



# Audit of Connections Project Environmental mitigation water for 2022-23

PREPARED FOR DEECA | November 2023

# Revision schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)		
			Prepared by	Reviewed by	Approved by
1	17/11/23	Draft for issue	SVW	PJL	SVW
2	23/11/23	Final	PJL	SVW	SVW



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## Quality statement

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23 November 2023

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23 November 2023

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23 November 2023



# SUMMARY FINDINGS

## Background and scope

This report details the findings from Stantec's audit to verify the environmental mitigation water associated with the earlier completed GMW Connections Stage 1 and 2 Project for the 2022-23 irrigation season. The environmental mitigation water is to be reported as estimated annual Phase 3 (ML/yr) water recovery volumes.

Environmental water is water that is managed to improve or maintain the health of rivers and wetlands including the plants and animals that depend on them. For the purpose of this audit, environmental water is water that is actively managed to benefit the environment and that has been determined as being required under the Connections Project Water Change Management Framework.

The scope of the audit is for 14 environmental watering sites included in the audit brief.

## Auditor statement

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STATUS Final | Project No 300203906

We have audited the 2022/23 mitigation water estimates prepared by the GMW. Our audit was conducted in accordance with the scope provided by DEECA on 15 August 2023. Our audit activities included:

Review of calculations of water savings

Review of calculation of mitigation water savings

Review of inputs to the calculations including customer deliveries and outfalls

Based on our audit activities, we consider that the Phase 3 mitigation water estimates for 2022/23 have been reported in accordance with the Water Savings Protocol (Version 5) and are free from material error.

## Audited Phase 3 mitigation water

The Phase 3 mitigation water for the 2022/23 for the 14 sites in the scope of this audit is 1,275.6 ML. The audited mitigation water volumes for 2022/23 are detailed in Table 1-1.

**Table 1-1 Calculation of mitigation water for 2022/23**

IPM Code	Asset Code	Site of environmental significance	MWC %	Baseline losses (ML)	Variable Outfalls in 22/23 (ML)	Gross variable Phase 3 savings 22/23	2022/23 Mitigating water commitment (ML)
PH1052A	ST025235	Lake Leaghur	33%	278.4	0	148.8	49.1
PH1249	ST008516	Little Lake Boort	67%	230.4	0	123.2	82.5
PH1119	ST023738	Duncan	n/a	0	0	-	-
PH1138A	ST023656	Lake Meran	100%	235.2	38.9	86.9	86.9
PH1186 <sup>1</sup>	ST023234	River Pool	100%	788.8	32.3	167.8	389.3
PH1211	ST025134 (ST025135 in EWP)	Dowdy's	90%	96	0	51.3	46.2



IPM Code	Asset Code	Site of environmental significance	MWC %	Baseline losses (ML)	Variable Outfalls in 22/23 (ML)	Gross variable Phase 3 savings 22/23	2022/23 Mitigating water commitment (ML)
PH1184	ST023230	Unnamed	88%	27.2	0	14.5	12.8
PH1096	ST023308 (ST047427 in EWP)	Gannons	85%	73.6	0	39.3	33.4
PH1224	ST073298 (ST023628 in EWP)	Delamare	49%	81.6	8.2	35.2	17.3
TO1025	ST004154	Lake Elizabeth	67%	641.6	0	277.7	186.1
Pig Swamp	Straight Cut	Pig Swamp	Fixed annual 170 ML/year	0	0	-	170
TO70	ST001206	McDonald's Swamp	100%	120.7	0	52.2	52.2
SH110	ST072390 (ST043937 in EWP)	Round Lake	100%	284.96	0	123.4	123.4
RN821	n/a	Grieners Lagoon	80%	71.6	0	33.0	26.4
<b>Total</b>							<b>1,275.6</b>

Note:

1. At PH1186, 'negative' outfall savings were observed, i.e. outfalls were above the baseline year due to outfalls outside of the irrigation season and likely due to flood water. Under the water savings protocol, the negative value is zeroed to not impact mitigation water. This causes the mitigation water commitment volume (389.3ML) being above the gross savings (167.8ML).



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# 1 Introduction

## 1.1 Background

The Victorian and Commonwealth Governments committed to investing more than \$2 billion in the modernisation of the Goulburn Murray Irrigation District (GMID) to achieve water recover for the Stage 1 and 2 Connections Project. Goulburn Murray Water (GMW) is the owner and operator of the GMID. The Connection Project has been audited annually for many years (both phase 3 and phase 4 water savings). The project works have been completed recently and delivered 433 GL LTAAY water recovery.

One of the commitments from the modernisation of irrigation infrastructure is that water is that environmental water is provided to sites impacted by irrigation modernisation consistent with the Water Change Management Framework.

## 1.2 Purpose

The purpose of this audit is to verify the environmental mitigation water delivered associated with the earlier completed GMW Connections Stage 1 and 2 Project for the 2022-23 irrigation season. The environmental mitigation water is to be reported as estimated annual Phase 3 (ML/yr) water recovery volumes.

## 1.3 Scope

The scope of the audit is the Phase 3 environmental mitigation water recovery volumes generated from the previous completed GMW Connections Project: from regulator automation, for the 2022-23 irrigation season. The audit is for the 14 mitigation water sites detailed in Section 2.4. The audited Phase 3 volume is to be used to temporarily distribute water to the Victorian Environmental Water Holder.



## 2 Background

### 2.1 Environmental water

Environmental water is water that is managed to improve or maintain the health of rivers and wetlands including the plants and animals that depend on them. For the purpose of this audit, environmental water is water that is actively managed to benefit the environment and that has been determined as being required under the Connections Project Water Change Management Framework.

### 2.2 Water change management framework

The GMW Connection Project's Water Change Management Framework is a requirement of the Victorian Minister for Planning and was first approved by the Victorian Minister for Water on 14 August 2009. There have been subsequent updates and reviews of the document and Version 4 of the WCMF was approved by the Minister for Water with advice from the Minister for Energy, Environment and Climate Change on the 24 October 2018.

The WCMF describes the means by which GMW will protect aquatic and riparian ecological values through management of water allocations and flows that may be impacted by implementation of the Connections Project within the modernised Goulburn Murray Irrigation District (GMID). The WCMF outlines procedures for monitoring, reporting and auditing changes in hydrological conditions in relevant wetlands or waterways associated with the project's operation. It provides the environmental commitments, processes, and methods for the relevant operations of the modified system.

Under the Water Change Management Framework, there is a requirement to prepare Environmental Water Management Plans for sites for where environmental water is to be delivered and to report annually on the environmental water delivered against that required under the Plans.

Where it has been identified that water which had previously flowed out from the irrigation network at outfalls provided environmental benefit and that modernisation would reduce these outfalls and therefore reduce the environmental benefit, a mitigation water commitment has been determined as the volume of water required to ensure no net impacts on sites of with high environmental value.

### 2.3 Goulburn Murray Irrigation District

The Goulburn Murray Irrigation District is composed of the following six main irrigation areas located in northern Victoria:

- Central Goulburn (CG) (which is divided into sub-areas CG1-4 and CG5-9)
- Murray Valley (MV) and Lower Broken Creek (MV-BC)
- Loddon Valley
  - Pyramid-Hill (LV-PH)<sup>1</sup>
  - Boort (LV-BO)
- Rochester (RO)
- Shepparton (SH) (including Shepparton East)
- Torrumbarry (TO).

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<sup>1</sup> The former Pyramid-Boort irrigation area, now Loddon Valley is divided into two separate water trading zones: Pyramid-Hill (LV-PH, zone 1A) and Boort (LV-BO, zone 1B). The "LV" designation is the overall larger irrigation area





Goulburn-Murray Water is responsible as both the Water Resource Manager and System Operator for the Goulburn Murray Irrigation District. Figure 2-1 shows the location of the Goulburn Murray Irrigation District and the main irrigation areas.



**Figure 2-1 Goulburn Murray Irrigation District**  
 Source: <http://www.g-mwater.com.au/about/regionalmap>

## 2.4 Environmental watering sites

The environmental watering sites in the scope of the audit were set by DEECA in the scope of work for this audit dated 15 August 2023. The environmental watering sites in scope are detailed in Table 2-1. This table identified the sites of environmental significance identified under the Water Change Management Framework, the mitigation water commitment for each site and the asset from which mitigation water is to be delivered. All of the environmental watering sites for mitigation water are in three irrigation areas: Central Goulburn, Torrumbarry and Loddon Valley – Boort.

**Table 2-1 Environmental watering sites in scope of audit**

IPM Code	Asset Code	Site of environmental significance	Environmental Watering Plan	MWC %
PH1052A	ST025235	Lake Leaghur	Lake Leaghur	33%
PH1249	ST008516	Little Lake Boort	Little Lake Boort	67%
PH1119	ST023738	Duncan	Loddon River	n/a
PH1138A	ST023656	Lake Meran	Lake Meran	100%
PH1186	ST023234	River Pool	Loddon River	100%
PH1211	ST025134 (ST025135 in EWP)	Dowdy's	Loddon River	90%



IPM Code	Asset Code	Site of environmental significance	Environmental Watering Plan	MWC %
PH1184	ST023230	Unnamed	Loddon River	88%
PH1096	ST023308 (ST047427 in EWP)	Gannons	Loddon River	85%
PH1224	ST073298 (ST023628 in EWP)	Delamare	Loddon River	49%*
TO1025	ST004154	Lake Elizabeth	Lake Elizabeth	67%
	Straight Cut	Pig Swamp	Pig Swamp	Fixed annual 170 ML/year
TO70	ST001206	McDonald's Swamp	McDonald's Swamp	100%
SH110	ST072390 (ST043937 in EWP)	Round Lake	Round Lake	100%
RN821	n/a	Grieners Lagoon	Grieners Lagoon	80%

Note:

49% is Weighted average of x2 sites PH1224 and PH1119

- ST023628 on the main #2 channel outfall (also coded ST073298 now ) = PH1224
  - ST023738 on the spur 3/2/8/2 channel downstream of the main #2 channel outfall = PH1119
- ST or asset structure codes can change depending on asset built there at the time.



# 3 Audit of mitigation water for 2022/23

## 3.1 Approach

To audit the environmental mitigation water for the GMW Connections Stage 1 and 2 Project for the 2022-23 irrigation season, we have undertaken the following activities:

- Compared the calculations used by GMW against those in the Technical Manual
- Checked baseline year parameters used as inputs into the calculations against the Revised baseline year water savings audit
- Checked mitigation water allowances for each site against the Environmental Watering Plan
- Reviewed a sample of outfall records for the current year to confirm the current year outfall volumes used in the calculations
- Recreated the calculations to determine the Phase 3 mitigation water for 2022/23 for the sites in scope.

## 3.2 Determining mitigation water volumes

Mitigation water volumes for a given year are determined as a proportion of Phase 3 savings achieved at the relevant outfall site through automation. Phase 3 water savings due to reduction in outfalls are estimated by the following equations from the technical manual

$$WS_{\text{outfalls}} = [(O_{\text{base-variable}} \times (D_{\text{yearX}} / D_{\text{Base}}) - O_{\text{YearX-variable}}] + [O_{\text{BaseFixed}} - O_{\text{YearXFixed}}]$$

The inputs required to calculate Phase 3 water savings due to outfall automation are summarised in Table 3-1 and Table 3-2.

The first table details the parameters that are fixed or have been previously audited. The second table details the input data from the current year.

**Table 3-1 Fixed parameters and baseline year parameters for automation water savings calculation**

Parameter	Description	Source
O <sub>Base - fixed</sub>	Fixed outfall loss in Baseline Year	Baseline Year water balance and analysis
O <sub>Base - variable</sub>	Variable outfall loss in Baseline Year	Baseline Year water balance and analysis
D <sub>Base</sub>	Deliveries for the irrigation area in the baseline year	Baseline Year water balance and analysis

**Table 3-2 Current year parameters and baseline year parameters for automation water savings calculation**

Parameter	Description	Source
O <sub>yearX - Fixed</sub>	Fixed outfalls in Current Year	SCADA and analysis
O <sub>yearX - Variable</sub>	Variable outfalls in Current Year	SCADA and analysis
D <sub>Yearx</sub>	Deliveries for the irrigation area in the year in question	SPM

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## 3.3 Data inputs

Table 3-3 summarises the findings from checking of the baseline year customer deliveries.



**Table 3-3 Check of baseline year customer deliveries**

Irrigation area	Customer deliveries in baseline year	Audit comment
Pyramid Hill	75,012	Since the baseline year audit, Pyramid Hill and Boort have been separated. The baseline year customer deliveries for Pyramid Hill are based on the ratio of deliveries to the two areas in the 2019/20 season
Torrumbarry	405,049	Figure used is consistent with the baseline year water balance
Central Goulburn 5-9	312,082	Figure used is consistent with the baseline year water balance

We selected a sample of outfall data used in the water savings and trailed these to SCADA flow records. The findings of this data trailing are summarised in Table 3-4. The substantial floods during 2022/23 resulted in outfall flows being excluded from the calculation of water savings. Our audit supported the outfall data used by GMW in its calculations.

**Table 3-4 Findings from trailing outfall data**

IPM/ Asset Code	Cleansed data used in calculations (ML)	Raw data from SCADA	Audit notes
PH.1096	0	0	The data is consistent
TO.1025	50.2	832.67	517ML of flows were excluded during the period 13/10/22 to 11/11/22 due to flood flows. Flows of 245 ML between 3/5/23 and 15/5/23 were for environmental water delivery. A further 20.9 ML of flows were excluded due to sensor error
TO.70	0	429.9	401ML of flows for environmental water delivery between 19/8/22 to 01/9/22. Flows of 28.2 ML excluded at the start of the season due to sensor error
RN.821	0	3.2	Flood water flows were excluded between 19/10/22 and 26/10/22

### 3.4 Mitigation water calculation

The audited mitigation water volumes for 2022/23 are detailed in Table 3-5.

**Table 3-5 Calculation of mitigation water for 2022/23**

IPM Code	Asset Code	Site of environmental significance	MWC %	Baseline losses (ML)	Variable Outfalls in 22/23 (ML)	Gross variable Phase 3 savings 22/23	2022/23 Mitigating water commitment (ML)
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1. At PH1186, 'negative' outfall savings were observed, i.e. outfalls were above the baseline year due to outfalls outside of the irrigation season and likely due to flood water. Under the water savings protocol, the negative value is zeroed to not impact mitigation water. This causes the mitigation water commitment volume (389.3ML) being above the gross savings (167.8ML).



# 4 Conclusion and recommendations

## 4.1 Conclusion

The Phase 3 mitigation water for the 2022/23 for the 14 sites in the scope of this audit is 1,275.6 ML. The breakdown of the mitigation water for each site is provided in Table 3-5.

## 4.2 Recommendations

There are no recommendations arising from this audit.



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