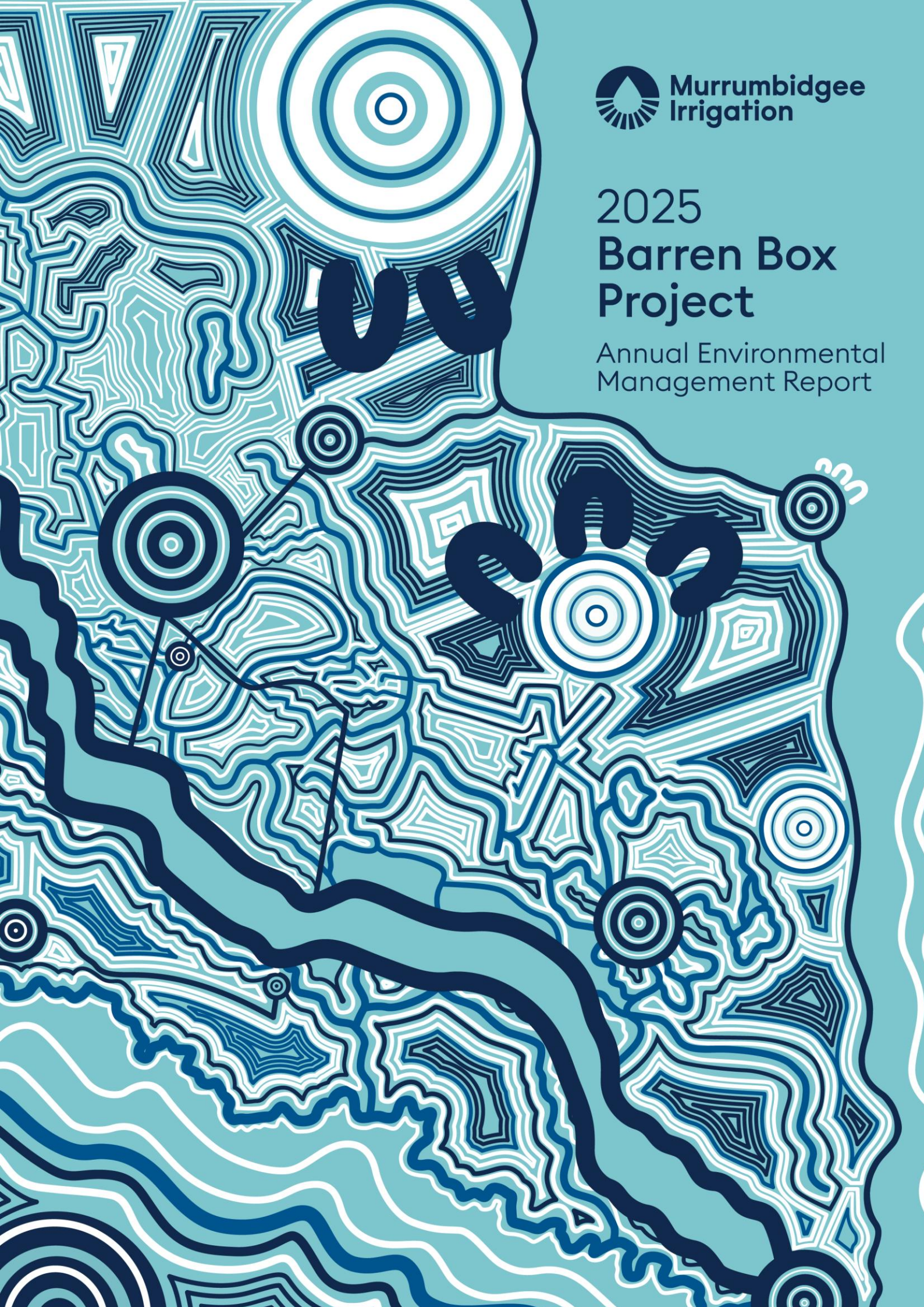

Murrumbidgee Irrigation

2025 Barren Box Project

Annual Environmental Management Report

This document is the property of Murrumbidgee Irrigation Limited. The data contained in this Barren Box Storage Project: Annual Environmental Management Report is for the sole purpose of meeting MI's compliance reporting requirements. MI does not guarantee the accuracy, reliability or suitability of excerpts of this data for any other purpose.

Executive Summary

The Barren Box Project Annual Environmental Management Report (AEMR) for the financial year 2024/25 has been prepared to meet the reporting requirements of Murrumbidgee Irrigation (MI) development approval. MI received feedback from the Department regarding MI's 2023-2024 AEMR on 5 June 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 AEMR's.

In 2024/25, Murrumbidgee Irrigation maintained progress toward compliance with the development approval, reporting no non-compliances and partially fulfilling nine conditions. Work is ongoing on MI's Operational Environmental Management Plan (OEMP), a dedicated flood management plan has been created, and the survey methodology programs for Barren Box Storage Wetland Cell and the Lower Mirrool Creek Floodway are nearing completion. Consultations with the Department continue on these matters, along with discussions with Environmental Water Officers about watering needs for the Lower Mirrool Creek Floodway.

MI have planned activities scheduled to be undertaken during 2025/26, which will continue to support our journey to full compliance while also maintaining and managing all operational aspects of the project.

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Abbreviations

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
BBS	Barren Box Storage
BBSW	Barren Box Storage and Wetland
BBWRP	Barren Box Weland 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 Investigation and Research Organisation
Department	NSW Department of Infrastructure, Planning and Natural Resources (for original consent); subsequently: Department of Planning, Housing and Infrastructure (current)
DEC – now 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
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
MDBPA	Murray Darling Basin Plan Authority
MDFRC	Murray Darling Freshwater Research Centre
MI	Murrumbidgee Irrigation Limited
MIA	Murrumbidgee Irrigation Area
ML	Megalitre
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
SES	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
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 Project Annual Environmental Management Report (AEMR) for the financial year 2024/25 has been prepared to meet the reporting requirements of MI's development approval. The report comprises and is in the format outlined in:

- Conditions 7.4 a-m of the development approval DA 101-4-2004-I – see Appendix A;
- Include any matters identified by the Director-General under Condition 7.6; and
- Be submitted to the Director-General, Council (i.e., Griffith City) and the DEC (now DCCEEW) annually under Condition 7.5.

This report has been prepared for the financial period 2024/25 and is due 30 October yearly to align with Condition 7.5 which is in line with MI's Annual Compliance Report for Environmental Protection Licence (EPL4651) and Combined Approval (40CA403245) Monitoring and Reporting plan. MI received feedback from the Department regarding MI's 2023-2024 AEMR on 5 June 2025. The Department considered that the Annual Report 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 and is 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; a	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;	Section 7.1.3, Appendix A
g) details of the total volume of water savings that have been made for the reporting period	Section 7.1.3
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

Condition	Report section
i) details of any deliberate releases: refer to condition 6.5d) xv);	Section 7.1.2, Section 9.2
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 12 month period;	Section 7.1.5
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.

Table 16 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; 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-g, 7.4i-m, 7.6		
Partially compliant	4.3	No evidence of construction independent audit submitted to EPA or Council.	Nil. Significant time has elapsed.
	6.4, 6.4a	6.4a – OEMP requires updating with all statutory and other obligations.	Section 6 OEMP is to be updated to include the Department feedback and be lodged.
	6.5d, 6.5di-xiv	Wetland Rehabilitation and Management Plan:	
		diii – Financial commitment	See Section 8.2
		dvii – Salt and nutrient accretion	Section 8.3.3
		dxiv – Ongoing monitoring of LMCF	Section 9. Work collaboratively with DCCEEW EWO.
	6.5e, 6.5ei-vi	6.5 Flood Management Plan:	
		6.5e – Consultation with Council and DNR	Section 7.1.7.2. Continue working with relevant Councils and DCCEEW South West Region Floodplain Management staff via Floodplain Management Committees and where required, Local Area Emergency Management Committees and the SES. Finalise dedicated flood management plan
		6.5eii - Program for assessment of water requirements for LMCF	Section 9. Work collaboratively with DCCEEW EWO.
	6.6	OEMP – 3 yearly review and notification to D-G, EPA and Council	Section 6 OEMP is to be updated to include the Department feedback and be lodged.

Compliance status	Conditions	Summary	Proposed actions
	7.4h	7.4h Health of LMCF, etc	Section 9. Update provided, see other LMCF actions.

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 2024/25 as summarised in Table 3 as required under condition 7.4b.

Table 3 - Summary of complaint numbers for 2024-2025 financial year.

Year	Number
2024-2025	0

5 Meteorology

The weather conditions between the completion of construction of the BBS project (August 2006) and 2025 have varied significantly. This included the end of the Millennium drought and floods in 2012, 2016/17, and 2022 (Figure 1, Appendix B).

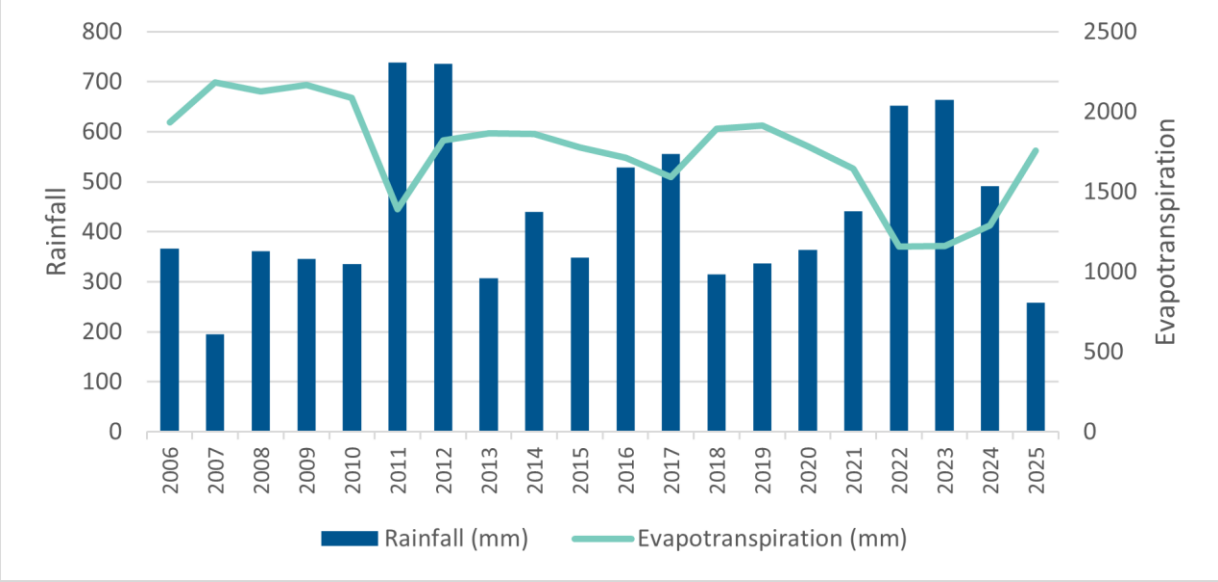


Figure 1 - Rainfall and evapotranspiration for financial years 2006-2025

Rainfall has continued to decline over the past five years, with 2024/25 recording well below-average rainfall. This is the lowest rainfall Griffith has experienced since 2007. There was a decrease of 234mm compared to 2023/24 and 406mm compared to 2022/23. Additionally, evapotranspiration increased by 468mm compared to last year, 2023/24.

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 is currently under review to incorporate the Department's comments, and actions from this AEMR. Following this review, 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.

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

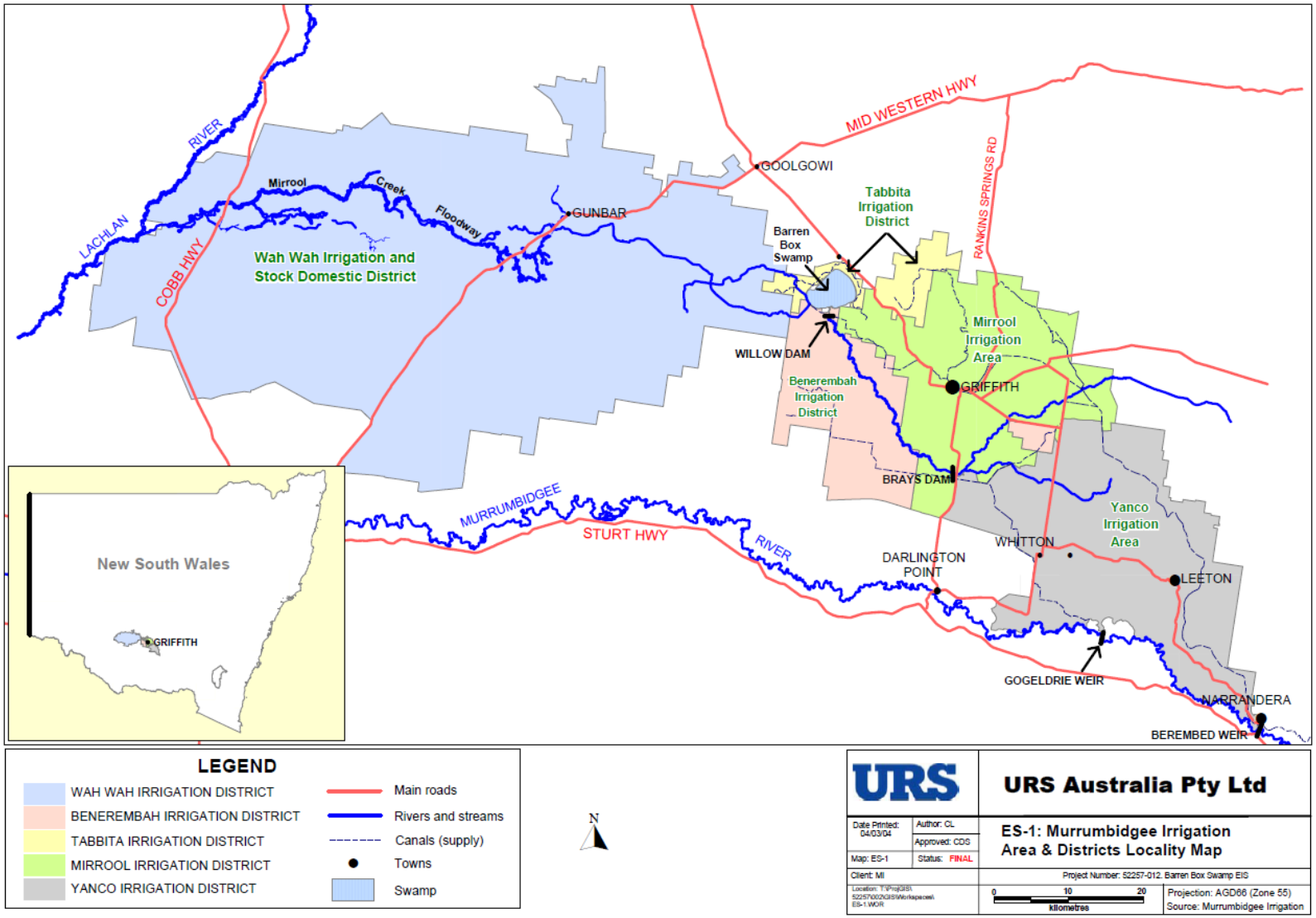
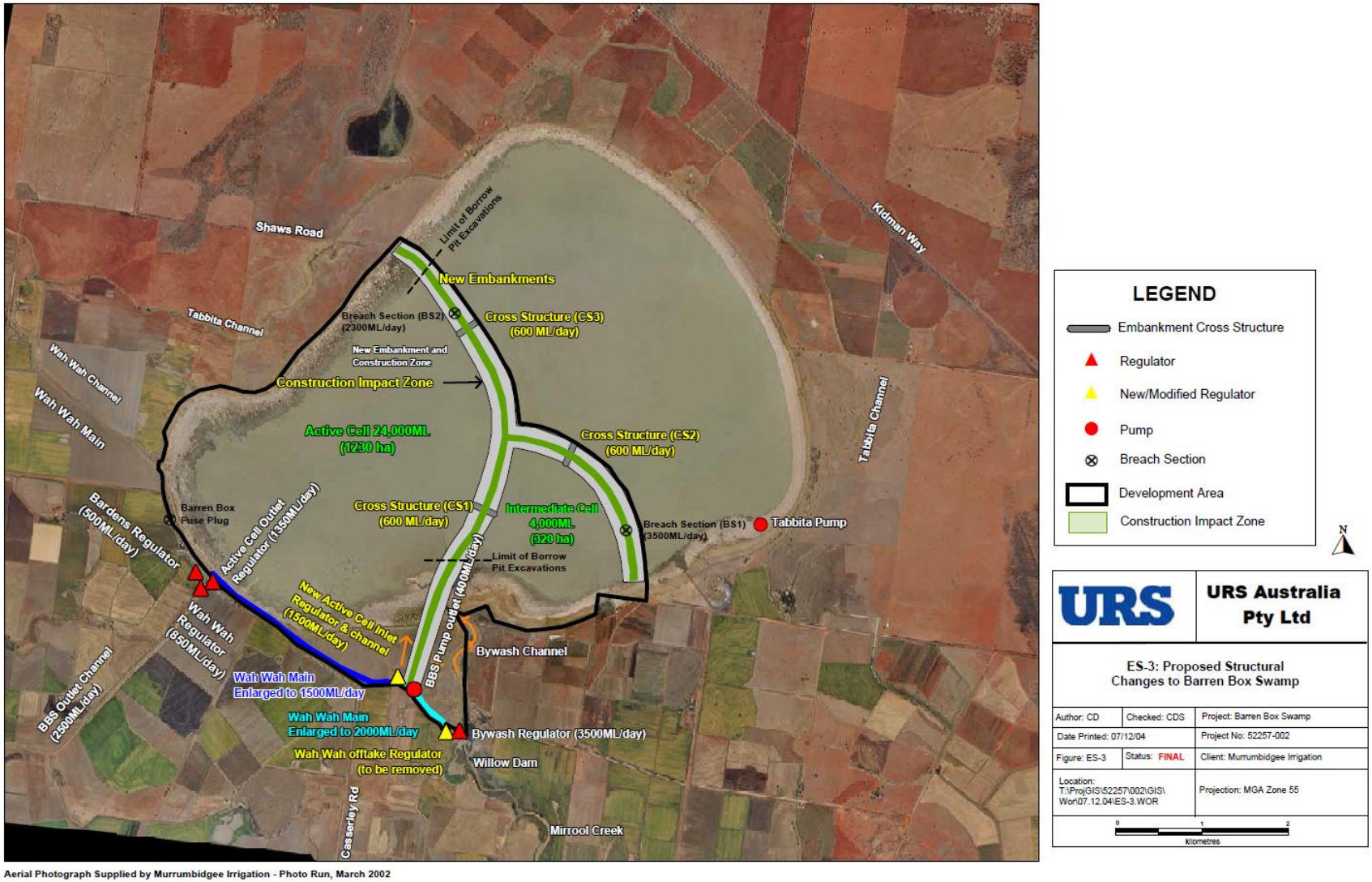


Figure 2 - Murrumbidgee Irrigation Area and Districts 2004 Locality Map (EIS ES-1)



Aerial Photograph Supplied by Murrumbidgee Irrigation - Photo Run, March 2002

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.

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.

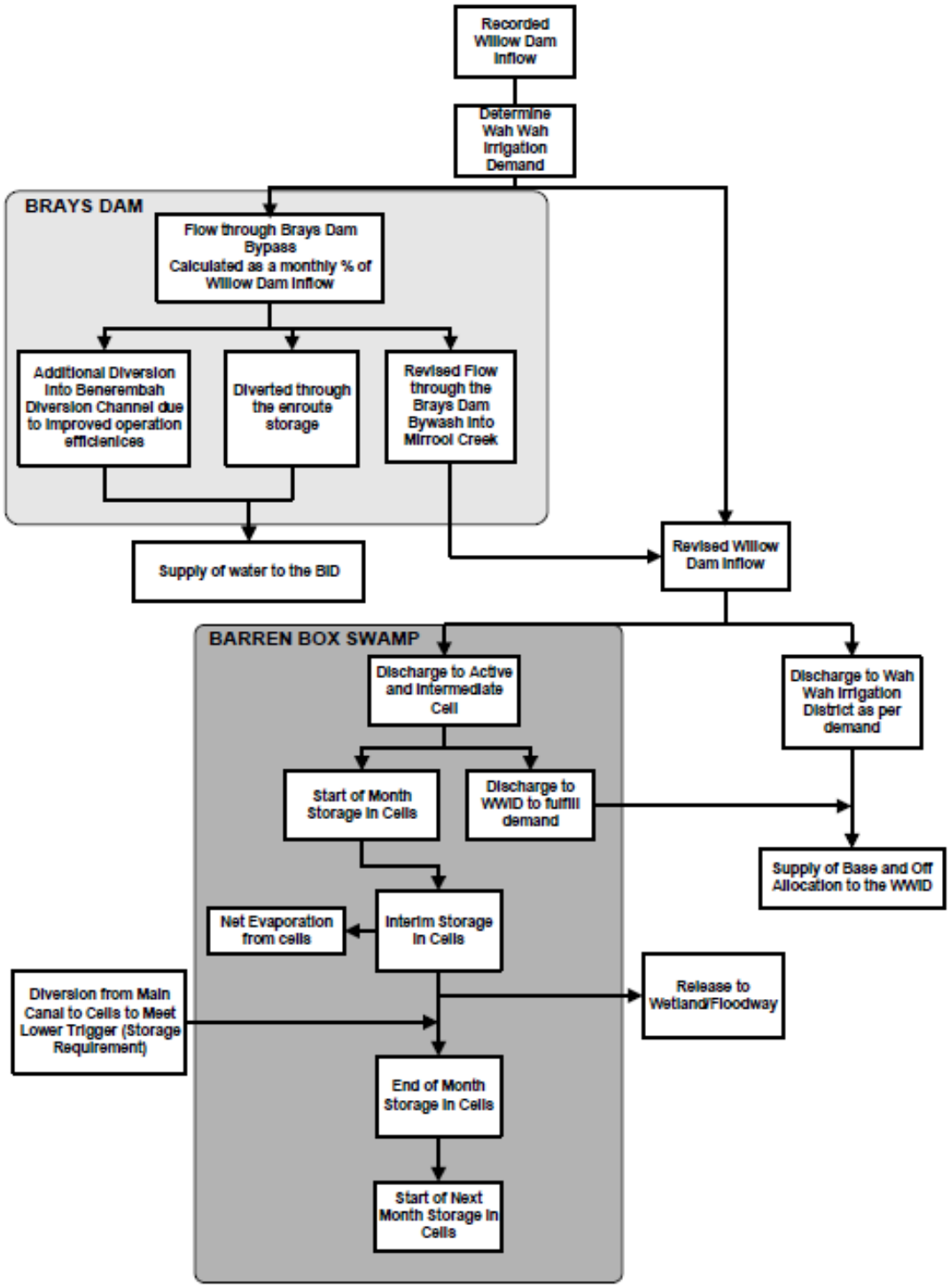


Figure 11-3 Schematic Model for Proposed Conditions

Figure 4 - EIS Model for predicted/ proposed conditions

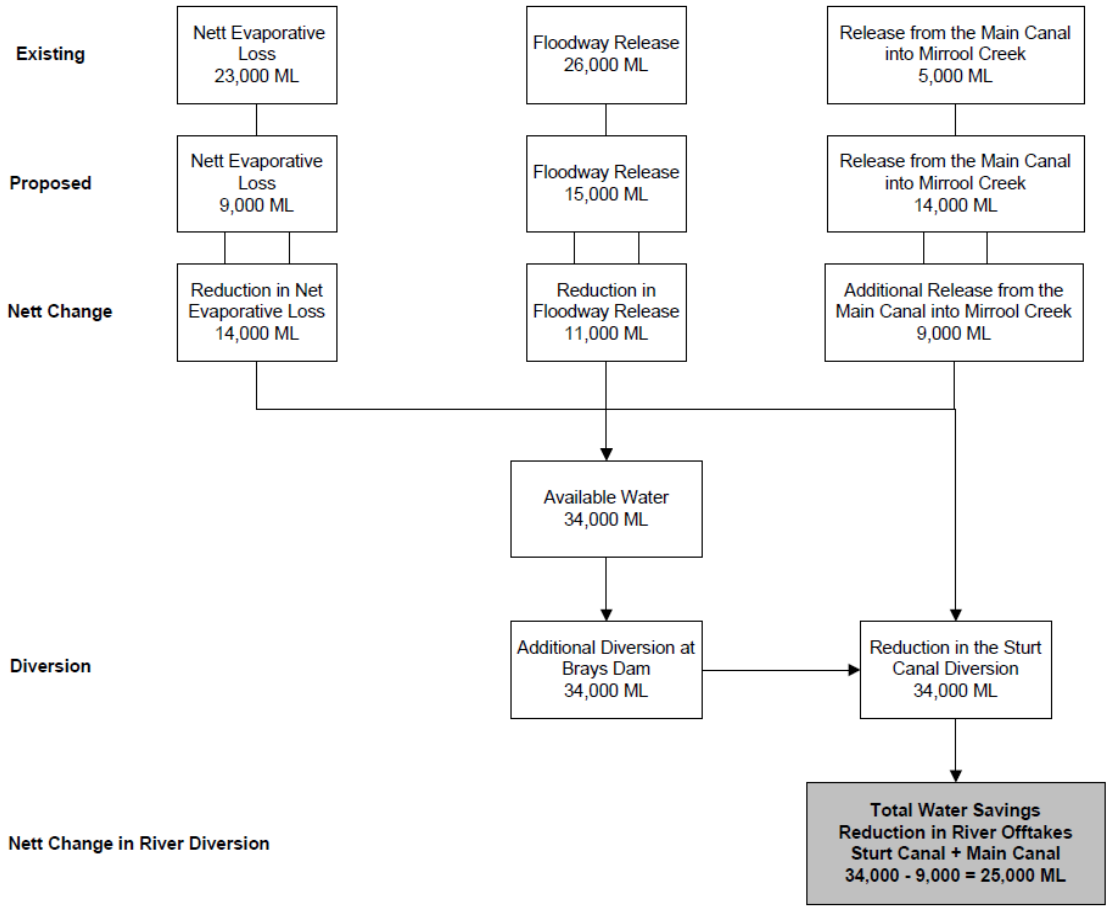


Figure 4-1 Revised Figure 5.6 and C17

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*
	Via en-route storage (Brays Dam)	*0*	*23,000*	*+23,000*
MIR	Flow through Brays Dam bywash	65,000	40,500	-24,500

ID	Description	Annual average flows (ML)		
		Existing conditions	Proposed conditions	Difference
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: see Section 7.1.3.
- Water delivered to the WWID: see Section 7.1.4 and
- Net evaporative losses from BBS.

Net evaporative losses from BBS were estimated to reduce by an annual average of 14,000ML 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.

In 2008 MI commissioned Water Technology to develop a hydrological model of the Barren Box Storage and Wetland. The primary purpose of the model was to provide MI with an appropriate tool to investigate appropriate water management strategies for the wetland cell and support rehabilitation planning.

In addition, the model would provide MI with the capability to explore the implications of different control rules to govern water movement between the three Barren Box cells as well as inflows from Willow Dam and outflows to the WWID.

The model runs determined evaporative losses for the constructed BBSW achieved a mean annual water saving of a little over 17GL/annum. The project found the evaporative saving was consistent with the EIS prediction of 14GL/annum and suggested the EIS modelling was conservative. The model results and report also indicated the magnitude of the savings varied significantly from year to year and month to month (Water Technologies 2008).

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.

With the implementation of the MIA and Districts Community Land and Water Management Plan (MI, 1998), MI committed to reducing the occurrence of releases to the floodway to minimise the impact on landholders in

the area. Therefore, the predicted reduction in the number and volume of forced discharges to the floodway would contribute to this undertaking.

7.1.2.2 Current performance

7.1.2.2.1 BBS wetland cell

Discharges to the BBS wetland cell have been mainly driven by flood events.

A monthly summary of water discharged to the BBS wetland cell for 2024/25 is presented in Table 5**.** A total volume of 2,988 ML was released during 2024/25. The water released to the wetland cell during July and August 2024 was due to the BBS Active and Intermediate cells being at capacity.

Table 5 - Monthly releases to the BBS wetland cell for 2024/25

Month	Total (ML)
Jul-24	1819
Aug-24	1169
Sep-24	0
Oct-24	0
Nov-24	0
Dec-24	0
Jan-25	0
Feb-25	0
Mar-25	0
Apr-25	0
May-25	0
Jun-25	0
Total	**2,988**

7.1.2.2.2 Lower Mirrool Creek Floodway

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. Some smaller releases have occurred due to operational needs, which can include operational constraints and/or maintenance, infrastructure malfunction and/or damage, and management of flows in excess of downstream demand.

A monthly summary of water discharged to the LMCF for 2024/25 is presented in Table 6**.** A total volume of 49.6ML was released during 2024/25.

Table 6 - Monthly released to the Lower Mirrool Creek Floodway for 2024/25

Month	Total (ML)
Jul-24	0
Aug-24	0
Sep-24	4.5

Month	Total (ML)
Oct-24	34.9
Nov-24	0
Dec-24	10.2
Jan-25	0
Feb-25	0
Mar-25	0
Apr-25	0
May-25	0
Jun-25	0
Total	**49.6**

7.1.3 Reduction in MIA water entitlement and water savings

7.1.3.1 EIS impacts or predictions

EIS Section 11.3 and Section 11.4.2 summarised the predicted water savings principally result from:

- A reduction in evaporation from BBS through the creation of a 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 LMCF.

The water savings from the project were proposed to contribute to the return of environmental flows to the Snowy River System and was set at a minimum average of 20,000 ML per year.

Therefore, river diversions to the MIA and ultimately MI's entitlement would need to be reduced to allow for these environmental flows to occur.

7.1.3.2 Current performance (Conditions 1.7, 1.8, 1.9, AEMR 7.4f, 7.4g)

On 6 October 2006, MI provided to the Department a certificate of title for a permanent transfer of 20,000 ML of water from MI's Continuing Annual Conveyance in satisfaction of Condition 1.9 of the development consent. Further details are provided in Appendix A as these conditions have been fully met and are not reported annually.

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

7.1.4.1 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.

7.1.4.2 Current performance

7.1.4.2.1 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).

7.1.4.2.2 Current operating guidelines

Significant changes to MI's integrated water delivery system and changes to customer usage needs mean the original concepts for BBS operation are no longer suitable. Significant changes from the original concept include:

- Annual metered usage to WWID customers has not exceeded 95,000ML - Table 7 (FYE 2010-2025).
- MI's modernisation and automation works, including on farm works and channel modernisation, has significantly reduced the drainage and inadvertent flows to Willow Dam.
- Original trigger levels do not account for:
  - water allocation %
  - annual and seasonal changes in land use and associated practices
  - annual and long-term climate forecasts
- Permanent plantings have increased on the WWM channel system, which introduces more reliance on BBS Intermediate Cell pumps.
- Changes in land use and expansion of irrigated areas means the capacity of the Main and Sturt channel systems is required to meet demand in the upper supply system, therefore, deliberate diversions to BBS during peak demand periods is managed to reduce stress on these systems.

The operation of BBS now accounts for individual season variabilities 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 7 - Water delivered to WWID customers during 2009-2025 irrigation seasons

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

The metered usage shown in Table 7 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 hectares 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 9GL (9,000ML) of MI's water entitlement was handed back to the Commonwealth Environmental Water Holder.

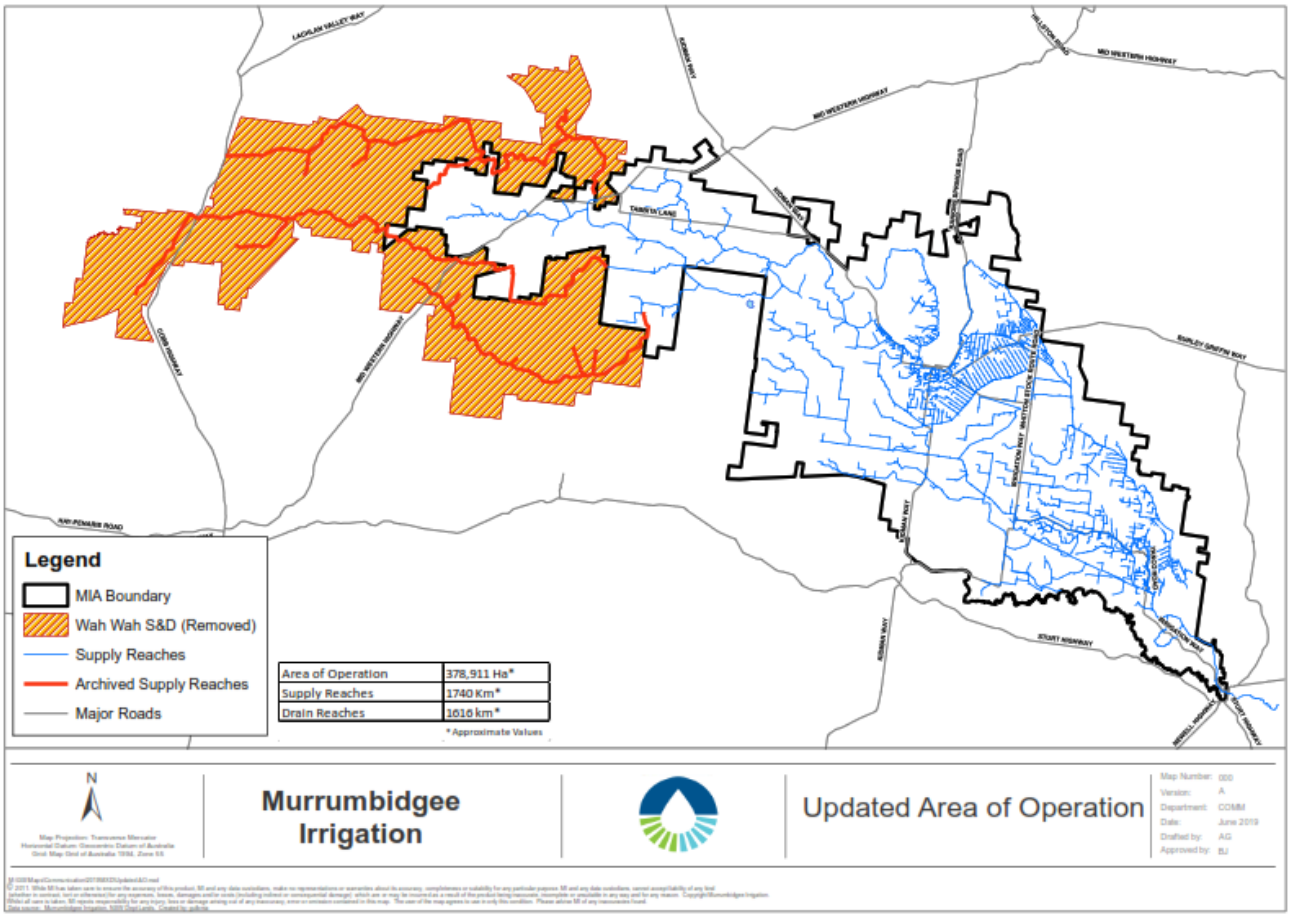


Figure 6 - MI Area of Operation change in 2019

7.1.5 Off allocation/ environmental surplus provided (7.4j)

The Department of Planning advised in their letter dated 31 January 2008 that condition 7.4j is no longer relevant due to the deproclamation of Mirrool Creek. Further details are provided in Appendix A as the condition has been fully met and is not reported annually.

7.1.6 Water Access Licenses

7.1.6.1 EIS impacts or predictions

The EIS documents identified the deproclamation of the Crown land and implementation of the *Water Management Act 2000* (NSW) and the Plan was occurring independently of the proposed BBS Project. However, the splitting of Barren Box Swamp would have an impact if the transfer of water access licences to MI had not been completed.

By the nature of the development, the alteration of the water regime would mean that flows may not be available for water access licences.

7.1.6.2 Current performance

Twenty one (21) licences were identified in the Project's Submission Report. MI negotiated new agreements with those licensees, with the terms now captured in MI's Surplus Water Rules.

7.1.7 Flood handling capacity

7.1.7.1 EIS impacts or predictions

7.1.7.1.1 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.

7.1.7.1.2 En-route Storage

The size of the proposed En-route Storage limits its use as a significant flood mitigation structure however, it would have some benefit in reducing flood peaks for moderate flood flows. This would add to the overall flood management improvements at BBS as described above.

7.1.7.2 Current performance

7.1.7.2.1 BBS

The development of the Flood Management Plan under the 2006 OEMP (approved 2008) included consultation with Griffith City Council and the Department of Natural Resource Murray Murrumbidgee Office.

The 2006 OEMP included the 1998 Flood Release guidelines, which detailed both the BBS water level (volume) and the release rate to the Mirrool Creek Floodway.

In 2008, MI commissioned Water Technology to develop a hydrological model of the Barren Box Storage and Wetland. The primary purpose of the model was to provide MI with an appropriate tool to investigate appropriate water management strategies for the wetland cell. The 2008 analysis considered data from 1979 to 2004, which included the large flood event of 1989.

MI was consulted and provided information to assist GCC's consultants BMT WBM during their flood studies undertaken in 2014 and 2015 and are noted as a stakeholder within the reports. These reports are available on GCC's website.

Following flood events impacting BBSW (March 2012 and September 2016) MI engaged BMT WBM in 2017 to study overall flood risk management of BBSW.

The 2017 study was used to further develop operational guidelines for BBSW as well as taking into consideration that MI is not a flood authority under the *State Emergency and Rescue Management Act 1989* (NSW). The relevant State Emergency Agencies and local Council/s are responsible for flood response for the areas MI operates within. This position has recently been restated to MI through the NSW Office of Local Government.

MI provides support, operational knowledge and responds to directions made under an emergency direction. This may include opening of regulators and breaching channels, and diversion of flows based on risk assessments and directions from the relevant authority [6.5ev].

A schematic showing the BBSW Operational Guideline process for flood risk management as at 30 June 2025 is shown in Figure 7 which is based on the outcomes of the BMT WBM study in 2017.

A review of the BBSW Operational Guideline was conducted in 2024/25, without any change to the process below. While management of flood was incorporated in the original OEMP and served the purpose of a Flood Management Plan, in response to Department feedback, MI have developed a dedicated Flood Management Plan in 2024/25. A Flood Management Procedure was added to the BBSW Operating Guidelines, adding further detail to the process.

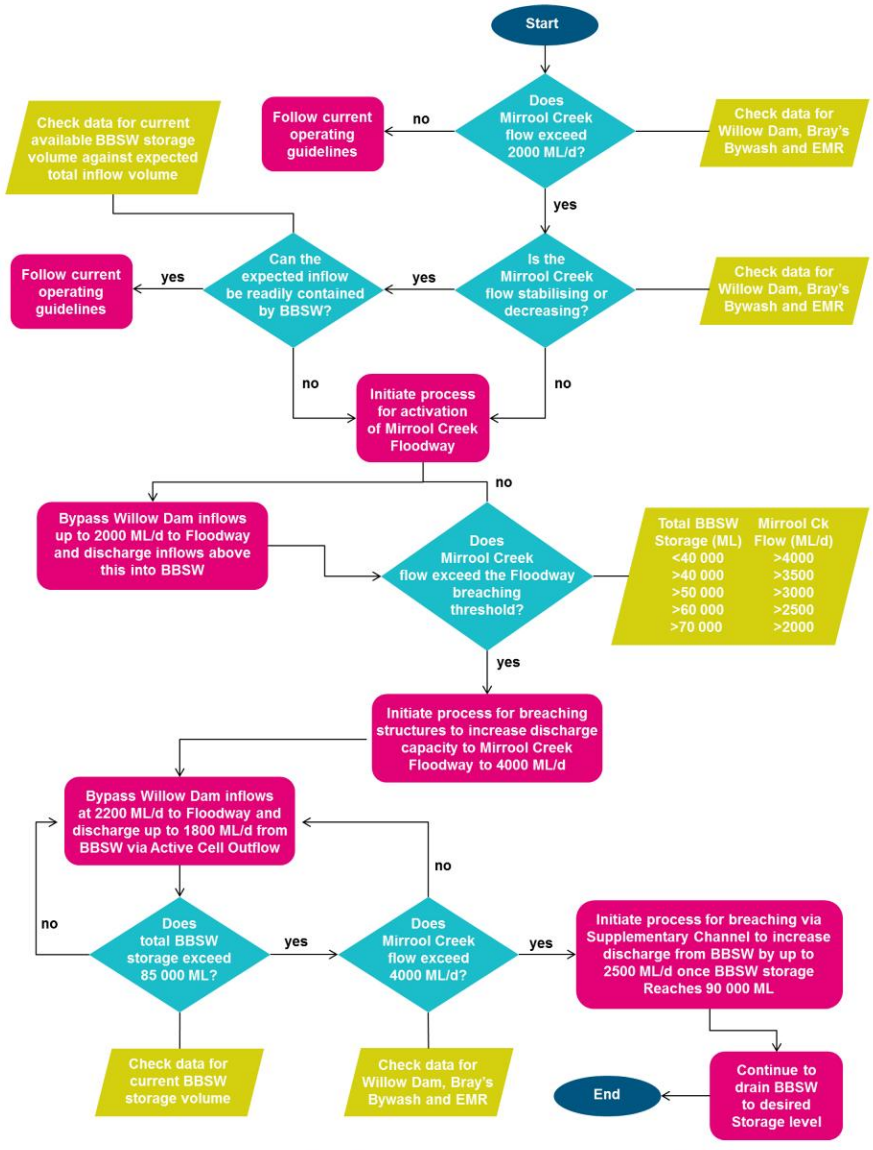


Figure 5-3 BBSW Operational Guidelines for Flood Risk Management

Figure 7 - BBSW Operational Guidelines for Flood Risk Management

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.

MI is committed to working collaboratively 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.

7.1.7.2.2 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 2,500ML 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 Chp 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 its environmental protection licence 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 8 - 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
BB0 (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 determined that given the size and residence time of water in the En-route storage (Brays Dam), the use of the storage to temporarily hold water (for up to two weeks at a time) is unlikely to significantly affect the water quality downstream of the site.

7.2.2 Current performance

MI regularly monitor water quality in key areas around the MIA, including any discharges out of the MIA as required by our EPL.

7.2.2.1 BBS salinity results

Salinity was the main parameter of concern identified in the EIS. 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 monitoring site.

The available results since BBS became operational at key locations surrounding and downstream of the BBS are provided in Figure 8. Historical water quality data back to 2006 has been collated from a variety of monitoring records with some results missing due to changes in both data recording methodology and water quality instrumentation over time.

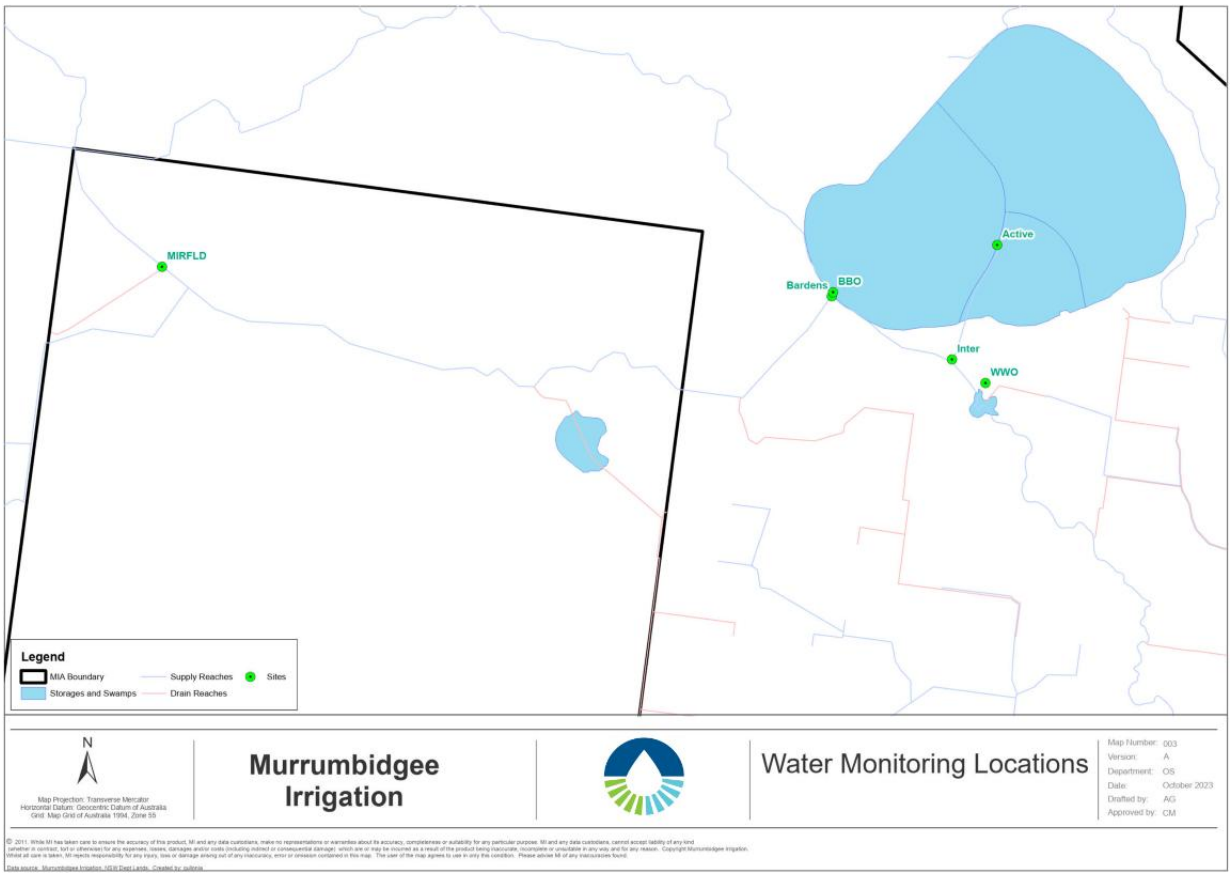


Figure 8 - Water monitoring locations around Barren Box Storage

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 post-construction until FY2011 (July 2010 – June 2011) 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.
- MIRFLD – Mirrool Creek Floodway: also, a discharge point under MI's EPL4651.

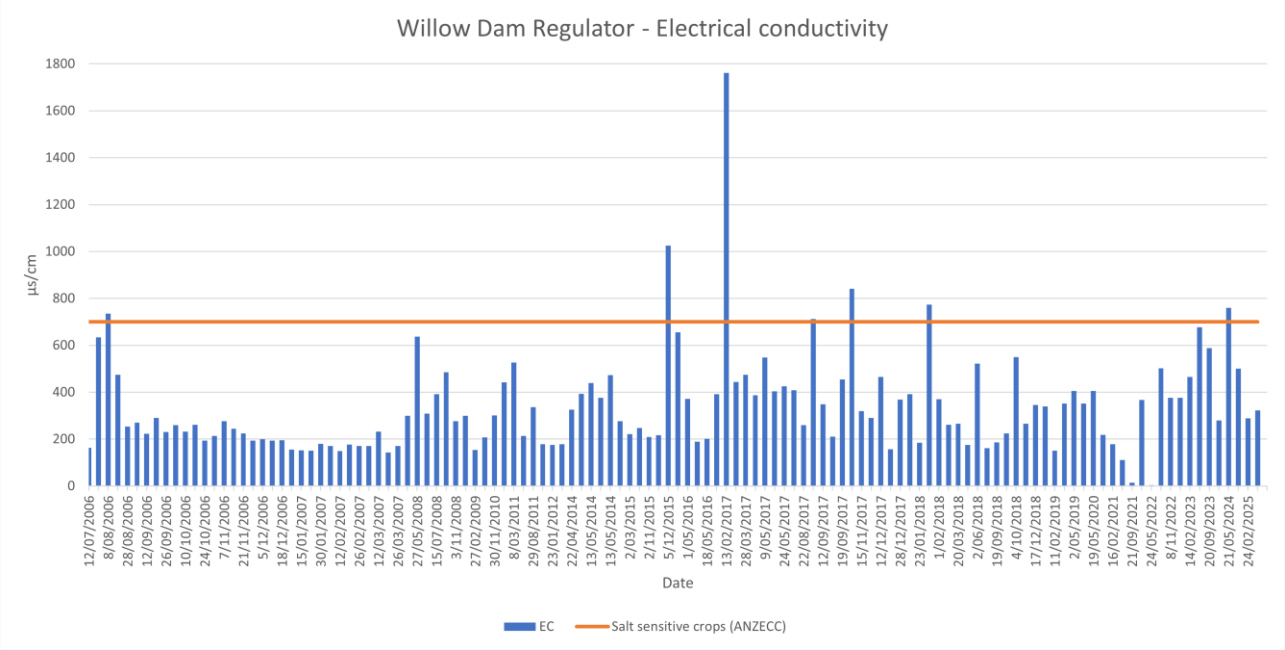


Figure 9 - Electrical conductivity at Willow Dam Regulator – 2006 to 2025

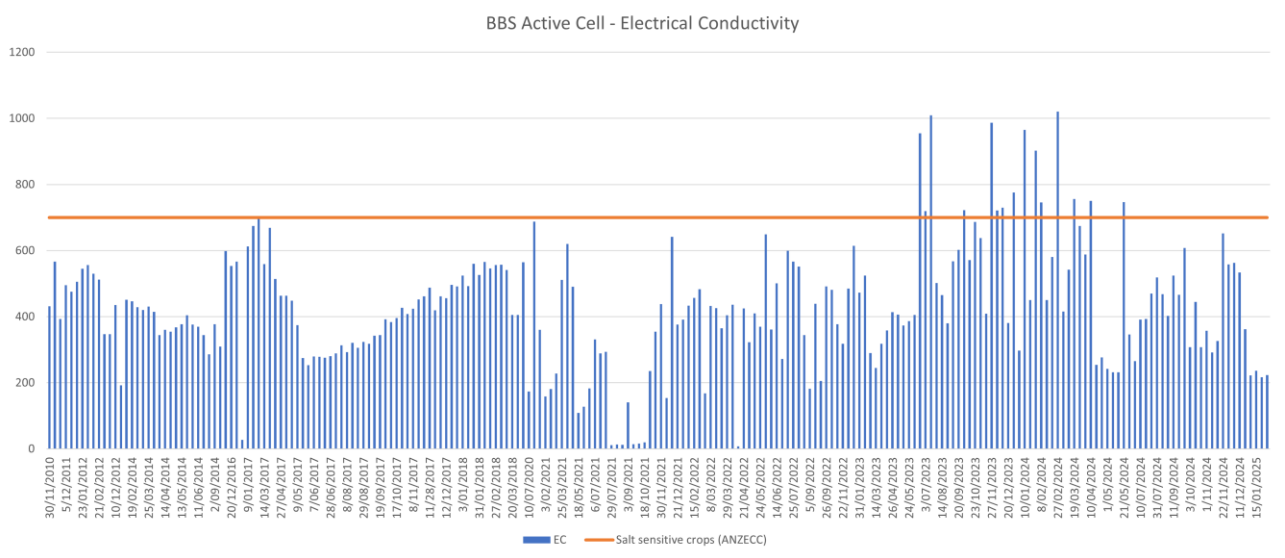


Figure 10 - Electrical conductivity in BBS Active Cell – 2010 to 2025

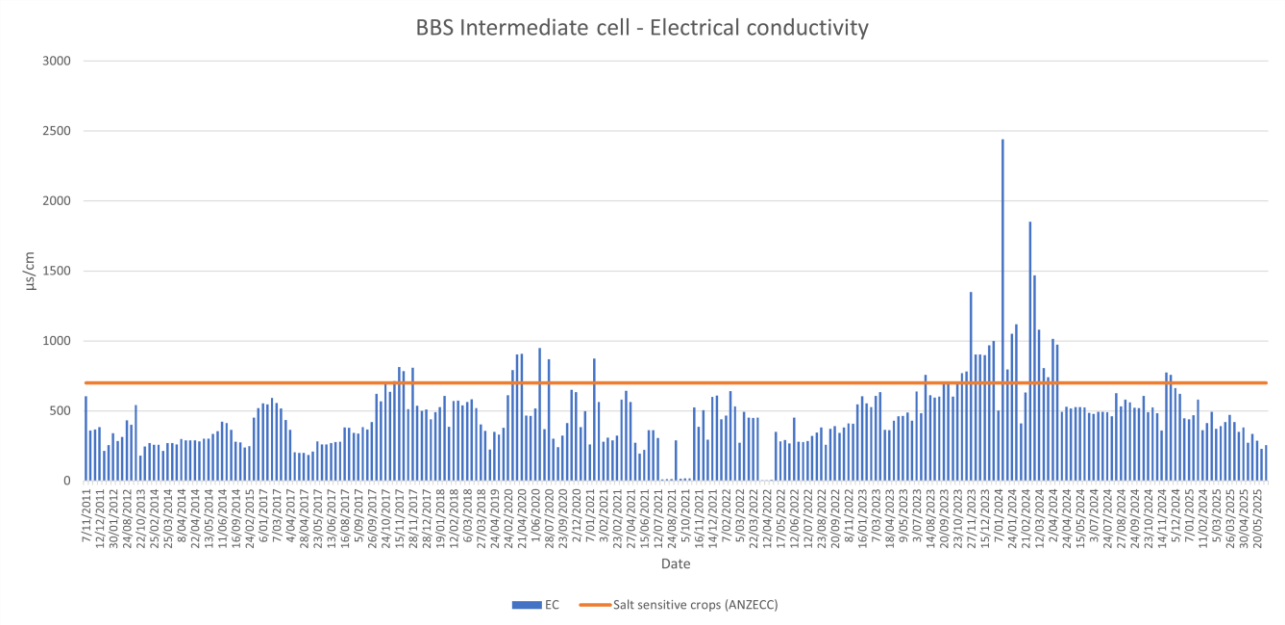


Figure 11 - Electrical conductivity in BBS Intermediate Cell – 2011 to 2025

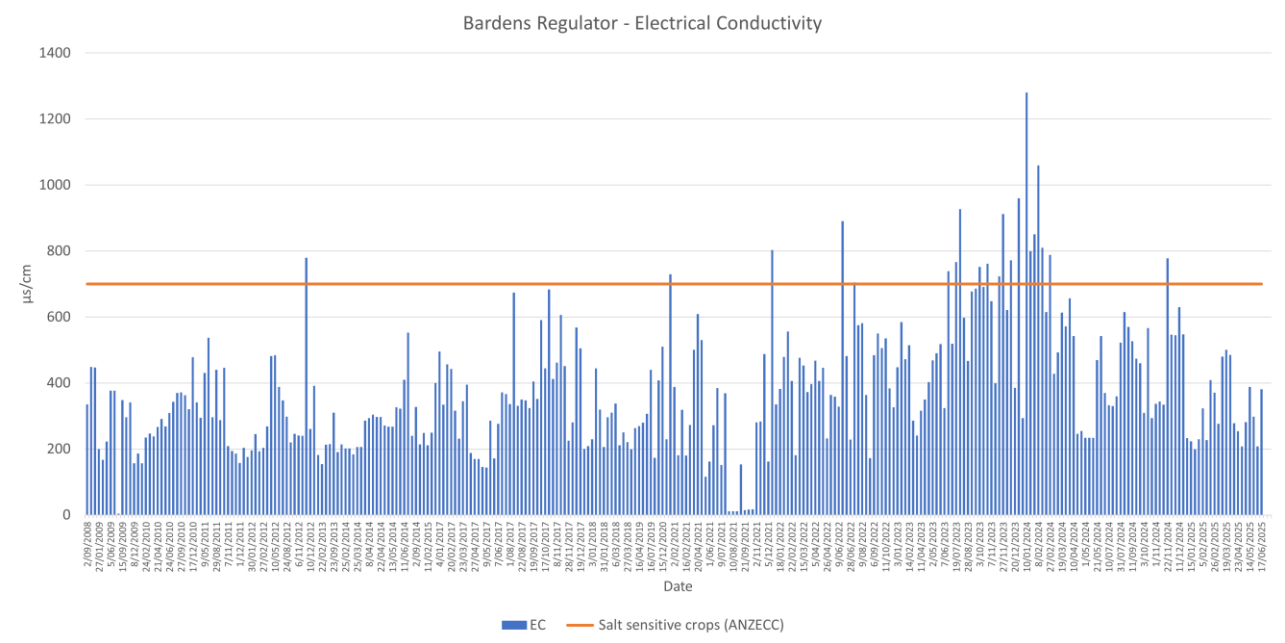


Figure 12 - Electrical conductivity at Bardens Regulator (on WWM) – 2008 to 2025

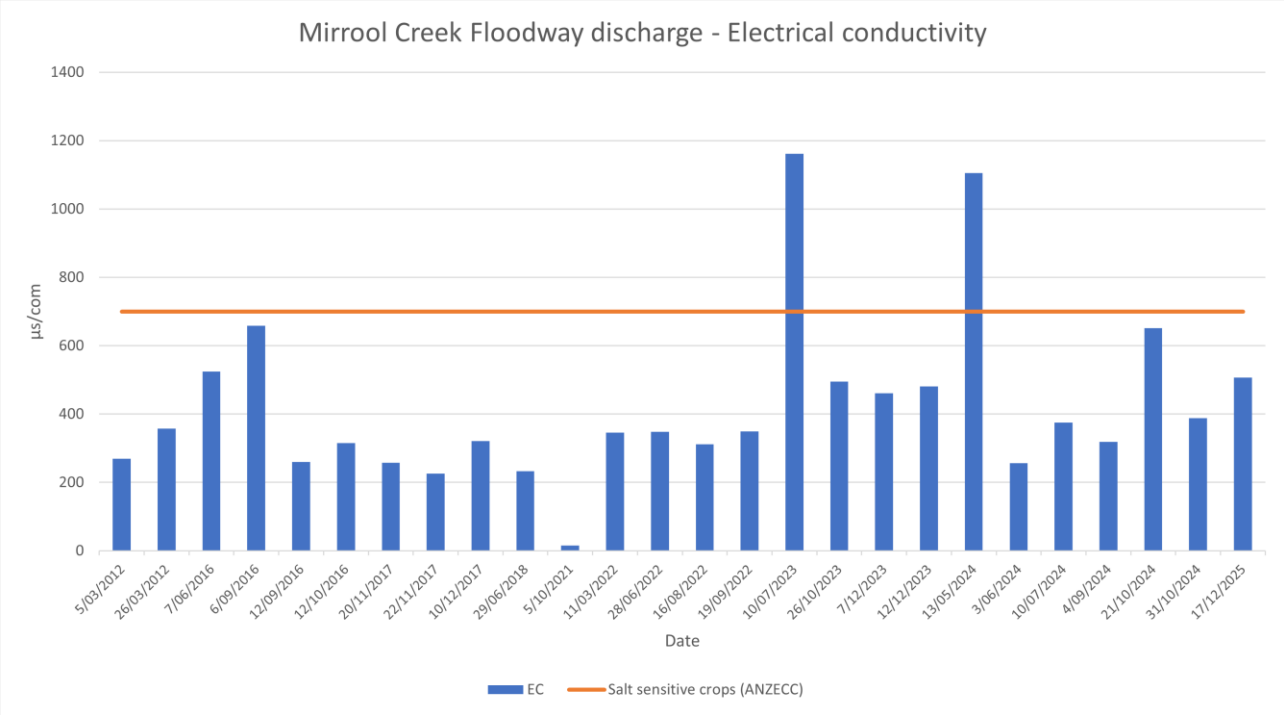


Figure 13 - Electrical conductivity at Mirrool Creek Floodway for release events– 2012 to 2025

While the EIS provided some EC data, 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.

The EIS Table 12-1 (see Table 8) 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 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 2024/25 the Intermediate cell and Barden's Regulator were the only sites to experience EC results above the benchmark. The Intermediate cell experienced the highest number of EC results above the benchmark, with only 2 instances of elevated EC levels recorded. The Intermediate cell, Active cell and Barden's Regulator sites each saw a significant reduction in the number of elevated EC results, due to a high frequency of water mixing and extraction caused by dry conditions driving high water demand downstream. Monitoring of the Active cell was carried out from June 2024 to February 2025, when the operational use of the Active cell as a storage ceased temporarily due to water levels becoming too low. Results above the benchmark are summarised in Table 9, and more detailed data is provided in Appendix D.

Results above the benchmark were short term and compliant result were achieved within one or two weeks.

Table 9 - Summary of samples above 700 µS/cm EC relating to BBS

Monitoring location	Financial year	Number
Willow Dam (BBS and WWM inflows)	2015	1
	2017	2
	2018	1
	2024	1
	2025	0
BBS Active cell	2023	1
	2024	14
	2025	0
BBS Intermediate cell	2017	5
	2020	5
	2021	1
	2023	10
	2024	12
	2025	2
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
Mirrool Creek Floodway	2023	1
	2024	1
	2025	0

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 Chp 13)

7.3.1 BBS

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 proposed restoration of a more natural flow regime to a significant portion of the BBS was likely to enhance habitat for native fish. The Active Cell would provide a permanent water source, while the ephemeral wetland area would encourage extensive habitat for small fish reliant on aquatic vegetation for food, refuges and breeding. It was expected that the wetland area would provide increased diversity of native emergent macrophytes and follow-on effects of increased macroinvertebrate and small fish populations, providing higher value food resources and habitat for a variety of fish. The deep water, permanent environment of the active cell and wetland area would provide habitat for obligate aquatic species such as turtles and crustaceans. The intermittent zone of the wetland area would be inundated every one in three to one in ten years and provide habitat for terrestrial species of mammal and reptiles and the gilgai area would possibly provide habitat for frogs.

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 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, in the short term (as was consistent with the MIA and Districts Community LWMP). An adaptive management approach would be adopted and linked with the outcomes of the current investigations which would be reviewed when available and the insight integrated into future water release practices.

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.

7.3.4 Current performance

The current performance is outlined below and/or referenced to another part of this report.

7.3.4.1 BBSW

Details on the BBS Wetland cell rehabilitation are detailed in Section 8.

7.3.4.2 LMCF

Details on the LMCF is detailed in Section 9.1.

7.3.4.3 Brays Dam

As part of compliance with condition 3.39 during 2006-7 planning and ground preparation of 6.5 hectares around Brays Dam was completed with planting of indigenous species taking place in July 2007.

A total of 2300 native species were planted, to form a future corridor with other proposed plantings along the entire length of Mirrool Creek which will improve the ecological functioning of the creek and surrounding

landscape with future linkages to the rehabilitated Barren Box Wetland. Further Mirrool Creek works were undertaken over the following years as part of the Mirrool Creek project as part of the LWMP.

Direct seeding undertaken around Brays Dam in 2021 is outlined in Section 7.5.

7.4 Groundwater (EIS Chp 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. These potential impact areas would be on MI land and no other adjoining properties are likely to be affected. 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

During the detailed design, construction and development of the operational environmental management plan (OEMP), the (then) Department of Natural Resources Murray Murrumbidgee Office was consulted on the monitoring and management approach.

The OEMP included information covering the (then) current groundwater conditions and the EM31 results and compaction test results for the WWM. At the request of the Department of Natural Resources an additional three piezometers were installed adjacent to the WWM channel to allow the ability to monitor for seepage from the channel.

MI uses a combination of field observations, loss calculations and customer notifications for any seepage risks and investigations.

7.4.2.1 Monitoring and management – BBS and WWM

The WWM channel had investigations and remedial works that occurred following an Electromagnetic (EM) survey in 2004. Further details on the investigation and actions were included in the OEMP.

Groundwater monitoring using existing piezometers (where still in place) has continued since commissioning, in line with MI's Combined Approval 40CA403245.

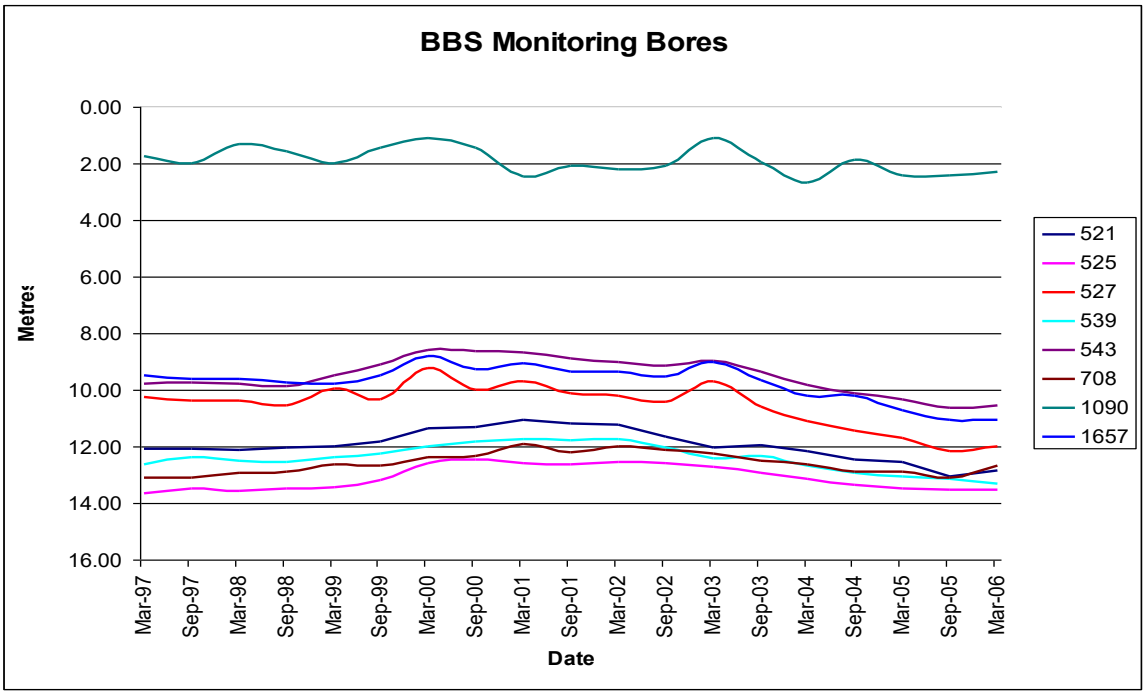


Figure 14 - Standing water levels of BBS piezometers (pre-commissioning)

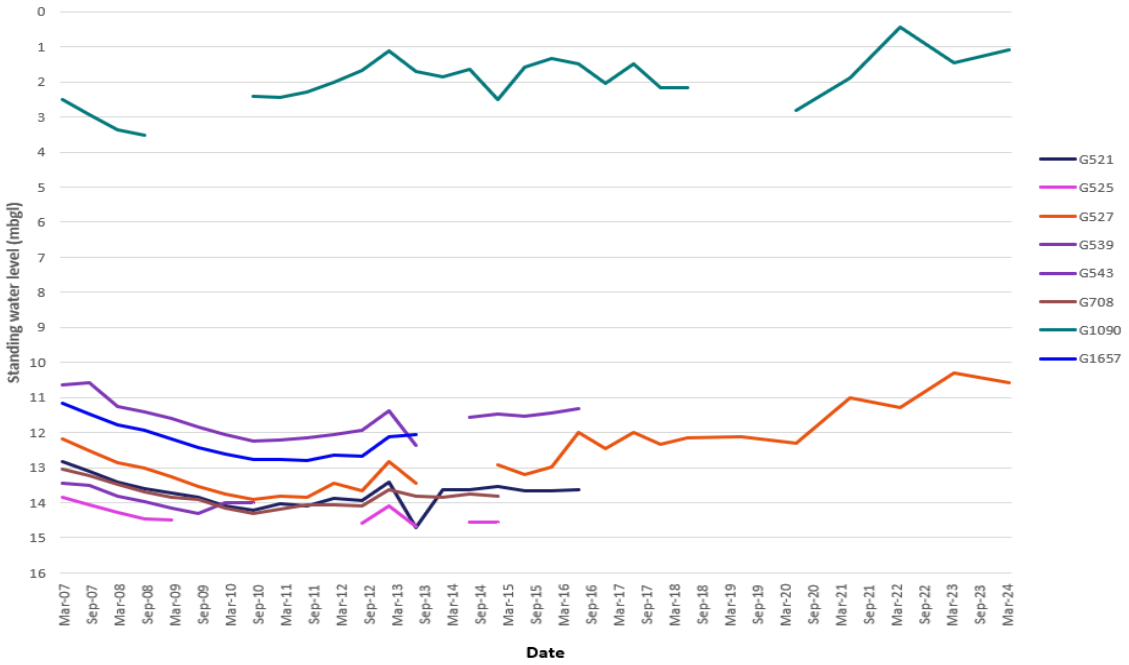


Figure 15 - Standing water levels of BBS piezometers (post-commissioning)

The graphs above indicate that groundwater levels around BBS are generally in line with baseline levels, and in some cases are lower. Recent small increases in levels are likely to reflect higher above average rainfall and water allocations since 2020 following a longer period of drought.

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 the Griffith region to estimate the individual contributions of rainfall, seepage and evaporation to the total loss rate.

The following estimates are from the 2024/25 season using a robust linear regression method for the recorded levels at the BBS Active and Intermediate cells. Figure 16 below shows the change in water level during the lock-up pondage test conducted on the BBS Intermediate Cell from 19 June 2025 at 5:00 am to 22 June 2025 at 5:30 am.

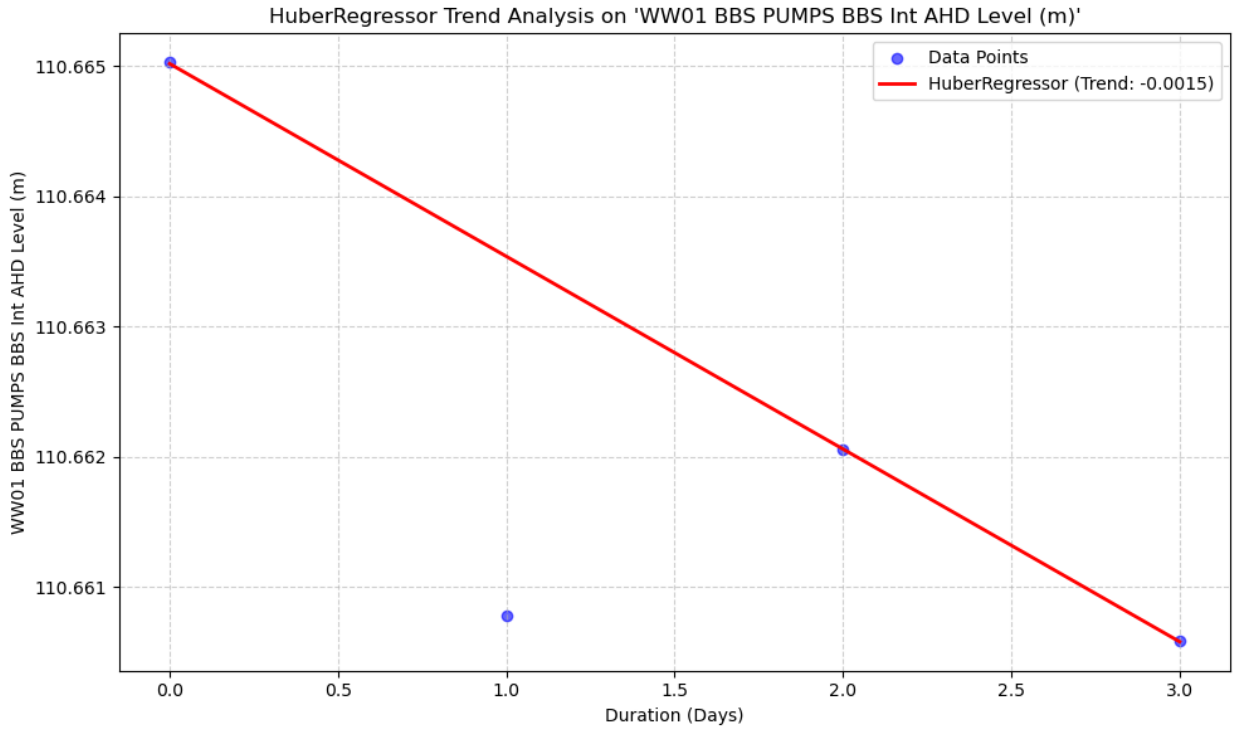


Figure 16 - Robust linear regression model of BBS Intermediate Cell lock-up pondage test data from 2024/2025

Note that water levels have been median filtered using a 24-hour window to remove water level fluctuations due to wave action arising from winds. The average rate of loss during this test was 1.5 ± 0.9 mm/day. For the lock-up period, no rainfall was observed, and the mean Morton's shallow lake evaporation was 1.25 ± 0.058 mm/day. This indicates the estimated seepage rate during the pondage test was 0.25 ± 0.9 mm/day.

A pondage test was conducted on BBS Active Cell from the same dates as BBS Intermediate Cells. The change in water level during the pondage test for the season is shown below in Figure 17. Note that water levels have been median filtered using a 24-hour window to remove water level fluctuations due to wave action arising from winds. The average rate of loss during this test was 1.4 ± 3.5 mm/day.

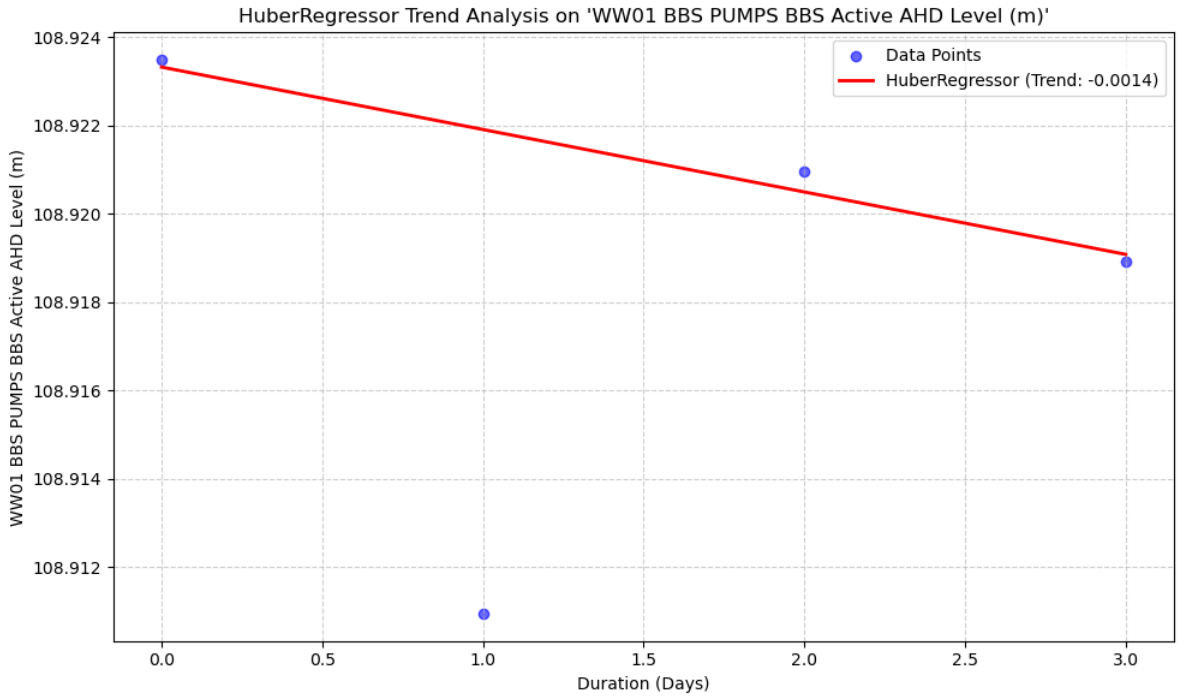


Figure 17 - Robust linear regression model of BBS Active Cell lock-up pondage test data from 2024/2025

For the lock-up period, no rainfall was observed, and the mean Morton's shallow lake evaporation was 1.25 ± 0.058 mm/day. This indicates the estimated seepage rate for 2024/25 during the pondage test was 0.15 ± 3.5 mm/day. Compared with 2023/24 where the seepage rate was 0.6 ± 0.8 mm/day the difference is 0.45 mm/day. In general, MI uses 5mm/day as an average expected seepage loss through channel banks and beds, indicating that seepage losses from the BBS Active cell are well within expected tolerances.

7.4.2.2 Monitoring and management – En-route storage (Brays Dam)

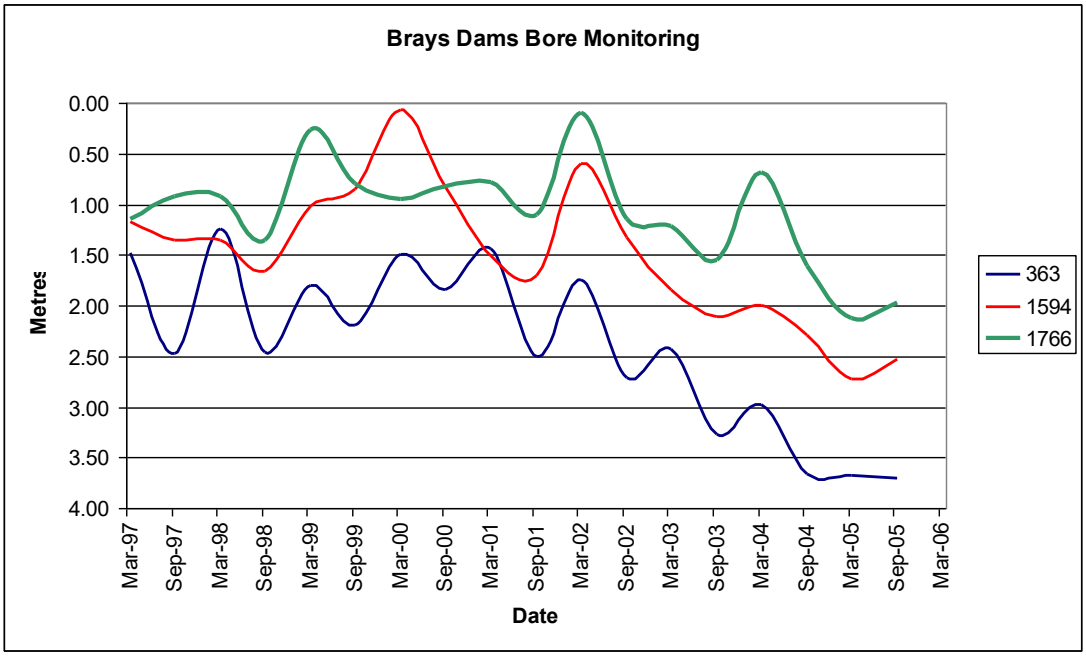


Figure 18 - Standing water levels of Brays Dam piezometers (pre-commissioning)

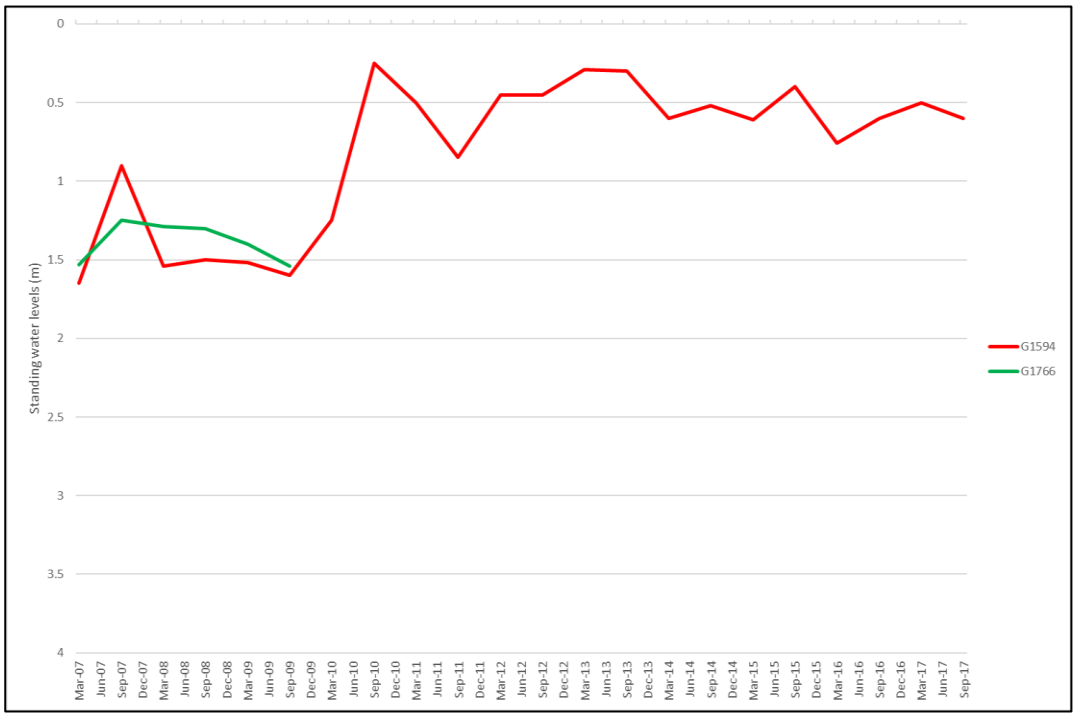


Figure 19 - Standing water levels of Brays Dam piezometers (post-commissioning)

Piezometer G363 was decommissioned during construction as it was within the construction footprint. Piezometer G1766 was available until 2009 when it was destroyed, however results to that time show no rise in standing water levels above the pre-commissioning levels.

G1594 was available until 2017 when it was also destroyed. Standing water levels are within the extents of the baseline levels. As this was a shallow piezometer, the increase in levels past 2010 are likely reflective of its location adjacent to a supply channel and in a low lying area in between both Brays Dam and the channel. This area was noted in the EIS as prone to water logging.

Destruction of piezometers over time occurs due to land development activities, as most piezometers are either not on MI lands or are in location where they are not readily seen. MI does have three piezometers installed post-construction along the northern bank of Brays Dam for use should seepage risks be identified.

7.4.2.2.1 Seepage estimation Brays Dam

The loss estimate at Brays Dam for the 2024/25 season is shown below in Figure 20**.** A lock up pondage test was conducted from 26 May 2025 at 5:00 AM to 29 May 2025 at 5:00 AM. The robust linear regression method was used for the estimates presented in Table 10. The daily loss value of 5.72mm/day ± 0.58 mm/day for 2024/25 is slightly less than the estimate from the prior year 2023/24 of 6.0mm/day ± 0.4 mm/day which shows that there hasn't been any significant change in water loss rates.

Table 10 - Brays Dam lockup results

Season	Daily Loss
2024/25	5.7mm/day ± 0.6mm/day
2023/24	6.0mm/day ± 0.4mm/day
2022/23	6.9mm/day ± 0.3mm/day
2021/22	6.8mm/day ± 0.6mm/day

Figure 20 below shows the change in water level during the lock up pondage test conducted on Brays Dam during 2024/25.

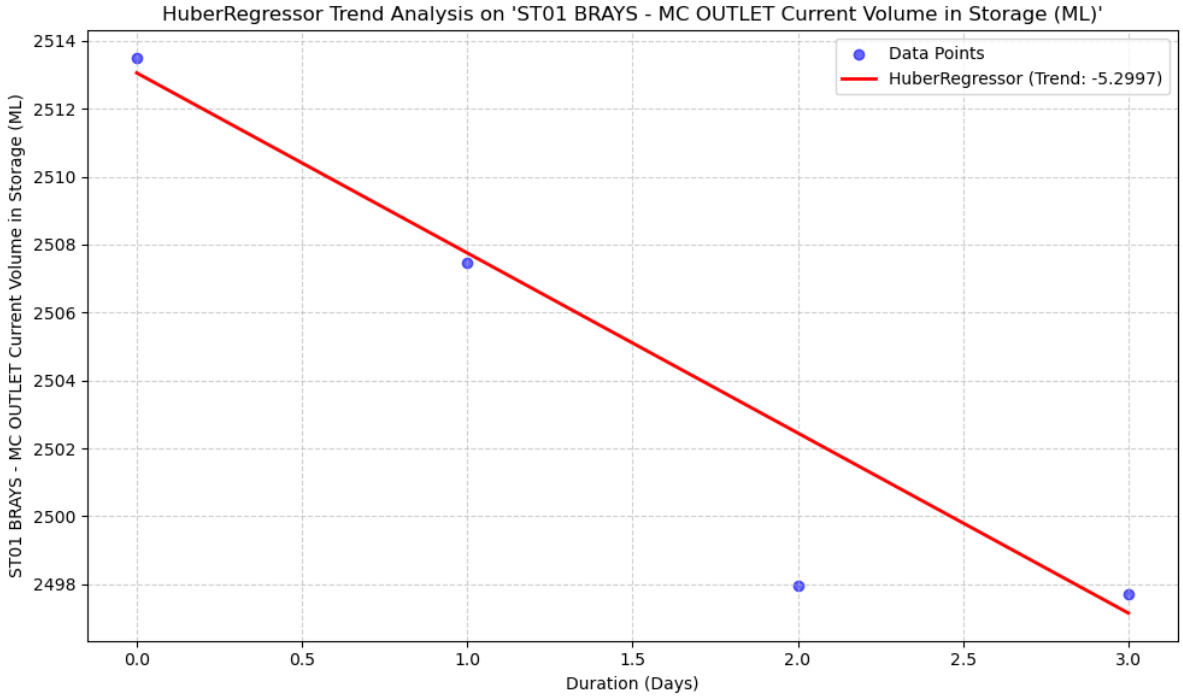


Figure 20 - Robust linear regression model of Brays Dam lock-up pondage test data from 2025

The loss calculation includes both evaporative losses and any influence on water levels due to wind action during the lock up period, so would be expected to be higher than actual seepage losses. Weather data was sourced from SILO (Queensland Government Long Paddock initiative) for the Griffith region to estimate the contribution of seepage related losses to total loss rate. For the lock-up period the mean rainfall was 0.4 ± 0.673 and the mean Morton's shallow lake evaporation was 1.225mm/day ± 0.25mm/day. This indicates the estimated seepage rate during the pondage test was 4.89mm/day ± 0.92mm/day.

In general, MI uses 5mm/day as an average expected seepage loss through channel banks and beds, indicating that seepage losses from the Brays Dam are within expected tolerances, when consideration of the expected evaporation and rainfall are considered in the loss calculations.

There have been no seepage reports and/or complaints around Brays Dam since its construction.

7.5 Landscape and visual (EIS Chp 15, 3.39)

In December 2020, MI approached Griffith City Council to determine if they were satisfied with landscaping provided around Brays Dam in response to Condition 3.39:

The Applicant shall ensure that landscape works surrounding the En-route storage facility is undertaken to the satisfaction of Griffith City Council.

The Submissions Response Report (URS 2005 – Section 4.13.2) for the project outlined that landscaping around Brays Dam would meet Table 14-4 of the EIS which stated:

Replace trees removed from the surrounding home site for both ecological and aesthetic purposes.

Council advised in early 2021 that the original landscaping expectation was not met by the landscaping which had been established on site and that additional planting work was required. While this appeared to be beyond

what was determined during the EIS, MI agreed to undertake direct seeding to the remaining perimeter areas of the dam where it was feasible. This approach and the proposed species were accepted by Council.

Direct seeding was undertaken on 9 April 2021 by specialist contractor Riverina Revegetation, following delays due to rain. Further details are provided in Appendix A as this condition has been fully met and will not be reported annually.

7.6 Archaeology and heritage (EIS Chp 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 proposed 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.

A construction phase Cultural Heritage Management Plan (CHMP) was prepared to ensure that any disturbance of archaeological artefacts was minimised and that contingency measures, as agreed to by the Aboriginal Community, were put in place should any artefacts be uncovered during construction works.

The cultural objectives and values of BBS were found to be complimentary to the proposal and present an excellent opportunity for both research and education within the wider community. MI would continue to work with the local Aboriginal community to ensure the archaeology of BBS, as identified by this project, is protected and further investigated. The protection and enhancement of the cultural heritage values of BBS is also a key principle for the management of the remaining area.

In addition, a CHMP was to be developed for the BBS wetland rehabilitation strategy and this requirement was included in the OEMP approved in 2008.

7.6.1 Current performance

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

- Restricted access to BBS via fencing, locked gates and security cameras.
- OEMP 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.

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 was 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, plus 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 provided in the EIS and Deflation basins and BBS (Jane Roberts June 2007).

The draft plan was publicly displayed and provided to Government Departments for comment towards the end of 2008. Implementation commenced in 2009 with preliminary works and some trials and revegetation having commenced in 2007 and 2008. Direct seeding occurred in May 2011, tube stock planting in July 2017 and tree planting in 2018 all in the Education Area.

8.1.1 Timeline of activities

Information from historic LCRs and ACRs developed by MI, together with historical records of seed purchases, contractor engagement, etc was collated and provided to NGH and is summarised in Section 8.1.2.

Activities following the 2012 floods are outlined in the following sections and include post-flood monitoring, weed and pest fauna control and revegetation on terrestrial sites around the Intermediate Cell.

A timeline of rehabilitation plan activities has been summarised below based on internal MI information:

Table 11 - Summary of BBSW Rehabilitation Plan activities

Activity	Completed
Site specific revegetation plans completed in accordance with BBWRP and legislative requirements	December 2009
Site preparation (weed control, groundworks, etc) using Indigenous and community members complete.	March 2010
Native seeds were collected and prepared for revegetation works using Indigenous community members.	June 2010
Revegetation completed in accordance with BBSWRP	March 2010 to June 2012
Indigenous partnerships created to prepare the cultural and heritage management plan	December 2009
Nesting boxes constructed and placed in existing stags within Barren Box	June 2010
Feral animal control plan developed and implemented	Ongoing

Activity	Completed
Development and construction of educational facilities including Indigenous interpretive sites using members of the Indigenous community.	June 2012
MER plan implemented	Commenced June 2010

8.1.2 Implementation of revegetation program

The following summary was included as Table A1 in NGH's report: *Site Inspection Barren Box Storage and Wetland Modification October 2021*, as well as Appendix E in NGH's report: *Barren Box Storage and Wetland Project Stage 1 – Survey and Reporting Methodology September 2022*, which were provided with MI's Modification Application as detailed in Section 11.

Table 12 outlines the revegetation efforts completed under the plan, with minor updates as additional information was identified after the report was issued.

Figure 21 below reproduces Figure 25 of the plan showing the planting zones proposed for revegetation activities.

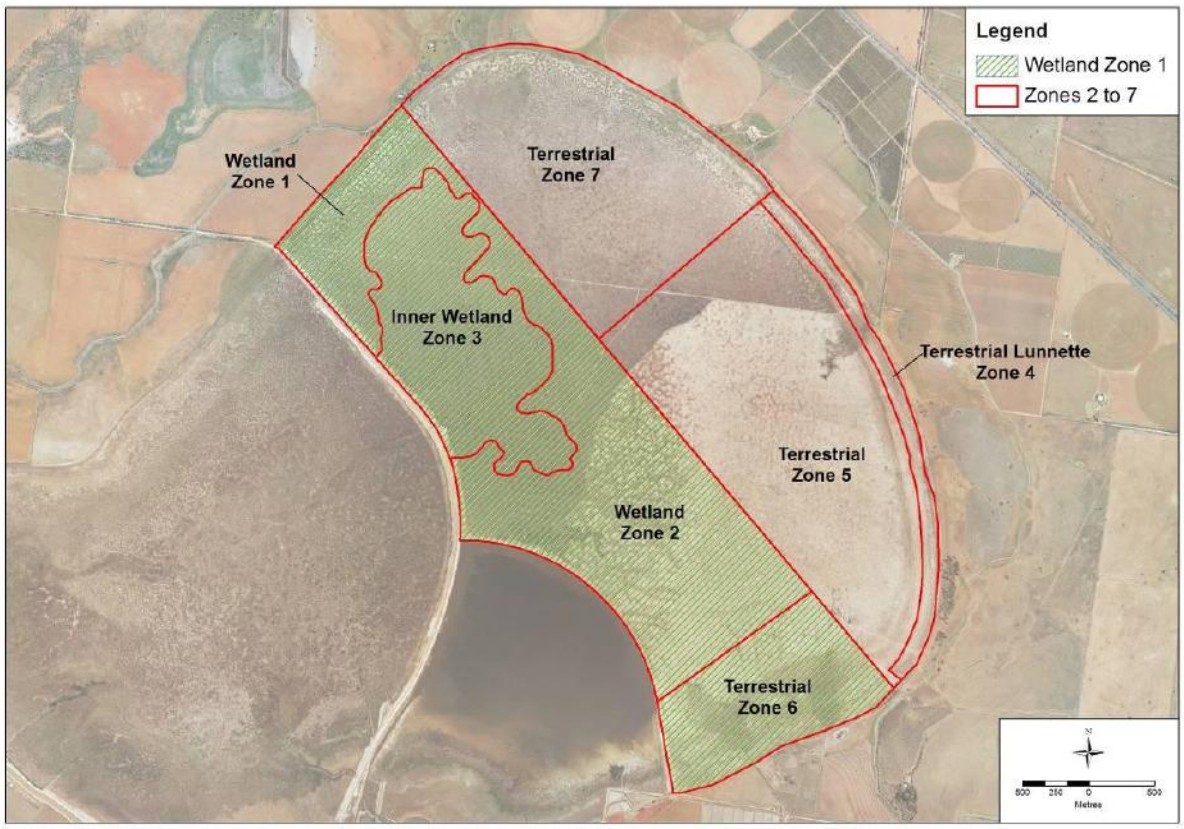


Figure 21 - BBS Wetland cell planting zones for revegetation activities.

Table 12 - Implementation review of BBWRP - Revegetation Program

BBWRP Action	Location	Timing proposed under plan	MI Implementation
Aerial sowing of 30kgs of local provenance Black Box (*Eucalyptus largiflorens*) seed	Wetland Zone 1	August 2008	2007 seed collection undertaken. Aerial seeding Zone 2c July / August 2008 – 30 kg over 690 ha Zones 1, 2, 3 & 4 (drier conditions with some residual soil moisture, 50% burnt 50% unburnt)
Aerial sowing of 20kgs of local provenance Black Box (*Eucalyptus largiflorens*) seed	Wetland Zone 2	Spring following average winter rains and soil moisture is near field capacity Or Early Spring 2009 following forced autumn/Winter releases into Wetland Zone	November 2010 - 30kg applied over 500 ha of zone 1, 2 & 3 (optimum conditions due to semi-inundation from environmental water flow allocation application to wetland)
Tubestock of local provenance Lignum *(Muelenbeckia florulenta)*	Inner Wetland Zone 3	Spring following average winter rains and soil moisture is near field capacity Or Early Spring 2009 following forced autumn/Winter releases into Wetland Zone	No record of tubestock planting in zone 3. Aerial sown in 2008 and 2010
Tubestock Planting **Community 2** Refer to Appendix 3 (Rehab Plan) for full species list	Terrestrial Lunette Zone 4	Autumn 2010 Dependant on favourable conditions	Undertaken in Autumn 2011, 2012.
Direct Seeding of local provenance chenopod shrubland species	Terrestrial Zone 5 Terrestrial Zone 6 Terrestrial Zone 7	Zone 5 Spring 2009 Zone 6 Autumn 2010 Zone 7 Autumn 2011 Dependant on favourable conditions	Terrestrial zone – direct seeding 300ha June 2009 – Boree & chenopod shrubland species. Terrestrial Zone 5 – Direct Seeding 390 ha undertaken in May 2010, May 2011 and 2018. Air blown native grass seed 2010 Terrestrial Zone 6 – Direct seeding undertaken in May 2011. Terrestrial Zone 7 – Direct Seeding Undertaken July and Aug 2009 300ha.
Additional works (not RP actions)			

BBWRP Action	Location	Timing proposed under plan	MI Implementation
Tubestock planting of native vegetation	Education Area (Intermediate cell)	N/A	Direct Seeding in May 2011 Post 2016 floods: Tubestock (48,000 seedlings) planting August 2017 Tree planting (18,000 seedlings) May 2018
Direct seeding and tubestock planting	Active Cell (new 2a) Perimeter BBS	n/a	Direct seeding August 2007 March 2008, July 2009 June 2009 native tree species perimeter BBS

8.2 Financial information (6.5diii)

MIA EnviroWise (otherwise known as the MIA and Districts' Community Land and Water

Management Plan 1998) LWMP, was endorsed by DNR in 2001.

The MIA EnviroWise program was funded from the National Action Plan for Salinity and Water Quality (NAP). The cost of implementing MIA EnviroWise was shared between the NSW and Australian governments and the MIA and Districts community.

The expenditure of MIA EnviroWise funds was administered in accordance with the cost share principles negotiated prior to the approval of the LWMP 1998 and subsequent principles developed by the MIA EnviroWise Advisory Panel in 2001. Government funding for the LWMPs ceased in 2013.

While financial information wasn't included in the rehabilitation plan (Condition 6.5 d iii), the commitment was included in the EnviroWise funding process under the LWMP. MI was required to report quarterly under the EnviroWise funding process to the NSW Government's Murrumbidgee Catchment Management Authority (MCMA). Full copies of these reports have not been retained due to the retention policies relating to those financial records.

Financial expenditure under the LWMP was summarised annually by MI via the LCR/ACRs.

Financial information is summarised below, using estimates from graphs provided in the LCR/ACRs and other supporting information found in historical records:

- 2007/2008 – budget request for $203,000 (from Biodiversity project expenditure of $900,000, exact expenditure not found).
- 2008/09 - $191,590 (budget $450,000)
- 2009/10 - $184,000 (budget $254,000)
- 2010/11 - $263,151 (budget $215,000)

From the 2012 report, no further financial breakdown was provided, however, funds were expended in 2011/12, with tubestock planting occurring in Autumn for both 2011 and 2012. With very wet conditions during late 2011 and the 2012 floods, expenditures for these periods were likely to be less than 2010/11.

Following the floods, additional plantings were undertaken under the Million Trees funding and with regular weed treatment, water quality sampling, pest fauna control and fire trail and fence maintenance covered under MI operational expenses. MI operational expense records:

- 2021/22 - $160,000 (budget $175,000)
- 2022/23 - $137,000 (budget $100,000)
- 2023/24 - $102,087 (budget $144,000)
- 2024/25 - $72,307 (budget $104,533)

Overall, it is estimated that to date over $1.15m has been spent on the rehabilitation plan implementation. This includes the operational expenditure from 2021 onwards and is inclusive of recent investigations, research and reporting as part of the modification application. It does not include any costs related to the LMCF works and investigations.

8.3 Monitoring and measurement

Barren Box Wetland Rehabilitation Plan 2009-2014 – Section 7 detailed the essential components of monitoring, evaluation and review on the status and condition of the ecosystem (Condition 6.5 d xi).

Monitoring for the rehabilitation of the Wetland Cell at Barren Box Storage and Wetland was to be undertaken in two parts:

- Short term monitoring of revegetation success to inform ongoing management; and

- Long term monitoring against ecological targets.

The plan indicated a comparison of these against targets allowed evaluation of project progress and success.

The plan had a life of 5 years (2009-2014). At the end of this period, a formal review was proposed to assess the achievements and progress towards ecological targets and review the vision and objectives to assess their further relevance and feasibility. The review was to include an assessment of monitoring data by an expert technical panel to determine whether additional actions are required to meet long-term ecological targets.

In 2016, MI undertook an internal review of the plan and prepared a draft action plan for the 2016-2021 period, based on the work and report by Blumer, 2015. Unfortunately, due to the 2016/17 flooding, this plan could not be enacted around the wetland cell, so revegetation efforts focused on the land area around the Intermediate cell and Education shelter and weed and pest fauna control as well as improving fencing and access control.

8.3.1 Waterbird monitoring

To support an understanding of the ecological outcomes of the wetland rehabilitation a detailed waterbird monitoring program of the intermediate cell was initiated by MI in April 2007. Surveys began in March 2008. Initially proposed with fortnightly surveys over a period of 24 months, these surveys were planned to establish baseline data on waterbird species and abundance in the MIA.

Following completion of the 2008-2010 waterbird study MI agreed to extend the study period for a further two years with surveys conducted monthly to enable comparisons of abundance and species richness over a longer timeframe.

The findings of the monitoring program were reported in MI's Licence Compliance Reports which were issued to the (then) Department of Natural Resources as part of the reporting against the MIA & District LWMP.

8.3.1.1 Bird field survey data

MI has facilitated and/or funded bird field surveys over many decades. The data has been collected through local community interest groups (e.g., bird-watching groups and local community groups), as well as formal ecological surveys. Bird data is also supplemented by information from e-bird (a global birding database) and Birdlife Australia's Bird data as well as MI staff observations.

In general, bird surveys are undertaken annually; however, in 2024/25, two bird-watching groups conducted field surveys. Additionally, the NSW Department of Primary Industries and Regional Development carried out an aerial drone survey at BBS to gather waterfowl species data for their annual waterfowl quota report.

The waterfowl species observed by the Department at BBS included:

- Pacific Black Duck (231)
- Grey Teal (78)
- Wood Duck (39)
- Pink Ear (14)
- Chestnut Teal (18)

The collated data from the surveys has been graphed below in Figure 22 and Figure 23. While not all records are directly comparable, they do indicate 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 23**.** Negative values shown in Figure 23 indicate the species was recorded based on measures other than visual sightings, e.g. bird call, nest or specific habitat noted. During 2024/25, 65 bird species were recorded, which is an increase of 42 species compared to 2023/24. The listed species have remained steady over recent years, with 2 listed species observed in 2024/25.

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.

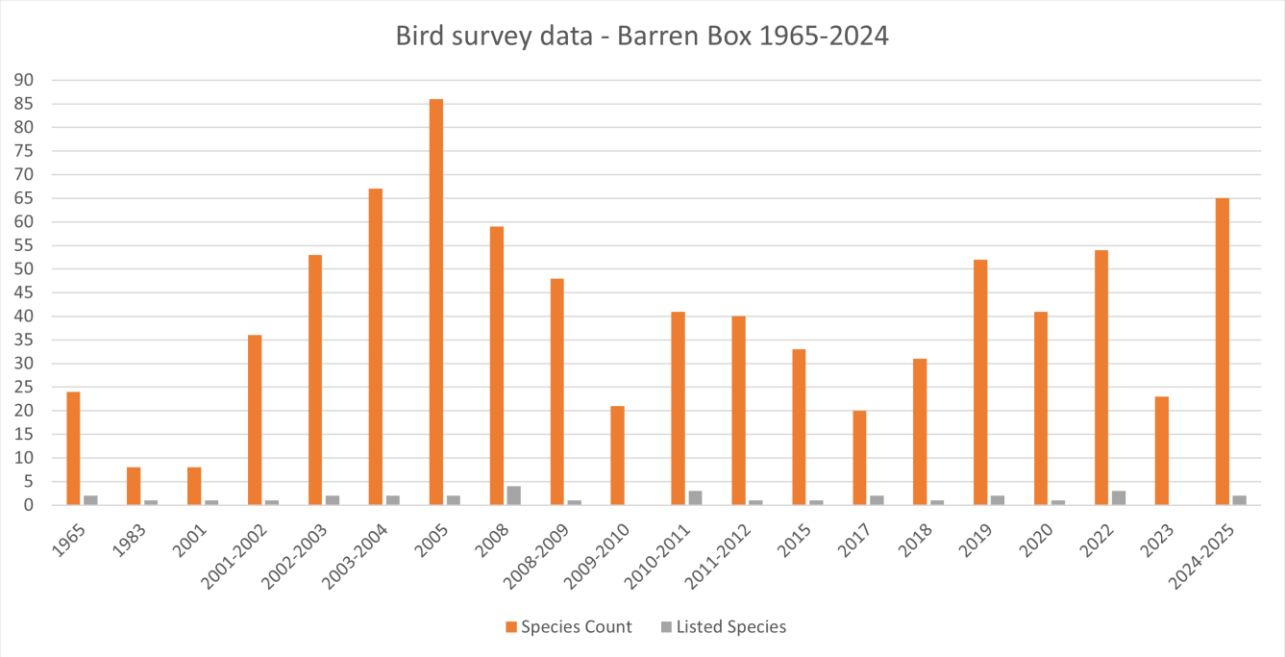


Figure 22 - Bird species numbers recorded at Barren Box Swamp/ Storage 1965-2025

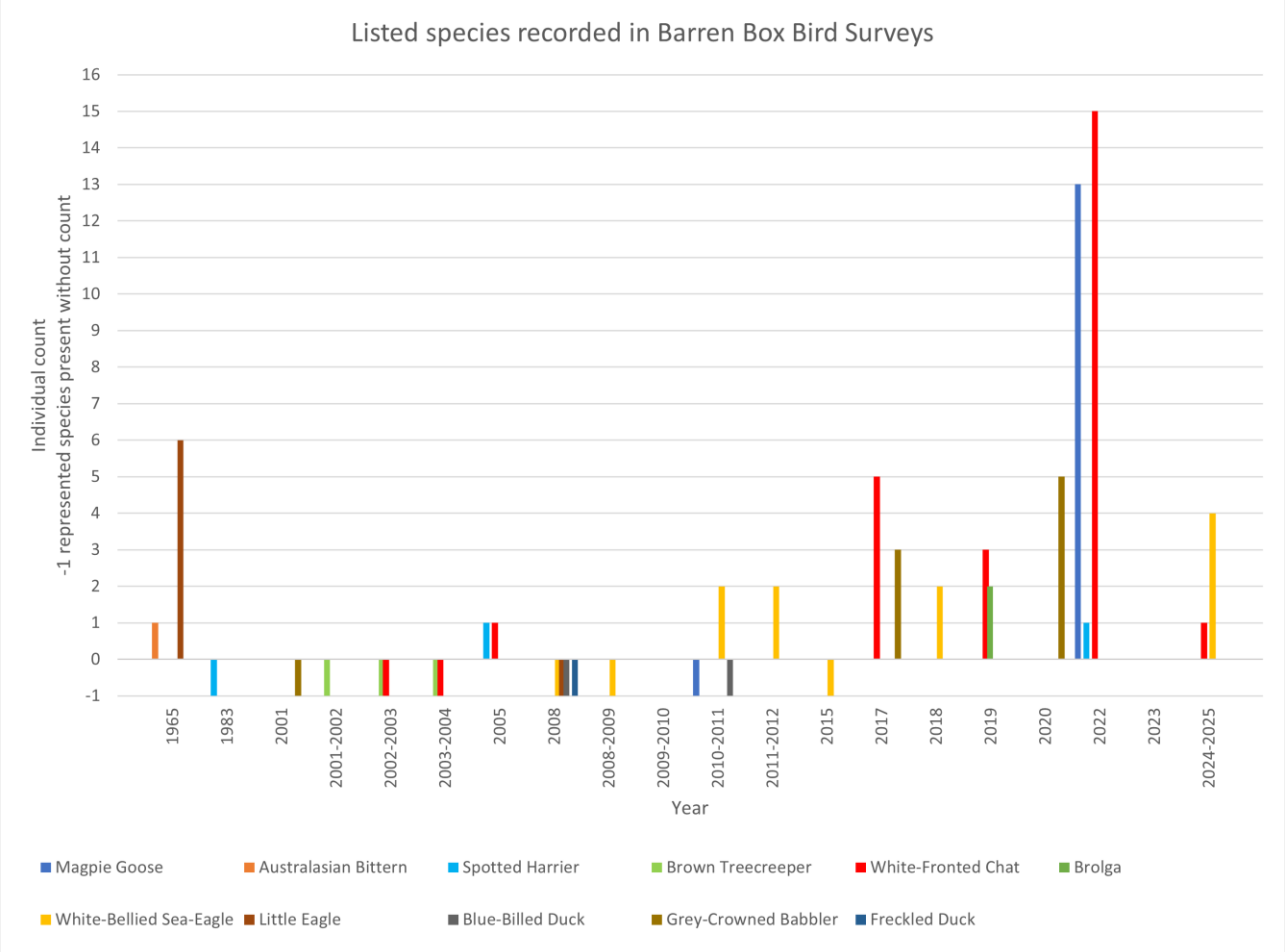


Figure 23 - Listed bird species counts recorded at Barren Box Swamp/ Storage 1965-2025

8.3.2 Ecological surveys

The vegetation survey efforts relevant to the rehabilitation of the Wetland Cell that have been undertaken consist of:

- URS Flora and Fauna Assessment 2004
- Baseline Vegetation Survey 2007
- 2013 post-2012 flood monitoring
- Review of Vegetation 2015
- NGH Barren Box Storage Modification Site Inspection 2021
- NGH Barren Box Storage Modification Site Inspection 2022

For further information regarding the vegetation survey efforts outlined above please refer to Murrumbidgee Irrigation Barren Box Project AEMR 2006-2022.

Given the time from the initial EIS survey and more recent surveys and the changes in ecological assessment methodologies over this period, MI engaged NGH Environmental to develop a survey methodology and seek feedback from DCCEEW Biodiversity Conservation and Science officers. MI submitted NGH's survey methodology to DCCEEW BCS received feedback. MI and NGH Environmental have been working through the feedback received. An updated proposed rehabilitation monitoring program, incorporating an enhanced monitoring methodology for the project based on DCCEEW recommendations, will be provided to DCCEEW BCS during 2025/26.

Information from past surveys will still be considered where applicable and build on the knowledge of the wetland cell and its ecology. Flooding, inundation periods and environmental water regimes will also be incorporated into ongoing assessments.

Due to the ongoing work to update the monitoring programs, ecological field surveys were delayed during 2024/25. Surveys will be scheduled to be undertaken during 2025/26 depending on feedback received from DCCEEW and access requirements to the site. It will allow ongoing survey efforts to be more easily compared to determine rehabilitation outcomes and any additional actions to be undertaken, e.g. weed control or similar.

8.3.3 Salt and nutrient accretion

A condition of the approval (6.5dvii) was for the rehabilitation plan to include:

vii) procedures for the management of salt and nutrient accretion

The plan's development by the Technical Panel, which included experts in wetland ecology and rehabilitation considered this requirement and determined (see Section 4.4.2 of the plan) that the likely 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 plan.

Salinity management had been a focus area under the LWMP, driven by the overarching MDBA's salinity plan and targets. MI undertook significant works and educational programs to aid in minimising salinity levels across the MIA.

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.

Given there has been two major floods in the past as well as one occurring in late 2022, the original expectation that major floods occur 10-15 yearly in the region has not been realised. These floods 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

As noted previously 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. Releases to the wetland cell that occurred during 2024/25 are included in section 7.1.2.2.

During 2024/25, water quality samples were taken directly from the wetland cell discharge points to capture the water that had entered the wetland cell.

Water quality results for 2024/25 are included in Appendix F.

The results indicate that water quality is of good quality with dissolved oxygen, pH, EC, turbidity and BGA all within a suitable range. Iron and aluminium results were slightly elevated, which is expected to be due to local soils contributing to these levels. BGA and EC concentrations were elevated in February due to low water levels causing ponding at the sample location, coupled with warm conditions.

Trace indicators of some agricultural pesticides are present, with no chemical levels above the EPL4651 notification and action levels triggered for the 2024/25 season.

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.

Figure 24 – Routine monitoring photo taken 26 Feb 2025 of the Wetland Cell of BBSW.

8.4 Biosecurity management

8.4.1 Weeds

MI manages biosecurity risks from weeds and nuisance plants under a Weed Management Strategy and associated Weed Management Plan which outlines weed identification, inspection schedules, preferred treatment and any specific permits available for targeted treatment. The Weed Management Strategy also outlines treatments including biocontrol and non-chemical treatments and any trials to be researched and/or undertaken.

Supporting the Weed Management Strategy is MI's Weed Management Guide. This document focuses on WONS found in the MIA, and outlines the requirements for annual planning, inspections, treatment and external notification/ reporting based on the plant type, recommended treatments, including applicable APVMA permits, and life cycle.

The above procedures support the BBS OEMP.

Weed inspections and treatment efforts remained steady during 2024/25. In late 2024 wet conditions continued to occur which affected access to areas such as the wetland cell and surrounding ground level access and fire trails. From 2025, there was below average rainfall experienced which allowed for more access due to drier conditions. Where access was safe, inspections were conducted via ATV units and on foot.

8.4.1.1 Alligator weed

The key biosecurity risk in the BBSW area is Alligator Weed (*Alternanthera philoxeroides*). MI undertakes scheduled inspections of areas where past or current outbreaks occurred, as well as areas further downstream should conditions such as flood or high water supply/ allocation indicate a potential for spread.

Due to the flood event in late 2022, there was an exponential rise in plant growth during 2022/23 which led to an increase in Alligator Weed inspections. Alligator Weed inspections remained consistent throughout 2024/25 however there was an increase in weed growth identification due to additional resources and increased access. MI continued to undertake measures to prevent the spread by utilising floating booms along key supply channels, to impede the movement of floating mats of weed and allow easier inspection and retrieval/ treatment as required.

The General Biosecurity Direction issued in December 2021 by Griffith City Council (GCC), as the local weed authority remains in place to exclude unauthorised entry to the public from BBS land and associated riparian zones. The direction was due to the increasing presence of alligator weed identified by both MI and Council due to above average rainfall and higher storage water levels creating ideal weed growth conditions.

While entry to BBS lands is restricted by locked entry gates controlled by MI and other approved entities (e.g. Council and approved Utilities), some illegal entry had been noted through other areas of the site. MI works collaboratively with GCC on managing these risks.

Since the issue of the direction, MI has increased security at gates and surrounding the site, a permit system for any approved contractors or visitors to the site is in place, along with the BBS site induction to ensure all MI staff, contractors and visitors are aware of the direction, weed hygiene requirements and the unique environmental and safety risks applicable to the site.

Table 13 outlines inspections and treatment undertaken in the BBSW and surrounding areas for Alligator Weed during 2024/25 compared to prior years.

Table 13 - BBS Alligator weed inspection and treatments

Financial year	Inspections	Inspection area	Findings and treatment
2005-2006	2	BBSW – 31 plants, downstream channels 9 plants	All chemically treated when located and GPS points taken

Financial year	Inspections	Inspection area	Findings and treatment
		floodway - 12	
2006-2007	2	BBSW – 6 plants	All chemically treated when located and GPS points taken
	2	Downstream channels – 3 plants	
	1	Floodway – 3 plants	
2007-2008	2	BBSW – 19 plants	All chemically treated when located and GPS points taken
	2	Downstream channels – 8 plants	
	1	Floodway – 1 plant	
2008-2009	2	BBSW – 6 plants	All chemically treated when located and GPS points taken
	2	Downstream channels – 7 plants	
	1	Floodway – 4 plants	
2009-2010	1	BBSW – 11 plants	All chemically treated when located and GPS points taken
	1	Downstream channels – 1 plant	
	1	Floodway – 1 plant	
2010-2011	2	BBSW – 6 plants	All chemically treated when located and GPS points taken. Two larger plants removed by hand and buried on site at BBSW.
	1	Downstream channels – 2 plants	
	1	Floodway – no plant found	
2011-2012	2	BBSW – 6 plants	All chemically treated when located and GPS points taken
	2	Downstream channels – 2 plants	
	0	Floodway – no inspection due to flooding	
2012-2013	3	BBSW – 14 plants	All chemically treated when located and GPS points taken
	3	Downstream channels – 23 plants	
	1	Floodway – Wyvern only. 1 plant	
2013-2014	2	BBSW – 11 plants	All chemically treated when located and GPS points taken
	2	Downstream channels – 4 plants	
	2	Floodway. 0 plant	
2014-2015	2	BBSW – 6 plants	All chemically treated when located and GPS points taken
	2	Downstream channels – 1 plant	
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	All chemically treated when located and GPS points taken. Where the weed is found in an area not in close proximity of previously mapped plants, this information is

Financial year	Inspections	Inspection area	Findings and treatment
		2017 – 4 treatments 2018 – 3 treatments 2019 – 3 treatments 2020-22 – numerous treatments, detailed inspections, physical removal and residual herbicide treatments.	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 30m 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 30m 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 30m buffer zone implemented.

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 May 2025. 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 keep detailed mapping and weed treatment records on all WONS locations. Where a WONS is 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 2025/26 with a planned blanket spray of the edges of the Active and intermediate Cells to reduce weed growth to increase identification efforts of Alligator Weed. 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 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 our land.

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)

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 proposed/ required. At the time MI considered this study was best undertaken as part of the EIS for the WWSD Water Use Study, via the Water for Rivers program.

Water for Rivers was the joint government enterprise established to develop water efficiency projects and other measures, including licence purchases, to recover the water for the three Increased Flows programs.

The Water for Rivers enterprise completed its task of securing enough water entitlements from the western rivers to achieve the target of Increased Flows volumes in July 2012.

While the initial Water Use Study was undertaken for the WWSD in 2006, the project was not funded under the Water for Rivers scheme and planning and construction of the project did not occur until 2016-2019. At that time, it was 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 25 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 7km upstream of Five Oaks Swamp, however in some cases was not considered to fall within the floodway wetland system (URS 2006).

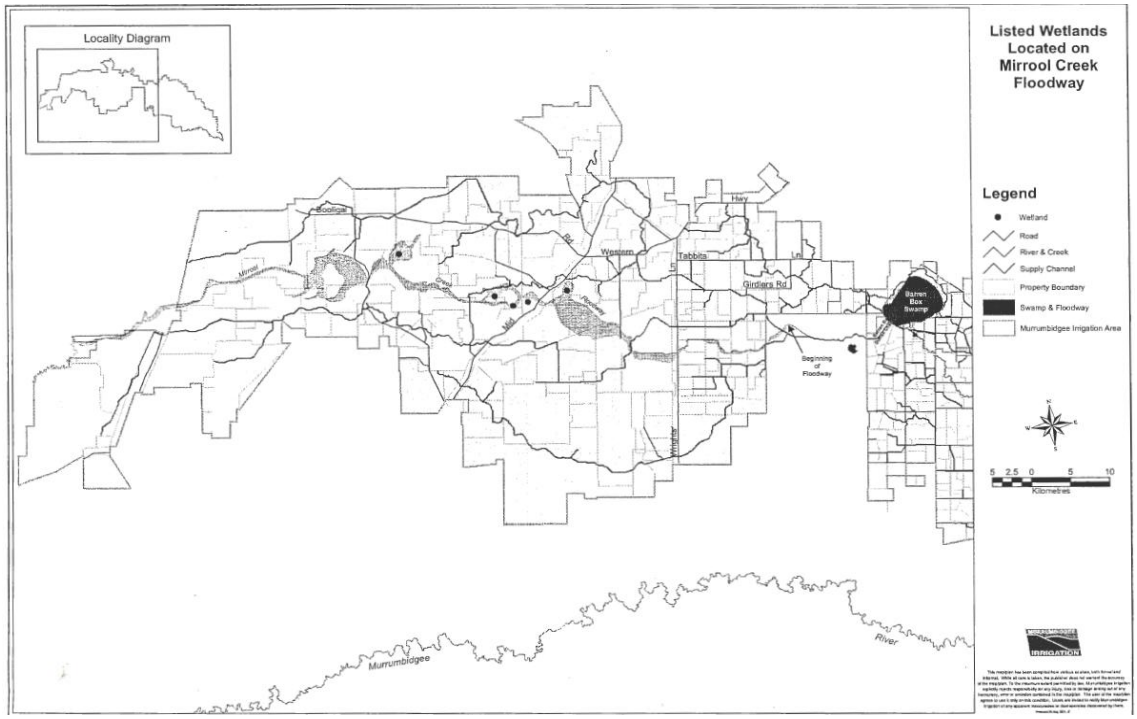


Figure 25 - Lower Mirrool Creek Floodway location (MIA extent in 2004)

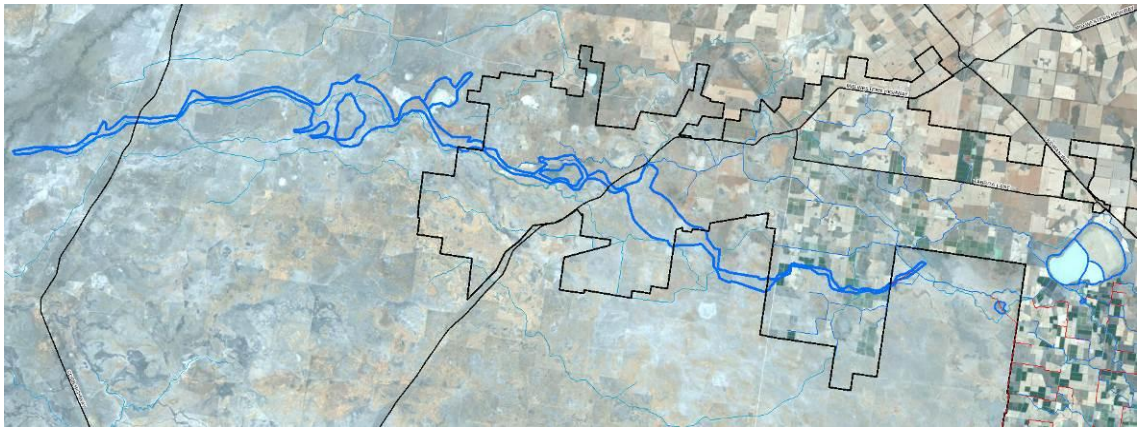


Figure 26 - Lower Mirrool Creek Floodway location (MIA extent from 2019)

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 area 2002
- Condition and biodiversity vegetation remnants of the MIA Stage 2 2003
- Condition and biodiversity of vegetation remnants in the MIA 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 AEMR 2006-2022.

9.1.1.1 Planned ecological assessment

NGH Environmental has reviewed available information regarding the BBS Wetland Cell and LMCF, a proposed survey methodology was provided to DCCEEW BCS officers as outlined in section 8.3.2. MI received a response from DCCEEW BCS. MI has been working with NGH Environmental on a proposed rehabilitation monitoring program, integrating an updated monitoring methodology that incorporates the recommendations from DCCEEW BCS for the project. The updated monitoring programs will be provided to DCCEEW BCS during 2025/26, with the surveys to be scheduled and undertaken, which will allow ongoing survey efforts to be more easily compared. This information will then be made available to DCCEEW EWO for use in the project to determine environmental water requirements (Section 9.2.3).

Due to the ongoing work to update the monitoring programs, ecological field surveys were delayed during 2024/25. Surveys will be scheduled to be undertaken during 2025/26 depending on feedback received from DCCEEW and access requirements to the site.

9.2 Releases to the floodway

During the construction of the BBS project and renewal of the offtake structure to the floodway during the 2006 season, approximately 1,950 ML of water was diverted into the floodway. The upgrade of the offtake structure allowed improved control over floodway releases and the BBS project provided additional control over water management. Environmental gains from the release were achieved by supplying water to trees and other vegetation in the vicinity, which had tolerated four years of drought.

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.

Section 7.1.2 details the monthly volumes released during 2024/25. Table 14 below includes the annual releases since commissioning.

Table 14 - Summary of releases to the Lower Mirrool Creek Floodway

Financial year end	Total (ML)
2012	**116,891**
2016	**281**
2017	**121,363**
2018	3,405

2019	150
2022	133.20
2023	**112,116.6**
2024	527.3
2025	49.60
Total	*356,867*
Average (2007-2012)	*15,561*

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.

The total flow volume reported for 2021/22 has been amended in Table 14 and Appendix C from 6,886.30ML to 133.2ML following a comprehensive review of LMCF flow data which identified that the flow volume reported during this year had been miscalculated. Further investigation found that the total flow had been calculated based on a series of point in time cumulative flow readings, rather than the sum of daily average flows.

MI releases water to the floodway in a controlled manner via the approved discharge location MIRFLD, and during flood events in consultation with the local and or state flood management authorities (such as GCC, CSC, and SES). During significant floods, water can find its way, via a variety of flow paths, towards the Lower Mirrool Creek - including both over-land and through/out MI's infrastructure. Where time permits, early notification of downstream landholders is undertaken by both MI for our area of operations and Councils for their LGAs. Section 7.1.7 outlines BBSW Operational Guidelines, including the management approach during flood events.

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.

Discussions with State and Federal EWOs commenced in mid-2022 regarding environmental water releases to the floodway. See Section 9.2.3 for further information.

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 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.

Minimal releases to the LMCF occurred during 2024/25 as there were no flood events and rainfall during this period was below average. Like the 2023/24 reporting year, releases were due to the ingress of water from the drainage system downstream of Barren Box and for operational reasons.

During the 2022, 2016 and 2012 flood events, most of the wetlands located in the lower Mirrool Creek Floodplain experienced watering following releases via MIRFLD ranging in volume from 112,116 to 121,363 ML.

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 2024/25. Historical exceedances are included in Table 15 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 15 - 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)	-	-
Metalochlor	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 2025/26.

9.3 LMCF wetland system – monitoring program (6.5dxiv)

The monitoring program for the LMCF wetland system has changed over time due to the changing focus from the LWMP when it was considered that too much water was being discharged to the floodway, the BBS project was identified as having the potential to impact the floodway ecology due to the change in watering regimes.

While the proposed Water Use Study did not investigate the LMCF as originally intended, as outlined above, ecological information was collected in 2011, 5 years after commissioning of the BBS project and compared with data from 2001-2003 which was prior to the project. The findings of the report did not indicate any significant ecological decline at the monitoring sites along the LMCF, indicating the change (i.e. reduction) in water being discharged into the floodway had not impacted the vegetation communities downstream.

NGH Environmental has reviewed available information regarding the BBS Wetland Cell and LMCF, a proposed survey methodology was provided to DCCEEW BCS officers as outlined in the section 8.3.2. MI received a response from DCCEEW BCS. MI has been working with NGH Environmental on a proposed rehabilitation monitoring program, incorporating an updated monitoring methodology that incorporates the recommendations from DCCEEW BCS for the project.

As outlined in Section 9.1.1.1 surveys will be scheduled and undertaken, which will allow ongoing survey efforts to be more easily compared. This information will then be made available to DCCEEW EWO for use in the project to determine environmental water requirements.

Due to the ongoing work to update the monitoring programs, ecological field surveys were delayed during 2024/25. Surveys will be scheduled to be undertaken during 2025/26 depending on feedback received from DCCEEW and access requirements to the site.

9.4 Planned activities to be undertaken in the next reporting period

Activities planned to be progressed for LMCF 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 2024/25 consist of:

- Ecological field assessment of BBS Wetland and LMCF
- BBS fencing project finalised.
- Updated 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.

MI carried out further ecological surveys to finalise environmental planning and approvals for the BBS fencing project. The fencing project for BBS lands, aligned with the General Biosecurity Direction for alligator weed, has been completed. The on-ground implementation will take place 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 feed into the update of the OEMP.

Figure 27 - BBS Wetland cell inundation 27 December 2024

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.
- Further improvements in MI's environmental management system, including the BBSW OEMP and compliance software, to ensure ongoing compliance is assured.
- Actions outlined in Section 12.
- Ongoing collaboration with DCCEEW – EWOs on environmental water feasibility study for LMCF and BBS Wetland cell.

11 Variations to approvals (7.4l)

During 2024/25 no variations to the BBS Project approval have been obtained.

A Modification request for DA101-4-2004i was submitted on 10 November 2021 seeking amendment and/or removal of several conditions. MI received a determination of the modification request on 5 July 2024. The Department refused the modification request. The key reason for refusing the modification application was that the application did not seek to effect a change to the development the subject of development consent DA 101-4-2004-1 and as such, the Minister's delegate did not have power to determine the modification application otherwise than by way of refusal.

While the following is not related to the BBS project, the following Direction is in place over BBS land:

- General Biosecurity Direction Griffith City Council (GCC), as the local weed authority, issued a General Biosecurity Direction in December 2021 to exclude unauthorised entry to the public from BBS land and associated riparian zones. This direction is in place for 5 years.

12 Environmental management targets and strategies (7.4m)

12.1 Activities planned for next reporting period (FY2025-26)

The following activities are planned to be progressed during the next reporting period (2025-26 financial year), subject to weather conditions, field access and availability of suitably qualified consultants and contractors:

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.	FY2026
BBS Fox baiting, fox den fumigation and feral cat trapping	FY2026
BBS Alligator weed inspections, including planned inspection by Councils, LLS, State Priority Weed team. Planned blanket spray of the edges of the Active and Intermediate cells to reduce weed growth.	FY2026
Implementation of the BBS fencing project on-ground works as part of the General Biosecurity Direction for alligator weed.	FY2026
MI to finalise ecological methodology with NGH Environmental, incorporating the Wetland Rehabilitation Plan monitoring data.	FY2026
MI to continue liaising on ecological methodology with DCCEEW-BCS and DCCEEW EWO.	FY2026
Ecological field assessment of BBS wetland cell and reporting (after methodology agreed).	FY2026
Ecological field assessment of LMCF and reporting (after methodology agreed).	FY2026
Continue to work with DCCEEW EWO on LMCF environmental water assessments.	FY2026
Continue to update the OEMP based on DCCEEW feedback, ecological assessment outcomes and AEMR findings. Notify D-G, GCC and DCCEEW of review.	FY2026
Fire management activities in consultation with Griffith RFS.	FY2026
Finalise dedicated flood management plan.	FY2026
Undertake a waterbird survey.	FY2026

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