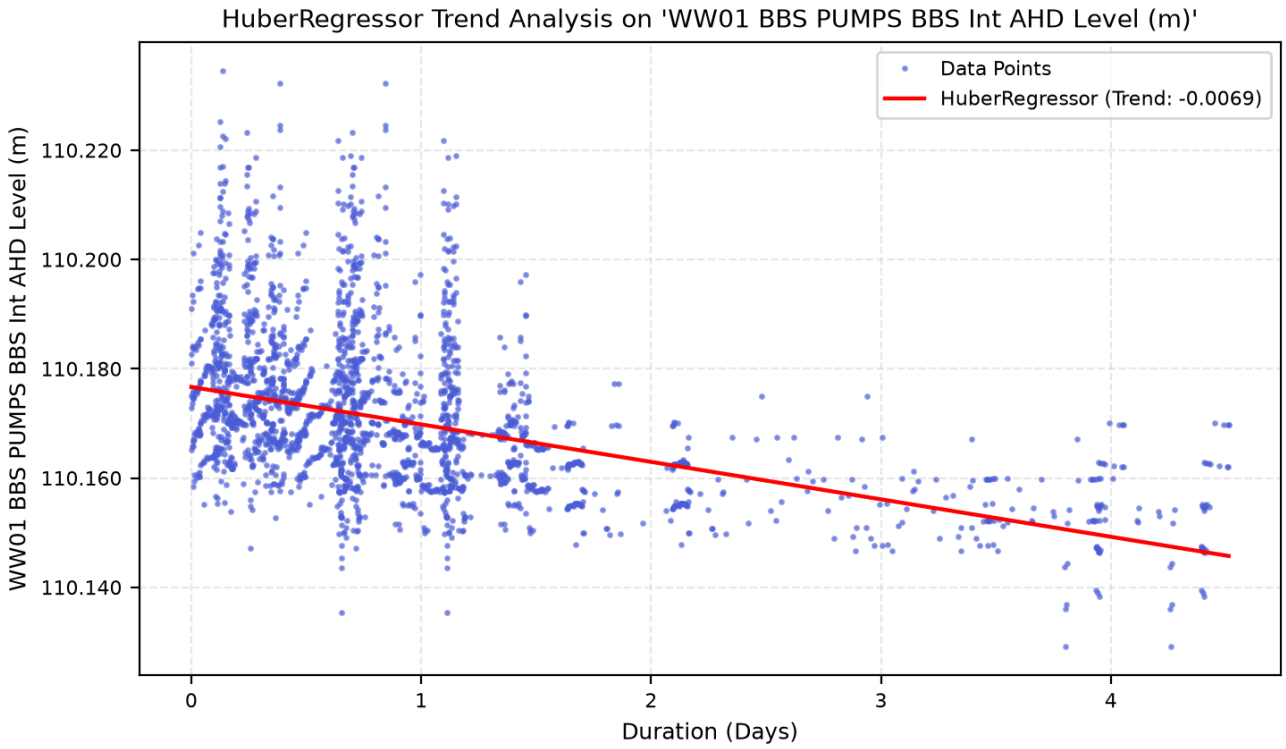

Figure 16 - Robust linear regression model of BBS Intermediate Cell lock-up pondage test data from 2025/2026 (4 days)

The 2024/25 estimate of 0.25 ± 0.9 mm/day was derived from a 72-hour lock-up in June 2025 using four daily median points. Refitting that window with all 47 recorded readings gives a loss of 0.7 ± 1.2 mm/day. A 72-hour test in winter, when evaporation is low and the level fall over three days is within the wind-induced scatter, cannot resolve seepage below about 1 mm/day. The 2025/26 estimate is therefore a more precise measurement rather than evidence of a change in the storage.

A longer lock-up was also recorded from 1 July 2025 to 18 July 2025 (424 hours, **Figure 17**), with a rate of loss of 4.0 ± 0.05 mm/day, evaporation of 1.16 ± 0.23 mm/day and rainfall of 0.09 mm/day, giving a residual of 2.9 mm/day. During this period the culvert regulator between the Intermediate and Active cells (RC-3-368) was approximately 30 mm open and reported a computed reverse flow of about 30 ML/day, and the Active Cell gained approximately 15 ML/day more than its metered inflow. The residual for this period includes leakage through the culvert into the Active Cell and is reported as an upper bound on seepage only.

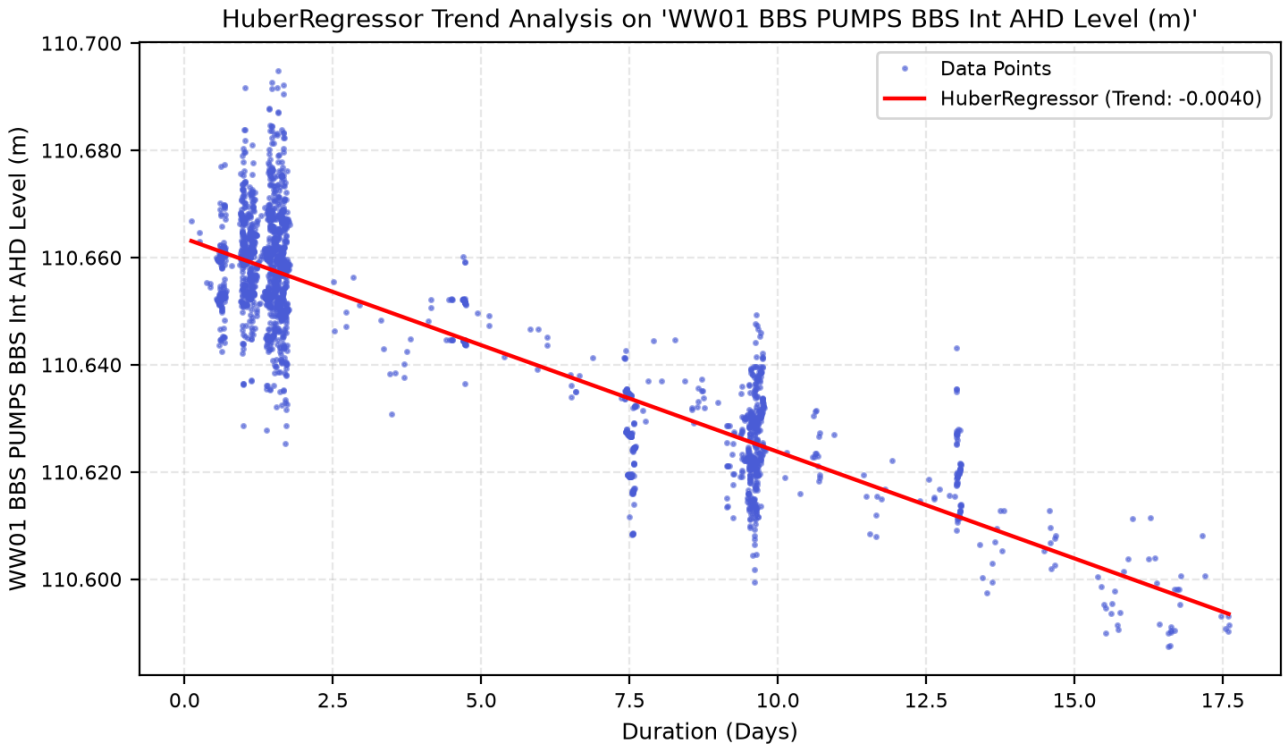

Figure 17 - Robust linear regression model of BBS Intermediate Cell lock-up pondage test data from 2025/2026 (17.5 days)

Lock-ups during May and June 2026, the period normally used for the annual test, were not suitable for seepage estimation. The cell level rose by between 1.5 and 9.6 mm/day while all metered boundary structures were closed, indicating inflow from unmetered sources such as drain-down of the Willow Dam bywash channel after the inlet closed, rainfall runoff or drainage inflow. No estimate is reported for these periods.

The Active Cell was not assessed in 2025/26 as it held little water for most of the season.

Table 8 – BBS Intermediate Cell lockup results

Season	Lock-up period	Duration (h)	Daily loss (mm/day)	Evaporation (mm/day)	Rainfall (mm/day)	Estimated seepage (mm/day)	Note
2025/26	12–17 March 2026	111	6.9 ± 0.3	4.47	0.00	2.4 ± 0.3	Reported value
2025/26	1–18 July 2025	424	4.0 ± 0.05	1.16	0.09	≤ 2.9	Includes RC-3-368 leakage; upper bound
2024/25	19–22 June 2025	72	1.5 ± 0.9	1.25	0.00	0.25 ± 0.9	2024/25 AEMR, four daily medians

7.5 Archaeology and heritage (EIS Chapter 16)

The EIS concluded that BBS is a place of Aboriginal cultural significance and was once a meeting place for large groups of Indigenous people. The BBS is not declared an Aboriginal Place or Site, however, a number of Aboriginal artefact sites have been identified and the location of these have been recorded. The construction and operation of the BBS Project had the potential to impact on a number of features of cultural heritage value. Artefacts would be collected and managed in accordance with the NPW Act and in consultation with the local Aboriginal community under the AHIP obtained for the project.

The OEMP (MI 2026) contains an action plan (Section 9.6, Table 7) which is derived from the Cultural Heritage Action Plan developed by Biosis in 2008 (expired and archived). MI has revised the Cultural Heritage Assessment and Finds Management Procedure (MI 2026) in 2025 and 2026 to emphasise the cultural sensitivity of BBS and incorporate feedback from Heritage NSW. The procedure is now under review in consultation with Aboriginal stakeholders to ensure that the cultural heritage values of the BBS are adequately protected.

7.5.1 Current performance

MI have several processes and procedures for protecting cultural heritage located within BBS, these include:

- Restricted access to BBS via fencing, locked gates and security cameras.
- OEMP outlining cultural heritage management and requiring induction prior to entry to BBS.
- BBS induction outlining the cultural heritage significance and past artefact finds.
- MI Maps (MI's spatial mapping) highlights the whole of BBS as a cultural heritage risk site, triggering assessment prior to any earth disturbance and/or access off existing access tracks.
- MI's Cultural Heritage Management Procedure detailing the requirement to check prior to works and/or stop work and report should any potential artefact be found.
- MI's Incident Management Procedure detailing management and reporting requirements if an environmental issue arises.

The Griffith Local Aboriginal Land Council (GLALC) provided input (meeting July 2018) into MI's approach to cultural heritage at BBSW and MI's overall Cultural Heritage Assessment and Management Procedure (URS 2006, updated 2026). MI maintain an ongoing collaborative approach with GLALC, with successful outcomes in the following areas:

- GLALC involvement in wetland rehabilitation plantings, as well as cultural artefact protection and salvage.
- Development of a cultural education shelter and toilet within BBSW to allow cultural and educational tours to be held.
- A cultural and heritage officer engaged by MI (2008 to 2013) and supported by another two cultural and heritage staff between 2010 and 2013 to assisted in a range of relevant projects, education and LWMP projects, including the BBS wetland cell rehabilitation.
- Additional projects within the MIA area: Three Ways Cultural Park development and Mirrool Creek rehabilitation.

8 Barren Box Storage and Wetland rehabilitation (6.5d)

MI reported annually up to 2013 on the BBS project during its environmental approval process, planning and construction and then post commissioning via the LCR and later ACR which has been published on MI's website over the years.

Funding for rehabilitation and other environmental initiatives were mainly managed via the Envirowise funding, which supported the requirements of the MIA & Districts LWMP. Reporting on both financial and milestone reporting also occurred to relevant committees and government bodies on an agreed basis.

The sections below summarise the progress highlighted in these reports and more recent progress.

8.1 Barren Box Wetland Rehabilitation Plan

The Barren Box Wetland Rehabilitation Plan 2009-2014 as required under Condition 6.5d was developed by the Barren Box Storage and Wetland Rehabilitation Technical Panel which was made up of MI staff, technical experts and stakeholders, including cultural heritage staff and adjacent landholders. The plan was developed with reference to the Wetland Concept Plan developed as a part of the original EIS (URS 2004). Both documents have since been superseded by the Barren Box Storage and Wetland Operational Environmental Management Plan (OEMP) (URS 2006, updated 2026).

The OEMP has been developed to provide a framework for ongoing rehabilitation and management efforts and to include feedback from Government agencies. Preliminary works toward rehabilitation including trials and revegetation were carried out at BBS from 2007-2008, before the Rehabilitation Plan was delivered to completion from 2009-2014 through various sources of funding. Additional plantings and revegetation were undertaken in subsequent years following the 1/100-year flood in 2012 and the 1/150-year flood in 2016, which both significantly affected previous revegetation efforts. Details of the rehabilitation activities carried out at BBS have been reported in previous Murrumbidgee Irrigation Barren Box Project AEMRs (2006–2022) and are detailed in the Barren Box Swamp Rehabilitation Monitoring Program (NGH 2025, Appendix I).

The BBSW is now managed by MI in accordance with the MIA wide weed and pest animal management, cultural heritage, maintenance and inspection procedures.

In 2022, the Barren Box Storage and Wetland Project – Stage 1: Survey and Reporting Methodology (NGH 2022) was developed and has since been superseded by the Barren Box Swamp and Lower Mirrool Creek Floodway Rehabilitation Monitoring Programs (NGH 2025) in response to feedback from Government agencies. Prior to implementation, the programs will be further revised to incorporate the advice of LMCF hydrological and ecological advisory groups. Once approved, the implementation of the Rehabilitation Monitoring Programs will provide further insight into the ecological condition of BBS and LMCF.

8.2 Financial information (6.5diii)

Rehabilitation works were implemented between 2007 and 2014. Overall, it is estimated that more than $1.15 million has been invested in implementing BBS rehabilitation works. This estimate includes rehabilitation, maintenance and operational expenditure incurred from 2021 onwards, together with recent investigations, research and reporting undertaken to support the modification application. Costs associated with LMCF works and investigations have been excluded.

Since completion of the Rehabilitation Plan revegetation program in 2014, ongoing maintenance, monitoring, surveys and supplementary planting activities have been incorporated into MI's routine operational programs and budgets [C6.5diii].

8.2.1 Operational expenditure

Operational expenditure includes regular maintenance activities such as ongoing weed treatment, water-quality monitoring, pest-fauna control, and fire-trail and fence maintenance.

MI's operational expenditure for the BBS has an average budget of $130,000, the reported actual expenses for 2025/26 and recent years were:

2021/22: $160,000

2022/23: $137,000

2023/24: $102,087

2024/25: $72,307

2025/26: $117,484.

Maintenance activities undertaken during 2025/26 included weed management through aerial and ground-based chemical spraying programs, targeted pest animal control (including fox and pig baiting), fire management activities such as fire-trail slashing, fire-trail spraying and fire-load assessments, as well as general site maintenance and infrastructure works including roadway grading and water cart operations. Specialist bushfire advice was also obtained. A dedicated alligator weed control program was also implemented to support ongoing biosecurity and land management objectives.

Boundary fencing upgrades around Barren Box Swamp commenced during the reporting period, with approximately 8.53 km of fencing completed. This includes works along the north-western, northern and south-eastern boundaries. The upgraded fencing improves site security, reduces the risk of unauthorised access and livestock incursions, and strengthens biosecurity outcomes by helping to limit the spread of pests, weeds and disease vectors into the reserve.

Approximately 5.6 km of fencing remains to be completed along sections of the southern boundary and is planned for delivery in FY2026/27. Detailed planning is underway to determine the most practical and cost-effective approach for completing the remaining works, taking into account site access and terrain constraints.

The 2025/26 fencing project budget was $320,000, with actual expenditure reaching $208,776.62 by the end of the reporting period.

8.3 Monitoring and measurement

The 2026 OEMP sets out the monitoring and measurement requirements for Barren Box Swamp (BBS). It is based on the now-superseded Barren Box Wetland Rehabilitation Plan 2009–2014, with Section 7 of that plan identifying the essential monitoring, evaluation and review requirements for assessing the status and condition of the ecosystem. Drawing on that report the monitoring outlined in the OEMP is consistent with the requirements of Condition 6.5(d)(xi).

All monitoring undertaken under the OEMP must comply with the monitoring and record-keeping requirements of EPL 4651. Under the licence, monitoring records must be:

- in a legible form, or in a form that can be readily reduced to a legible form;
- kept for at least four years after the monitoring or event to which the results relate took place;
- produced in a legible form to any authorised officer of the EPA, the Department or the Director-General, upon request.

For each sample collected under the OEMP, the following information must be recorded in accordance with EPL Condition M1.3:

- date(s) the sample was collected;
- time(s) the sample was collected;
- point at which the sample was collected; and
- name of the person who collected the sample.

The AEMR (this report) and ACR are the primary mechanisms for reporting on the BBS Project and assessing compliance with the conditions of consent. These reports are to be submitted by 30 October each year to the Director-General, Council and the relevant NSW Government environmental authority, now the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

The reports incorporate monitoring data collected under the applicable consent conditions and evaluate the project's performance against the OEMP, development consent conditions, environmental protection licences and other relevant approvals.

8.3.1 Waterbird monitoring

In the 2025/26 reporting period surveys were conducted in autumn across March, April and May. The surveys are conducted by community birdwatching groups. The waterbird monitoring program is coordinated by the environmental Planning Manager or delegate and aims to conduct water bird monitoring to assess changes in species distribution.

8.3.1.1 *Bird field survey data*

Bird surveys are undertaken annually. The bird surveys for the 2025/26 reporting period occurred between March and May. The collated data from the surveys in comparison to previous years has been graphed below in **Figure 18** and **Figure 19**.

Records indicate that the BBS and its surrounds provide waterbird habitat and/or refugia over the longer term with species numbers increasing in recent years, including for bird species protected under legislation as shown in **Figure 19.** Negative values shown in **Figure 19** indicate the species was recorded based on measures other than visual sightings, e.g. bird call, nest or specific habitat noted. During 2025/26, 66 bird species were recorded, which is an increase of 1 species compared to 2024/25 (**Figure 18**). The listed species have remained steady over recent years, with 3 listed species observed in 2025/26 (**Figure 19**).

MI will continue to facilitate bird counts at BBS by community groups, while maintaining strict access and weed hygiene protocols due to the General Biosecurity Direction in place due to the presence of Alligator weed.

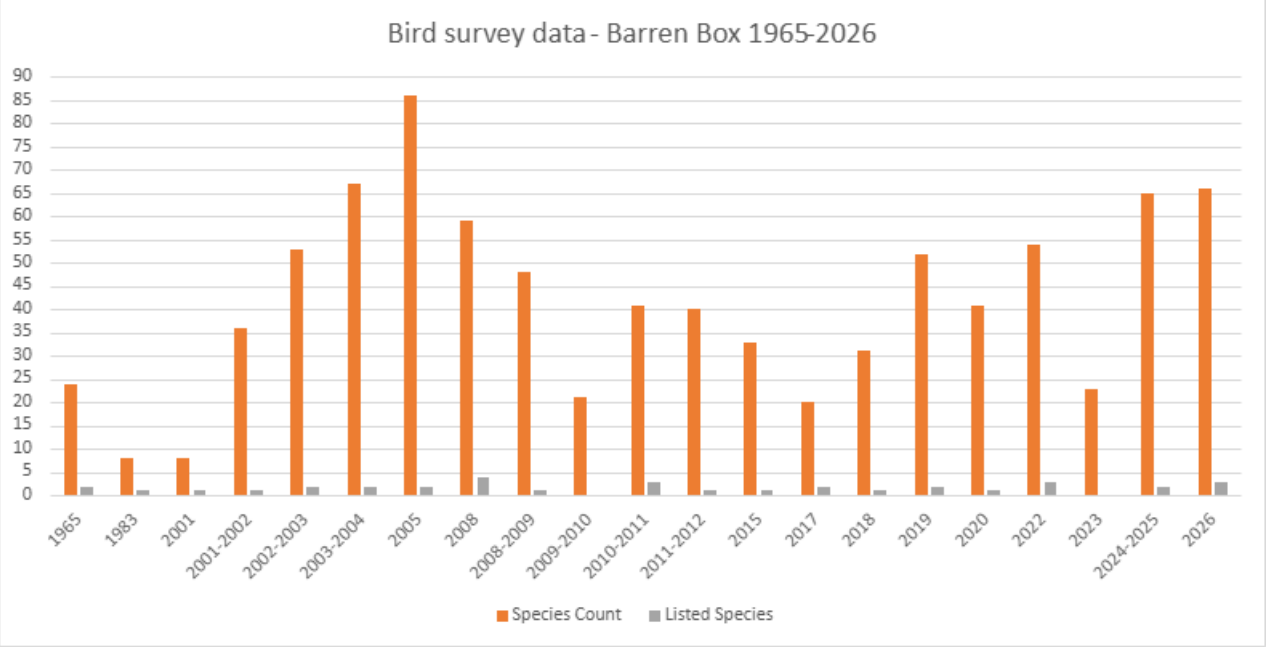

Figure 18 - Bird species numbers recorded at Barren Box Swamp/ Storage 1965-2026

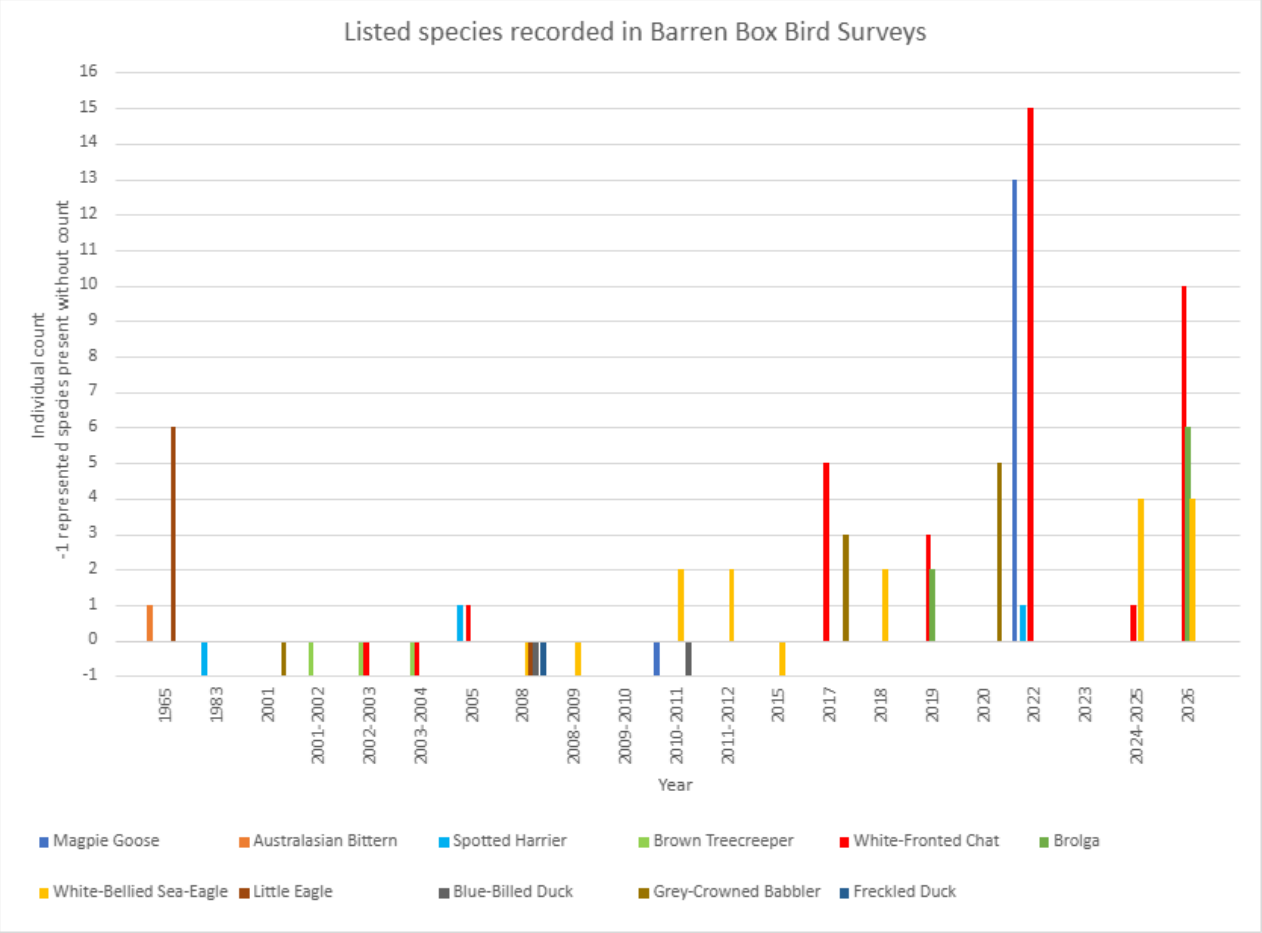

Figure 19 - Listed bird species counts recorded at Barren Box Swamp/ Storage 1965-2026

8.3.2 Ecological surveys

Vegetation surveys relevant to the rehabilitation of the Wetland Cell include:

- URS Flora and Fauna Assessment (2004);
- Baseline Vegetation Survey (2007);
- Post-2012 Flood Monitoring (2013);
- Vegetation Review (2015);
- NGH Barren Box Storage Modification Site Inspection (2021); and
- NGH Barren Box Storage Modification Site Inspection (2022).

Further details of these surveys are provided in the Murrumbidgee Irrigation Barren Box Project AEMRs (2006–2022).

The ecological methodology was finalised and submitted to the Department for review during the 2025/26 reporting period. Following this review, additional feedback was received from the Department, and further revisions are required before the methodology can be implemented. An advisory group will be established during the 2026/27 reporting period to inform the refinement of the ecological methodology and broader rehabilitation planning. Following finalisation of the methodology, ecological field assessments will be undertaken.

As the methodology remains under review, the updated Rehabilitation Monitoring Program has not yet been finalised or submitted to DCCEEW. Once the methodology has been revised to incorporate the Department's recommendations and finalised, the Rehabilitation Monitoring Program will be updated accordingly and submitted to DCCEEW.

Relevant information from previous surveys will continue to be used, where appropriate, to build on the existing understanding of the Wetland Cell and its ecological condition. Future assessments will also consider flooding history, inundation duration and environmental water regimes.

The updated monitoring approach is intended to improve the consistency and comparability of future surveys, support assessment of rehabilitation outcomes and identify any additional management actions required, such as weed control.

8.3.3 Salt and nutrient accretion

A condition of the development consent (6.5dvii) was for the Rehabilitation Plan to include:

vii) procedures for the management of salt and nutrient accretion

The Rehabilitation Plan was developed by experts in ecology, water quality, hydrology, cultural heritage and local knowledge who concluded that the consequence of eutrophication and algal blooms are likely to be minor, given:

As a terminal system that receives irrigation drainage water, it is highly likely that the system will become nutrient enriched. However, this will be mitigated by extended dry periods. Consequence: Given that inundation of the Wetland Cell will occur on average once every 4 years for 2 – 8 months and that the water will not be extracted for human use, the consequences of eutrophication and algal blooms are likely to be minor.

Therefore, no specific measures for nutrient accretion were included in the Rehabilitation Plan.

As noted in Section 7.2.2.1 the salinity levels (using EC) of the waters flowing into and out of the BBS system are generally below the benchmark level of 700 µS/cm and therefore have salinity levels close to or lower than accepted Australian drinking water levels for EC.

Since the BBS project was commissioned, no evidence of salt accretion has been noted in or around the wetland. In addition, no corrosion of concrete or steel infrastructure has been noted to indicate high salt levels in the ground or water. Floods in the BBS, occurring most recently in late 2022, aid in further dilution and/or flushing of both surface and groundwater EC levels.

Further details are included in Section 8.3.4 regarding salinity assessment.

8.3.4 Water quality

MI undertakes water quality monitoring for both discharges from licenced discharge points as well as key locations within the MIA network.

While monitoring of BBS storages for BGA and other general water quality parameters occurs weekly or fortnightly at BBS, as determined by the most recent algae levels, more comprehensive sampling occurs tri-annually when the cells are holding sufficient water to safely sample.

Since the commissioning of the BBS project, the storage water quality has been used as an indicator of the water discharged to the wetland cell. There were no water quality samples collected during 2025/26 reporting period. As outlined in section 7.1.2.2, this is because no water was released to the BBSW during the 2025/26 period, and the wetland remained dry. Water quality results for previous years are included in Appendix F.

MI's Water Monitoring Plan includes water quality sampling following release events where the wetland cell is inundated, nominally more than 10,000ML, in addition to the tri-annual benchmarking samples. Sampling also includes field observations of inundation levels, and when evidence exists of ecological change, e.g. change in pest flora or fauna, evidence of salt accretion, significant flora or fauna presence or physical damage from floods or unauthorised or illegal activities.

8.4 Biosecurity management

8.4.1 Weeds

Murrumbidgee Irrigation (MI) has undertaken risk assessments for all known Weeds of National Significance (WoNS) and priority weeds within its area of operation and has identified the relevant management protocols.

These requirements are consolidated in the Weed Management Guide (MI 2026d), which provides best-practice guidance for weed management and supports coordinated management activities across MI's operational area and with affected stakeholders. The Weed Management Guide addresses:

- Weed identification;
- Inspection and monitoring schedules;
- Preferred treatment methods;
- Relevant permits for targeted treatment;
- Biological control and non-chemical treatment options; and
- Proposed or ongoing weed-management trials.

The Weed Management Guide supports implementation of the BBS OEMP. Weed inspections and treatment activities continued during FY2025/26 at a consistent level

8.4.1.1 *Alligator weed*

The Weed Management Guide (2026) identifies alligator weed (*Alternanthera philoxeroides*) as both an aquatic and terrestrial weed and a WoNS. It is the primary biosecurity risk identified within the BBSW area.

MI undertakes scheduled inspections of areas with current or historical infestations, as well as downstream areas where conditions such as flooding or increased water supply and allocations may increase the risk of spread. Where practicable, infestations are eradicated; otherwise, treatment is undertaken to suppress growth and prevent further dispersal.

Containment measures are also used throughout the irrigation network. A minimum of three floating booms is required across the main outflow from an infestation site, with one boom installed on each of the Wah Wah and Barren Box outfall channels. These booms help restrict the movement of floating weed mats and facilitate inspection, retrieval and treatment.

Following the flood event in late 2022, alligator weed growth increased substantially during 2022/23, resulting in more frequent inspections. Inspection activities remained consistent during 2024/25, although the number of identified infestations increased due to additional resources and improved site access.

The General Biosecurity Direction (GBD) issued by Griffith City Council, as the local weed authority, in December 2021 remained in effect during the reporting period. The direction restricts unauthorised public access to BBS land and the associated riparian zones. The ongoing fencing project supports these controls by limiting unauthorised access and reducing the risk of weed introduction and spread. This direction has since been replaced by a new GBD issued in 2026-27. Consideration of the current GBD is outside the scope of the 2025/26 report.

Although access to BBS land is controlled through locked gates operated by MI and other approved entities, including Council and authorised utilities, some instances of unauthorised entry have occurred through other parts of the site. MI continues to work with Griffith City Council to manage these risks.

A permit system is in place for approved contractors and visitors, and all MI personnel, contractors and visitors must complete a BBS site induction as outlined in the OEMP. The induction covers the biosecurity direction, weed-hygiene requirements, and the environmental and safety risks specific to the site.

Table 9 outlines inspections and treatment undertaken in the BBSW and surrounding areas for Alligator Weed during 2025/26 compared to prior years.

Table 9 - BBS Alligator weed inspection and treatments

Financial year	Inspections	Inspection area	Findings and treatment
2005-2006	2	BBSW – 31 plants, downstream channels 9 plants floodway - 12	All chemically treated when located and GPS points taken
2006-2007	2 2 1	BBSW – 6 plants Downstream channels – 3 plants Floodway – 3 plants	All chemically treated when located and GPS points taken
2007-2008	2 2 1	BBSW – 19 plants Downstream channels – 8 plants Floodway – 1 plant	All chemically treated when located and GPS points taken
2008-2009	2 2 1	BBSW – 6 plants Downstream channels – 7 plants Floodway – 4 plants	All chemically treated when located and GPS points taken
2009-2010	1 1 1	BBSW – 11 plants Downstream channels – 1 plant Floodway – 1 plant	All chemically treated when located and GPS points taken
2010-2011	2 1 1	BBSW – 6 plants Downstream channels – 2 plants Floodway – no plant found	All chemically treated when located and GPS points taken. Two larger plants removed by hand and buried on site at BBSW.
2011-2012	2 2 0	BBSW – 6 plants Downstream channels – 2 plants	All chemically treated when located and GPS points taken

Financial year	Inspections	Inspection area	Findings and treatment
		Floodway – no inspection due to flooding	
2012-2013	3 3 1	BBSW – 14 plants Downstream channels – 23 plants Floodway – Wyvern only. 1 plant	All chemically treated when located and GPS points taken
2013-2014	2 2 2	BBSW – 11 plants Downstream channels – 4 plants Floodway. 0 plant	All chemically treated when located and GPS points taken
2014-2015	2 2	BBSW – 6 plants Downstream channels – 1 plant	All chemically treated when located and GPS points taken
2016-2022	At least 2 per annum	The MI spray record system, in place since 2016, shows the following treatments in the BBS zone: 2016 – 3 treatments 2017 – 4 treatments 2018 – 3 treatments 2019 – 3 treatments 2020-22 – numerous treatments, detailed inspections, physical removal and residual herbicide treatments.	All chemically treated when located and GPS points taken. Where the weed is found in an area not in proximity of previously mapped plants, this information is reported to the relevant local weed authority (Council).
2022-23	56	BBSW – 225 plants Downstream channels – 146 plants	All chemically treated when located and GPS points taken. All sites were mapped with a 30 m buffer zone implemented.
2023-24	50	BBSW – 7 plants Surrounding and downstream channels – 21 plants	All chemically treated when located and GPS points taken. All sites were mapped with a 30 m buffer zone implemented.
2024-25	54	BBSW – 25 plants Surrounding and downstream channels – 30 plants	All chemically treated when located and GPS points taken. All sites were mapped with a 30 m buffer zone implemented.
2025-26	42*	BBSW – 2 work orders Surrounding and downstream channels – 15 work orders	All chemically treated when located and GPS points taken. All sites were mapped with a 30 m buffer zone implemented.

* Note that work order structure was changed reducing the total number of inspections required.

MI works closely with GCC, CSC and the State Priority Weed team on WoNS management for alligator weed. MI also supports, attends, and where required facilitates the State or Council site inspections, the last of which

was held in August 2026. MI staff, when available also attend Riverina Murray Alligator Weed meetings and Regional Weed Committee meetings.

MI supports and works collaboratively with the Irrigation Research and Extension Committee (IREC) on their many weed related initiatives and forums. MI also works collaboratively with research scientists from the Department of Primary Industries and Regional Development to assist them with an environmental DNA project for detecting Alligator weed.

MI keeps detailed mapping and weed treatment records on all WoNS locations. Where a WoNS are mapped and not in close proximity to previously identified locations, notification occurs to the applicable Weed Authority (i.e., local Council - GCC (for BBS and nearby zones) and Carrathool Shire Council for supply channels downstream of BBS past Bringagee Road, Tabbita). The Council weed officers then provide the information to the State Priority Weed Team.

Alligator weed inspection will continue to occur during 2026/27. The use of drone technology for weed identification within the MI area of operations is currently being investigated.

8.4.2 Pest fauna

A few pest fauna species are known to historically occur at BBS. The higher risk species include feral pigs, foxes and European carp.

MI staff and contractors are encouraged to report any signs of pest species, so that they can be assessed for potential control or other mitigation. In addition, MI takes reports from customers and surrounding community members or Councils relating to the MIA.

Pest fauna management undertaken since the BBS project was commissioned:

- 2006 Aerial shooting
- 2007 Fox baiting
- 2007 Pig trapping and shooting
- 2008-10 Pig trapping
- 2015 Fox baiting
- 2017-2018 European Carp removal
- 2021 Aerial shooting of pigs – LLS project included BBS lands
- 2021 Sheep removal (escaped into BBS from surrounding properties)
- 2021 Fox baiting and den fumigation (October)
- 2022 Fox baiting (March)
- 2022 Fox baiting and cat trapping (October)
- 2023 Fox baiting (April)
- 2023 Fox baiting (December)
- 2024 Fox baiting (June)
- 2024 Fox baiting (November)
- 2025 Fox baiting (April)
- 2025 Fox baiting (October)
- 2026 Fox baiting (February/March)
- 2026 Pig baiting (February/March 2026)

MI engages fully qualified and licenced contractors for pest control activities.

8.5 Planned activities to be undertaken in the next reporting period

Activities planned to be progressed for BBS including the wetland rehabilitation monitoring are detailed under Section 12.

9 Lower Mirrool Creek Floodway (6.5 d-x, xiv, xv, 6.5eii, iii & 7.4 h-i)

During the EIS process for the BBS project, it was acknowledged by both the Department of Planning and MI that a long-term study to determine the ecological water requirements of the Lower Mirrool Creek was required. It was later determined that an EIS was not required, and the project proceeded under a Review of Environmental Factors process.

9.1 Assessment of the health of the LMCF (7.4h)

Figure 20 shows the location of LMCF, with the listed wetlands marked from left – Belaley Swamp, Berangerine Swamp, Little Berangerine Swamp, Highway Swamp and Five Oaks Swamp. This map was provided to Department of Planning during negotiations on the EIS to highlight the wetlands to be considered during any environmental water investigations. Narrabri Swamp is located approximately 7 km upstream of Five Oaks Swamp, however in some cases was not considered to fall within the floodway wetland system (URS 2006, updated 2026).

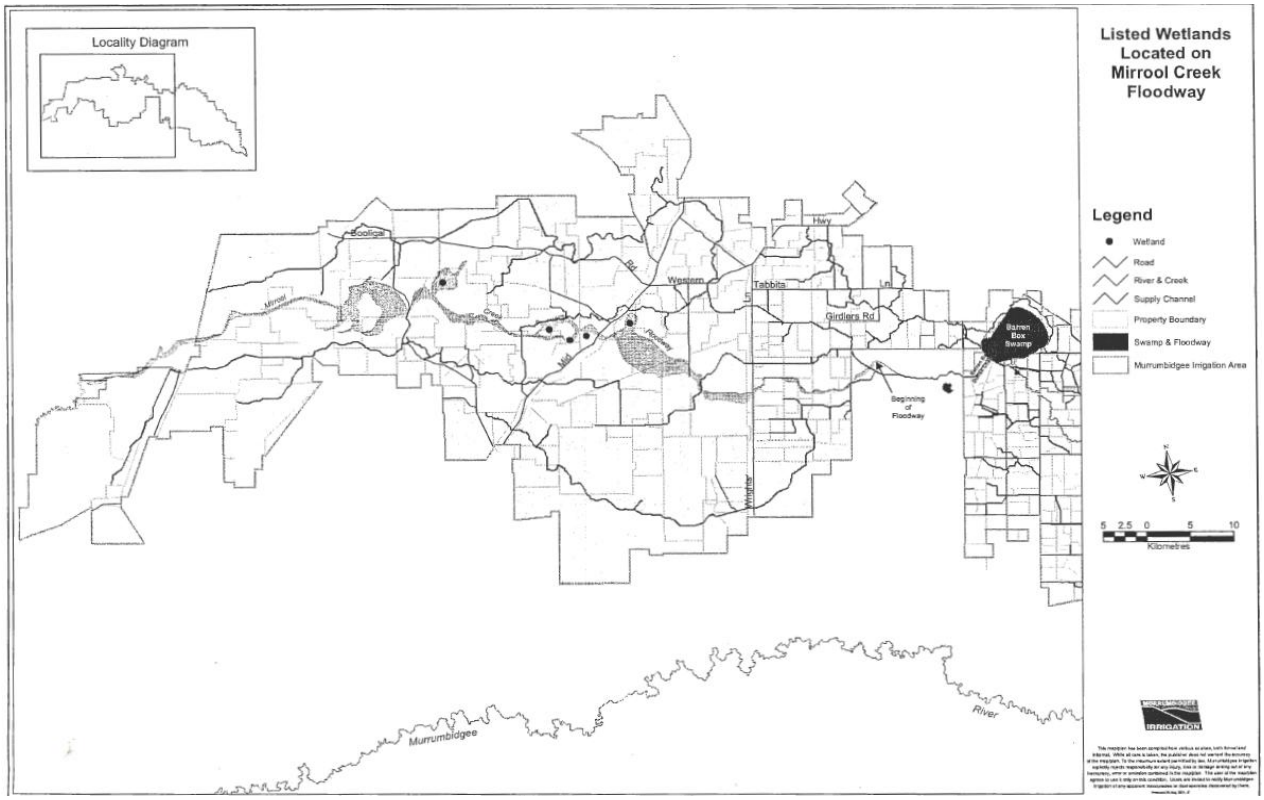

Figure 20 - Lower Mirrool Creek Floodway location (MIA extent in 2004)

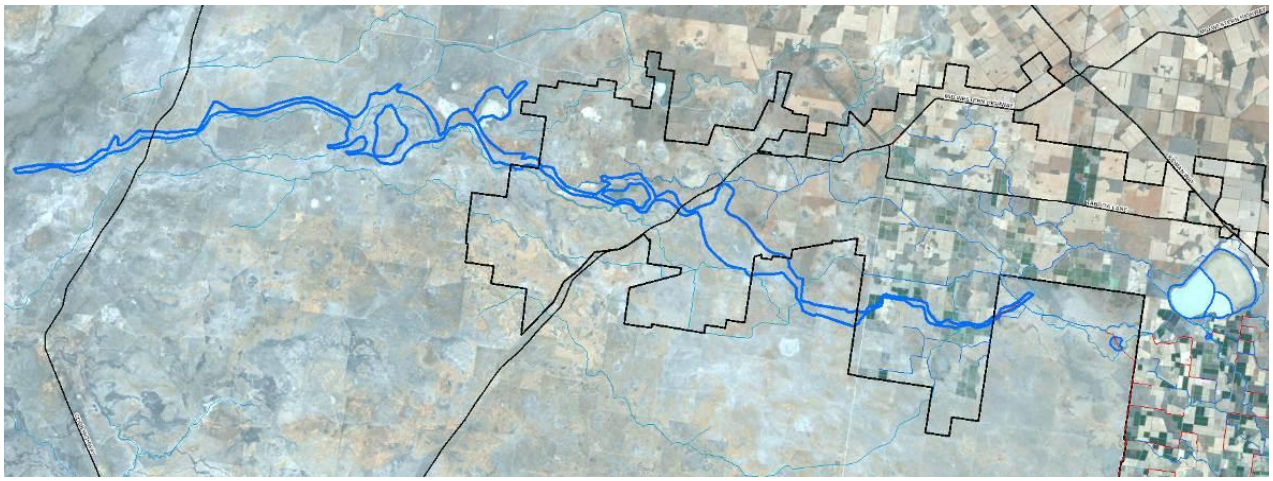

Figure 21 - Lower Mirrool Creek Floodway location (MIA extent from 2019)

Aerial imagery from SixMaps utilised in MI Maps (MI's GIS mapping system)

9.1.1 Condition of vegetation

Several studies and assessments have been undertaken since the early 1990s of the vegetation along the LMCF, focusing on the wetlands outlined above, these studies and assessments consist of:

- Wetland vegetation of the floodway monitoring program 1992-2002
- Monitoring the floodway 2003
- Condition and biodiversity of vegetation remnants in the MIA: Stage I 2002
- Condition and biodiversity vegetation remnants of the MIA: Stage II 2003
- Condition and biodiversity of vegetation remnants in the MIA: Stage III 2001-2004
- Condition and biodiversity of vegetation remnants in the MIA: Stage IV: Assessing change between 2001 and 2011
- Gunbar pipeline and channel decommissioning (WWSD) Reviews of Environmental Factors
- NGH site inspection 2021

For further information regarding the studies and assessments outlined above please refer to Murrumbidgee Irrigation Barren Box Project AEMRs 2006-2022.

9.1.1.1 *Planned ecological assessment*

During the 2024/25 reporting period, NGH Environmental reviewed available information relating to the BBS Wetland Cell and LMCF and submitted a proposed survey methodology to DCCEEW BCS officers, as outlined in **Section 8.3.2**. MI subsequently received feedback from DCCEEW BCS and has been working with NGH Environmental to develop a rehabilitation monitoring program incorporating an updated methodology and the recommendations provided by DCCEEW BCS.

The updated monitoring program is to be provided to DCCEEW BCS during 2026/27. Once agreed, the methodology will support a consistent and comparable approach to future ecological surveys. Monitoring results will also be provided to DCCEEW EWO to support the determination of EWR, as outlined in **Section 9.2.3.**

Ecological field surveys were not undertaken during the 2025/26 reporting period as the monitoring program was being updated. Subject to feedback from DCCEEW and site-access requirements, surveys are expected to be scheduled during FY2027/28. MI will continue liaising with DCCEEW BCS and DCCEEW EWO regarding the ecological methodology. An ecological field assessment of the BBS Wetland Cell and associated reporting will be undertaken once the methodology has been agreed.

9.2 Releases to the floodway

No deliberate releases have been made based on vegetation conditions since the commissioning of the BBS Project. While historical data indicated flood events every 10-15 years, the 2012, 2016 and 2022 flood events indicate a more regular wetting of the floodway due to natural events with major floods occurring every 4-6 years since the BBS project was commissioned.

The Lower Mirrool Creek Floodway is an approved discharge point under EPL4651. When releases are planned (where possible), MI are required to:

- Notify affected customers ahead of time
- Notify the EPA
- Take water quality samples

As detailed under **Section 7.1.2** since the commissioning of the BBS project discharges to the LMCF have been mainly driven by flood events and following directions from Flood Management Authorities, with smaller releases due to operational reasons. During extreme floods, releases may occur with little warning. **Section 7.1.5** outlines BBSW Operational Guidelines, including the management approach during flood events.

Appendix C details the monthly volumes released during 2025/26. **Table 10** below includes the annual releases since commissioning.

Table 10 - Summary of releases to the Lower Mirrool Creek Floodway (2012 – 2026)

Financial year end	Total (ML)
2012	**116,891**
2016	**281**
2017	**121,363**
2018	3,405
2019	150
2022	133.2
2023	**112,116.6**
2024	527.3
2025	49.6
2026	0
Total	**354,916.7**

Note: figures in **bold** denote releases during major flood events.
BBS project opened August 2006. Total includes 1950ML flow released to the Floodway in 2006.

9.2.1 Inundation - duration and extent

MI does not have detailed records of inundation levels along the length of the LMCF during flood and/or release events since the BBS project was commissioned. Prior to privatisation, other State government departments supplied satellite imagery interpretation showing inundation during floods to MI, which was then Government-owned. MI now uses anecdotal records, site inspections, drone footage and feedback from local flood/ Council

authorities, customers and landholders to aid in determining this information. MI also accesses publicly available satellite imagery taken during flooding, where available.

It is noted the DCCEEW EWO feasibility project as a part of the Resilient Rivers Program will undertake mapping of inundation extent based on satellite and aerial mapping. MI has provided available flow and/or discharge data, including staff knowledge from prior flood events, to support this mapping and allow understanding of inundation extents against released volumes.

There were no releases to the LMCF during 2025/26 as there were no flood events and rainfall during this period was below average.

Activities planned for the next reporting period include water sampling and analysis of wetland cell, including monitoring of inundation levels as flood waters recede over time (if required). Field observations will include any evidence of salt accretion, damage, recovery or other noteworthy occurrences.

9.2.2 Quality of water discharged via MIRFLD

As part of MI's EPL4651, MI monitors discharges at Point No 15 MIRFLD, which releases water to the LMCF. When access to this location is a safety risk due to severe weather and/or flooding, MI samples either at Channel 13, Bypass from the Barren Box Outfall channel or a nearby safe location which is assessed as containing water representative of the outflow.

When time permits, MI samples prior to the release and notifies EPA of the potential of a release. This is to inform the EPA in case of enquiries from downstream landholders to the EPA, however, it is noted that this is not an EPL condition.

Water quality data is provided in **Appendix G** for release or due diligence events via the MIRFLD location. In general, the data shows water released is suitable for primary production based on ANZECC 2000 guidelines, with only occasional results outside of the guidelines, which should be expected during flood release events when turbidity is raised with the resulting elevated levels of soil-associated metals and chemicals.

For chemicals tested as part of EPL4651 compliance, no exceedances were recorded during 2025/26. Historical exceedances are included in **Table 11** with all exceedances reported to EPA upon receipt, published on MI's website and summarised in the relevant LCR/ACR. In addition, MI has a Chemical Contingency Plan which outlines the investigations and contingency measures MI follows should an exceedance be received.

Table 11 - Water quality released via MIRFLD – summary of EPL4651 chemical exceedances

Parameter	Notification level	Action level	Comments
Chlorpyrifos	4 (Nov/Dec 17)	-	-
Diuron	1 (Nov 17)	-	-
Metolachlor	4 (Sept/Oct 2016, Nov 17)	6 (2012, 2016, 2017, 2018)	All pre-2018 exceedances were under the current EPL levels which are based on the 2020 technical brief for guideline values.
Thiobencarb	-	1 (Nov 17)	-

9.2.3 Environmental water allocations

MI works cooperatively with State and Commonwealth EWOs to deliver environmental water allocations when ordered. In addition, MI has worked with Councils and other stakeholders to deliver water for other environmental needs.

The LWMP identified that the LMCF releases, which at that time were regular and annual events, led to environmental impacts and/or changes to the floodway vegetation and wetlands. Since the 1990's MI and other government stakeholders have investigated management measures for this lower part of the Mirrool Creek system which is approximately 100km long and up to 4 km wide in places.

Throughout these investigations, it was acknowledged that a variety of stakeholders needed to be involved, including private landholders along the floodway. In addition, releases from BBS were unlikely to reach the end of the floodway, i.e. its confluence with the Lachlan River due to the vast volumes of water required to fully wet the floodway. The last recorded flood that reached the Lachlan River was in 1989 and MI records show a floodway release volume of 218,385ML in 1988/89 plus any additional floodway catchment and escape flows realised prior to and during the flood event.

Following discussions on MI's Modification application for the BBS Project approval conditions with government stakeholders, DCCEEW EWOs approached MI in early July 2022 to discuss their planned Environmental Water Feasibility study for LMCF and BBS Wetland cell. MI and DCCEEW EWOs have been collaborating with MI sharing information for reporting periods to assist DCCEEW and their consultants in the delivery of the project and its outcomes.

In 2024/25, DCCEEW EWOs developed a set of environmental water requirements, including draft flow guidelines for the LMCF. MI will continue to collaborate with DCCEEW EWOs to develop adequate environmental watering proposals for the LMCF in 2026/27.

9.3 LMCF wetland system – monitoring program (6.5dxiv)

The LWMP biodiversity surveys and other MI procedures have included monitoring of the LMCF; however, a clearly defined and consistent monitoring program has not been in place in recent years. NGH Environmental has prepared a proposed survey methodology taking into account the available information relating to the BBS Wetland Cell and LMCF and, which was provided to DCCEEW BCS officers. MI has subsequently received feedback from DCCEEW BCS and has been working with NGH Environmental to refine a rehabilitation monitoring program that incorporates an updated methodology and the recommendations provided by DCCEEW BCS. MI is also working collaboratively with DPE EHG EWO and DPE BCD to further define the monitoring program.

Ecological field surveys were delayed during the 2025/26 reporting period due to the ongoing review and development of the monitoring methodology. Subject to feedback from DCCEEW and access requirements, a formal ecological field assessment of the LMCF and associated reporting is planned for inclusion within the 2027/28 AEMR, following agreement on the monitoring methodology.

MI will continue to work with DCCEEW EWO on environmental watering proposals for the LMCF and provide the results of ongoing monitoring to support the determination of EWR. Surveys will be scheduled and undertaken using the agreed methodology, enabling results from future surveys to be more readily compared over time.

9.4 Planned activities to be undertaken in the next reporting period

Activities planned to be progressed for LMCF including monitoring are detailed under **Section 12.**

10 Environmental performance goals not met (7.4e)

As outlined in Section 3 and Appendix A, several conditions were not met, and by association, the performance goals relating to those conditions were only partially or not met. The performance goals that were not met during 2025/26 include ecological field assessment of BBS Wetland and LMCF and finalisation of the OEMP.

Work has proceeded with MI and NGH Environmental to finalise the ecological survey methodology, with the aim of enabling the commencement of field environmental assessments and related activities reporting. The on-ground implementation of the BBS fencing project commenced in 2025/26.

The OEMP Department feedback was reviewed, and in response, MI has developed a dedicated Flood Management Plan, as well as reviewed and updated the BBSW Operational Guideline. Both items informed updates to the OEMP.

MI is progressing compliance with the items included in Section 3 and Appendix A in several ways:

- Ongoing consultation with government agencies to respond to a variety of feedback provided to MI.
- Review of Cultural Heritage Assessment and Finds Management Procedure in consultation with Griffith LALC.
- Consultation with two Advisory Groups for floodway ecology and hydrology.
- Ongoing collaboration with DCCEEW – EWOs on ecological methodology and surveys for LMCF and BBS Wetland cell.
- Further improvements in MI's environmental management system, including the submission of the updated BBSW OEMP to the Department.
- Actions outlined in Section 12.

11 Variations to approvals (7.4l)

During the 2025/26 financial year, no variations to the Barren Box Swamp (BBS) Project approval were obtained.

While not related to the BBS project, a General Biosecurity Direction remains in place over BBS land. The original direction, issued by Griffith City Council in December 2021, restricted unauthorised public access to BBS land and associated riparian zones. This direction has since been replaced by a new GBD issued in 2026-27. Consideration of the current GBD is outside the scope of the 2025/26 report.

12 Environmental management targets and strategies (7.4m)

12.1 Activities planned for next reporting period (FY2026-27)

The following activities are planned to be progressed during the next reporting period (2026-27 financial year), subject to weather conditions, field access and availability of suitably qualified consultants and contractors.

Table 12 – Activities planned for next reporting period

Activity	Timeframe
Next Reporting Period	
Water sampling and analysis of wetland cell, including mapping of inundation levels as flood waters recede over time (if required). Field observations will include any evidence of salt accretion, damage, recovery or other noteworthy occurrence.	FY2027
BBS Fox baiting, fox den fumigation and feral cat trapping and pig baiting	FY2027
BBS Alligator weed inspections, including planned inspection by Councils, LLS, State Priority Weed team.	FY2027
Completion of the final stages of the BBS fencing project on-ground works as part of the General Biosecurity Direction for alligator weed.	FY2027
MI to finalise ecological methodology with NGH-FYFE incorporating the Wetland Rehabilitation Plan monitoring data.	FY2027
MI to establish advisory groups with assistance form NGH-FYFE to obtain broader expert advice to inform rehabilitation and flood management plans.	FY2027
MI to continue liaising on ecological methodology with DCCEEW-BCS and DCCEEW EWO	FY2027
Ecological field assessment of BBS wetland cell and reporting (after methodology agreed)	FY2028
Ecological field assessment of LMCF and reporting (after methodology agreed)	FY2028
Continue to work with DCCEEW EWO on LMCF environmental watering proposals	FY2027
Continue to update the OEMP and associated documents based on feedback from DCCEEW, consultation outcomes and AEMR findings.	FY2027
Notify D-G, GCC and DCCEEW of OEMP review.	FY2027
Fire management activities in consultation with Griffith RFS.	FY2027
Undertake water bird survey	FY2027

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