Australian Government

Murray–Darling Basin Authority

Sustainable Diversion Limit Adjustment Mechanism: 2023 Assurance Report

July 2023

Published by the Murray–Darling Basin Authority
MDBA publication no: 13/23
ISBN (online): 978-1-922699-27-5

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Cataloguing data
Title: Sustainable Diversion Limit Adjustment Mechanism: 2023 Assurance Report, Murray–Darling Basin Authority Canberra, 2023. CC BY 4.0

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Acknowledgement of the Traditional Owners of the Murray–Darling Basin
The Murray−Darling Basin Authority pays respect to the Traditional Owners and their Nations of the Murray−Darling Basin. We acknowledge their deep Cultural, social, environmental, spiritual and economic connection to their lands and waters.

Aboriginal people should be aware that this publication may contain images, names or quotations of deceased persons.

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Foreword

The foundation of the Basin Plan is about balance and ensuring that the Basin and its communities can adapt to a changing and uncertain future.

To provide flexibility, the Basin Plan includes a way to adjust the amount of water that can be taken from our rivers and groundwater systems and used – this is known as the SDL Adjustment Mechanism.

The assurance process undertaken over the past 3 years, and summarised in this report, provides insight into whether Sustainable Diversion Limit Adjustment Mechanism (SDLAM) measures will be operational by 30 June 2024 and how measures will be operated.

This report reaffirms that some SDLAM measures will not be implemented by 30 June 2024 and that under current settings a reconciliation will be required in 2024.

While the assurance process does not explore in detail the reasons why the supply measures will not be fully operable by the required legislated timeframe, on behalf of the Authority I do wish to acknowledge the considerable work that Basin governments have put into developing and progressing the measures and in particular the unanticipated challenges for fieldwork, ground surveys and community engagement aspects due to the global COVID pandemic and the significant flooding experienced in 2022.

The inclusion of First Nations people in water management is also a focus area for the Authority. The Authority recognises that the involvement of Traditional Owners has been essential to shaping and improving some of the SDL Adjustment mechanism measures and outcomes. However, it is noted that not all Traditional Owners support the SDLAM and some of its measures. Feedback from First Nations and from the broader community has also shaped the projects for the better.

While Basin states are individually responsible for their SDLAM measures, it is the Authority's role to operate the mechanism, including the conduct of the reconciliation in line with Basin Plan timelines.

I commend the states for their open and responsive approach to working with the Authority in the delivery of the 2023 Assurance report.

Sir Angus Houston AK, AFC (Ret'd)
Chair

1 Executive summary

1.1 Why is the Authority conducting assurance?

The Sustainable Diversion Limit Adjustment Mechanism (SDLAM) is a mechanism included in the *Basin Plan 2012* (Cth) (Basin Plan) that provides an opportunity to adjust the Sustainable Diversion Limits (SDLs).

Basin states nominated a package of 36 supply measures under the SDLAM, and in 2017 the Murray–Darling Basin Authority (the Authority) determined that the implementation of these measures would achieve equivalent or improved environmental outcomes to those being sought by the Basin Plan, with 605 gigalitres per year (GL/y) less water recovery. The New Goulburn constraints measure was nominated as a constraints measure and constitutes the 37th measure of the SDLAM package. The Basin's SDLs were subsequently amended based on the 2017 determination.

Under the Basin Plan, the Authority is required to assess whether the notified measures, as implemented at 30 June 2024 (under current settings), support the SDL adjustment initially determined in 2017. If the Authority considers that the measures would produce a result different from the 2017 determination, the Authority must conduct a reconciliation.

In 2022, the Authority concluded that a reconciliation of SDLAM would be required. This was due to several measures experiencing changes significant enough to impact their ability to support the outcomes assumed in the 2017 determination.

To ensure that the Authority's preparations are transparent, the Authority has committed to using annual assurance to help inform its view of the projects that are likely to be capable of operating by 30 June 2024 and highlight material changes to measures. This year's assurance builds on the work of previous years by focusing on measures that have not been considered in previous years' reports.

1.2 Assurance findings for 2023

The 2023 SDLAM Assurance Report considers 23 notified measures at various stages of implementation. Of the 23 measures assured in this report:

- 7 are or will likely be operable by 30 June 2024, and
- 16 will not or are unlikely to be operable by 30 June 2024.

This year's assurance includes forecasting project completion for measures that are in progress and to reflect varying degrees of certainty, the likelihood of operability has been assessed.

1.3 Overall assurance findings

Assurance in 2023 has provided a point in time assessment of which measures could contribute to the SDL adjustment and the environmental outcomes that the SDLAM supply package could support.

In conjunction with the findings of previous years' SDLAM assurance reports, of the original 37 SDLAM measures:

- 14 are currently operational
- 6 are likely to be operable by 30 June 2024
- 16 will not/are unlikely to be operable by 30 June 2024
- 1 was not progressed nor modelled.

In 2022 the Authority estimated a revised supply contribution of between 290 to 415 GL/y. This would equate to a shortfall of 190 to 315 GL/y from the expected 605 GL/y contribution. As assurance in 2023 has found that several measures have been further delayed, the Authority is of the view that the shortfall will be at the higher end of this forecast.

2 Background

2.1 The Basin Plan and sustainable diversion limits

The Basin Plan establishes Sustainable Diversion Limits (SDLs) that reflect an Environmentally Sustainable Level of Take for the Murray–Darling Basin. The SDLs set sustainable limits on the average quantity of surface and groundwater that can be diverted for consumptive use in the Basin.

When preparing the Basin Plan and proposing the SDLs, it was determined that a portion of surface water and groundwater entitlements should be recovered from consumptive use and retained in the system to improve the health of rivers, wetlands and groundwater systems. The quantity of water to be recovered for this purpose is known as the water recovery target.

In 2012, the surface water recovery target was set as a long-term average volume of 2,750 GL/y for the entire Basin (Figure 1). This target was made up of 390 GL/y in the northern Basin, 2,289 GL/y in the southern Basin and 71 GL/y in other disconnected valleys of the Basin.

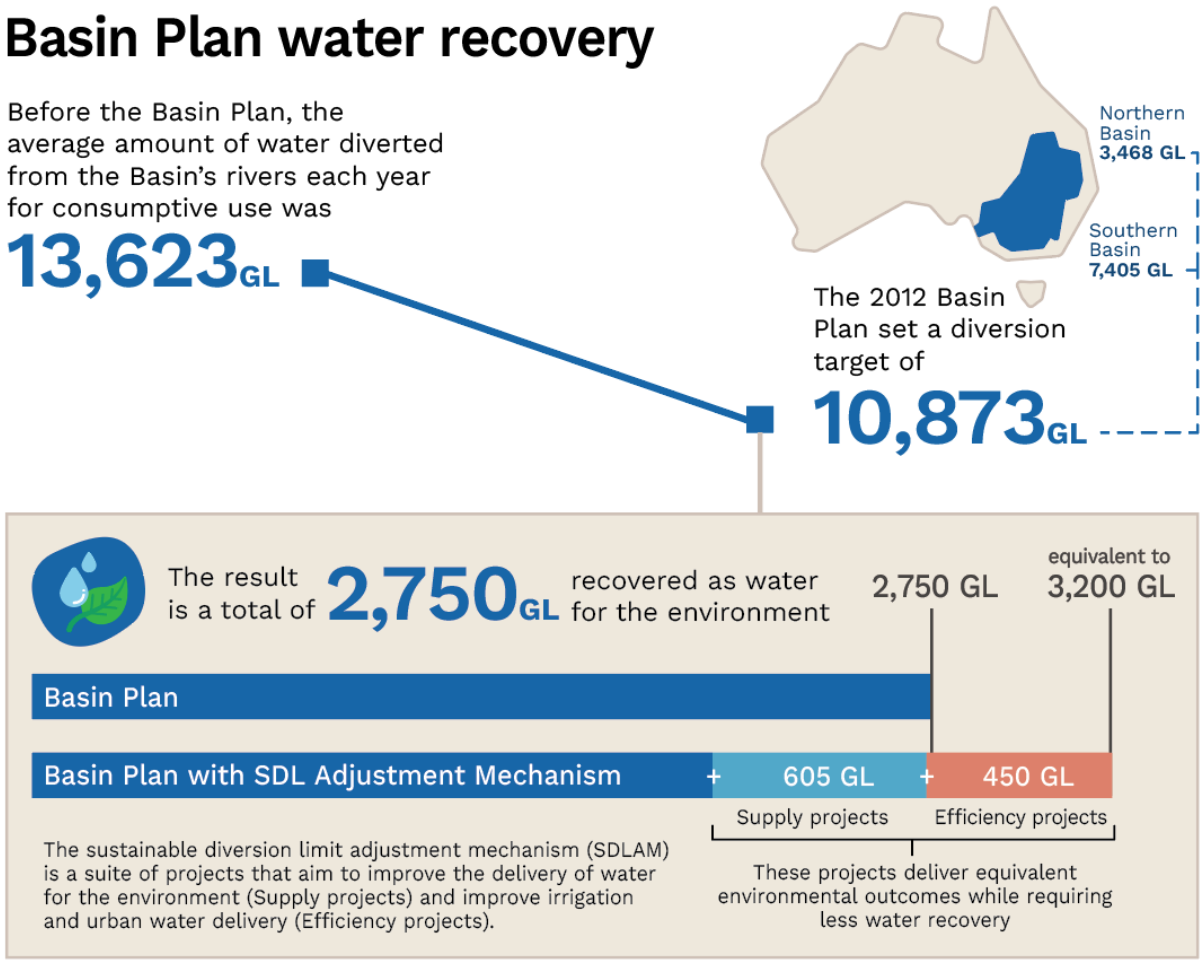

Figure 1. Basin Plan water recovery target and limits before the SDL adjustment mechanism (2012).

Within the Basin there are 29 surface water and 80 groundwater areas known as SDL resource units that all have their own SDLs set by the Basin Plan. These limits consider climate, trade, usage patterns and the development of infrastructure. The SDLs are established based on the estimate of

how much water was either allowed to be used or was being used in the Basin before the Basin Plan (Baseline Diversion Limit – BDL), less the water recovery target for each area. For surface water, this resulted in a Basin-wide surface water SDL of 10,873 GL/y.

2.2 Adjusting sustainable diversion limits

The Basin Plan SDLs were set using the best available information at the time. It was also acknowledged that there was an opportunity to improve the understanding of the river system and make changes prior to the SDLs coming into effect in July 2019.

The BDLs need to consider the best available information and can be adjusted as new information becomes available, resulting in an equivalent change to relevant SDLs.[1] These changes do not represent more water being available for use, but rather reflect a more accurate understanding of how much water is available for use, or was already being used.

Flexibility is also provided through the adjustment of the SDLs and associated water recovery targets. This flexibility is achieved in the northern Basin through the Northern Basin Review (NBR) and in southern Basin through the SDL Adjustment Mechanism (SDLAM) prescribed by Chapter 7.

2.2.1 The Northern Basin Review

At the time the Basin Plan was established, the Authority recognised more work was needed to improve knowledge of the hydrology, environment and socio-economic implications of Basin Plan settings in the less regulated river systems in the north. A commitment was made, supported by all Basin governments, to undertake a review and assess whether Basin Plan settings in the north were appropriate.

The Authority conducted a 4-year review ending in 2016 that resulted in a 70 GL/y reduction to the 390 GL/y water recovery target in the north, and an agreement that the New South Wales and Queensland governments would also adopt a range of water related measures with assistance from the Australian Government. While these measures complement and support the implementation of the Basin Plan, they themselves were not the basis for the 70 GL/y offset. The Basin Plan SDLs for the northern Basin were amended accordingly, with the amendments adopted by both houses of federal parliament in July 2018. Information relating to the Northern Basin Review can be found at: Projects in the Northern Basin toolkit | Murray–Darling Basin Authority (mdba.gov.au).

2.2.2 Sustainable Diversion Limit Adjustment Mechanism (SDLAM)

The SDLAM provides the opportunity and incentive to find ways to improve how the Basin's water resources are used, and potentially amend the SDLs set in 2012 as a result. The SDLAM allows SDLs to both increase in response to the more efficient use of water for the environment through supply measures, and decrease in response to more efficient consumptive use, through efficiency measures with neutral or positive socio-economic impacts.

[1] Some BDLs have been updated since 2019 as part of Water Resource Plan accreditation, based on best available information. Updated BDLs and the reasons for change are available at: Current diversion limits for the Basin | Murray–Darling Basin Authority (mdba.gov.au)

While providing flexibility, the Basin Plan limits the net change of the Basin-wide surface water SDLs in response to these efficiencies to no more than 5% of the 2012 Basin-wide SDL (approximately 543 GL for surface water SDLs) (Figure 2). The Basin Plan also includes safeguards for the reliability of supply for water right holders, places limits on changes to environmental outcomes and requires that all third-party risks be addressed or mitigated.

There are 2 types of projects that contribute to an SDL adjustment under the SDLAM

- **Supply measures** are projects which enable Basin Plan environmental outcomes to be achieved with less water. These include projects like water management infrastructure to deliver water to wetlands, forests and floodplains and changes to operating rules to support improved river management. Achieving equivalent or improved environmental outcomes more efficiently **allows the SDL to be increased**, leaving more water available for consumptive users.
- **Efficiency measures** are activities that act to use and deliver consumptive water more efficiently while maintaining or improving productivity. The savings in consumptive use **allow the SDL to be reduced**, with the water savings then transferred for use by environmental water holders. Projects can include upgrading irrigation systems, lining water delivery channels, installing water meters, changing urban water management practices to reduce water use, and improving water productivity in manufacturing and irrigated agriculture. Projects must have a positive or neutral socio-economic impact on Basin communities and industries.

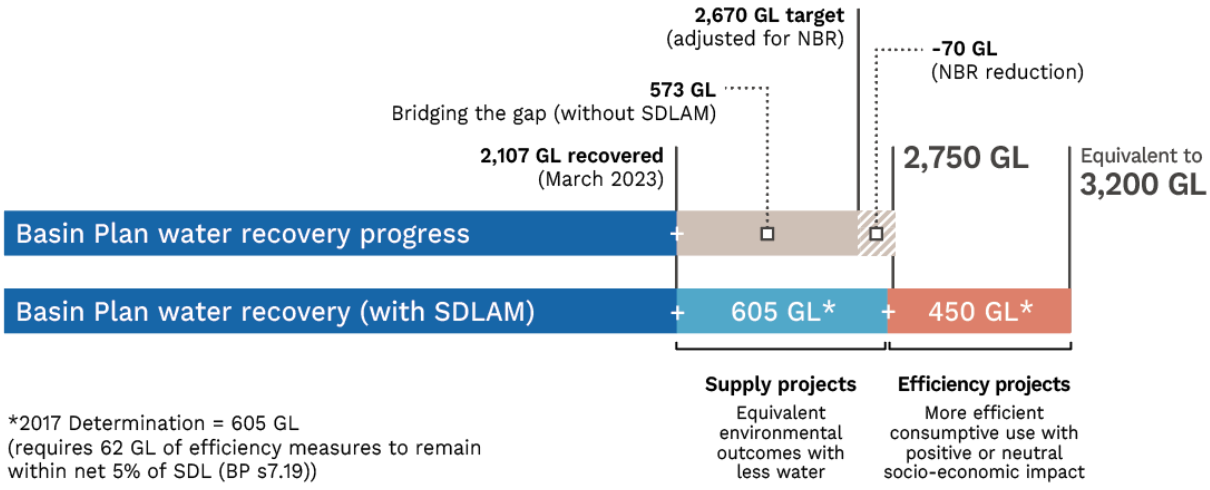

Figure 2. Basin-wide water recovery targets

Basin states nominated a suite of 36 supply measures under SDLAM and in 2017, the Authority determined that the implementation of these measures would achieve equivalent or improved environmental outcomes to those being sought by the Basin Plan with 605 GL/y less water recovery. This would allow 605 GL/y of water to remain in the consumptive pool. The Authority proposed amendments to the Basin Plan SDLs to reflect this, which were supported in both houses of parliament in January 2018.

Under the Basin Plan, the Authority is required to assess whether the notified measures, as implemented at 30 June 2024 (under current Basin Plan settings), support the SDL adjustment

initially determined in 2017. If the Authority considers that the measures would produce a result different from the 2017 determination, the Basin Plan requires that the Authority must conduct a reconciliation.

The 2017 determination envisaged concurrent implementation of 450 GL/y worth of efficiency measures, to provide the enhanced environmental benefits detailed in Schedule 5 of the Basin Plan, when implemented in conjunction with constraints measures.[2]

2.3 Progress against water recovery

The combination of the outcomes of the Northern Basin Review and the operation of the SDLAM has resulted in a reduction of the Basin-wide water recovery target of 2,750 GL/y, down to 2,075 GL/y (assuming at least 62 GL/y of efficiency measures is recovered).

As of 31 May 2023, 2,107.4 GL/y of surface water has been recovered towards the 2,075 GL/y Basin-wide surface water recovery target (Figure 3). This recovery amount is higher than the overall target as some SDL resource units have recovered water above their water recovery targets, while other units are yet to achieve their water recovery target in full. Despite total recovery exceeding the Basin-wide target, a further 46 GL/y of water recovery remains to meet the local and shared water recovery targets.

Efficiency measures do not contribute to the 2,075 GL/y Basin-wide target. Instead, efficiency measures contribute an additional 450 GL/y of water, and when combined with constraints relaxation can achieve the enhanced environmental outcomes identified in Schedule 5 of the Basin Plan.

As of 31 May 2023, 26 GL/y of water recovery has been contracted towards efficiency measures; this figure includes 12.2 GL/y of registered water recovery. [3] Remaining recovery through efficiency measures is 424 GL/y, assuming the delivery of existing contracts and transfer of the GL/y volume in whole to an environmental water holder for use.

Further information on water recovery progress in different SDL resource units is available here: Progress on water recovery | Murray–Darling Basin Authority (mdba.gov.au).

[2] Constraints measures refers to measures that remove or ease a physical or other constraint on the capacity to deliver environmental water to the environmental assets of the Murray–Darling Basin. Accordingly, some but not all constraints measures have been notified as supply measures. More information on constraints is available at Managing constraints | Murray–Darling Basin Authority (mdba.gov.au)

[3] Progress on Murray-Darling Basin water recovery - DCCEEW

Breakdown of water recovery sources

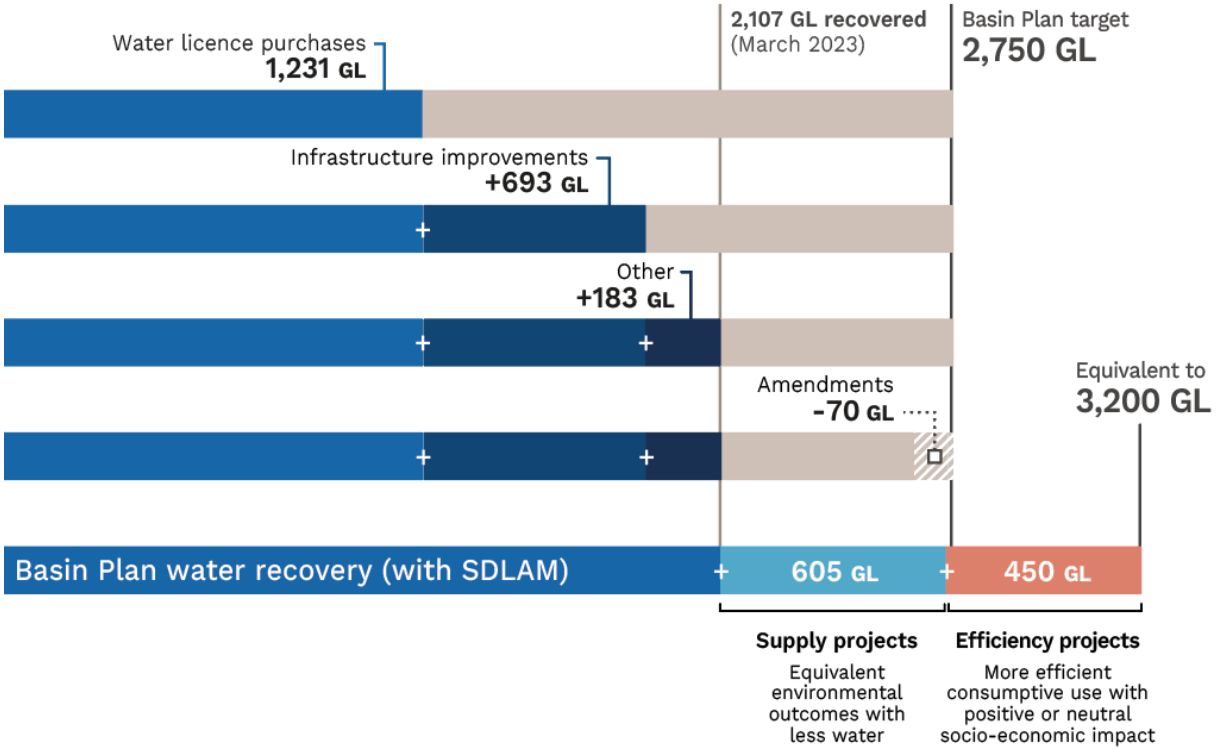

Figure 3. Breakdown of the Basin-wide surface water recovery progress as at 31 May 2023[4]

[4] Progress on water recovery | Murray–Darling Basin Authority (mdba.gov.au)

3 SDLAM Assurance Approach

In 2021 and 2022, the Authority's annual assurance activities focused on measures identified as complete or in operation by Basin states through their quarterly SDLAM project progress status reporting.

In 2023, assurance activities have focused on all measures not yet assured through the 2021 and 2022 assurance processes. Twenty-three SDLAM measures were assured in 2023 (Table 1).

This year's assurance work program included projects that were still in-progress at the time of assessment and involved forecasting project completion for current Basin Plan requirements. A proportionate and evidence-based assurance approach was used to forecast the likelihood of operability for these projects.

Assurance was conducted using existing project reports and briefing papers as well as documentation submitted by Basin governments. Where necessary, discussions with project implementation or coordination teams were conducted. Basin states were provided with the opportunity to review and respond to draft assurance assessments for their respective measures.

As in previous years, assurance assessed the measures' capability to deliver the expected environmental outcomes, and therefore support the expected associated SDL adjustment offset.

The assurance of whether a measure was capable of operating as expected did not include engineering assessments and related reviews as these are considered part of the project-management reporting and commissioning process undertaken by project managers.

Where measures were operational, the assurance did not assess measures against the operational decisions made by site managers and environmental water holders.

Assurance was not conducted on efficiency measures. The progress towards the 450 GL/y water recovery target through these measures is reported by the Department of Climate Change, Energy, the Environment and Water.

Table 1 Measures assured in 2023

Measure title	Responsible jurisdiction/s
Supply Measures: Environmental works	
South East Flows restoration project	South Australia
Eastern Mount Lofty Ranges Flows for the Future	South Australia
Lindsay Island (Stage 2) floodplain management project	Victoria
Wallpolla Island floodplain management project	Victoria
Hattah Lakes North floodplain management project	Victoria
Belsar-Yungera floodplain management project	Victoria
Burra Creek floodplain management proposal	Victoria
Vinifera floodplain management project	Victoria
Nyah floodplain management project	Victoria
Guttrum and Benwell State Forests environmental works project	Victoria
Gunbower National Park environmental works project	Victoria
Murray and Murrumbidgee Valley National Parks SDL adjustment supply measure	New South Wales
Modernising supply systems for effluent creeks - Murrumbidgee River	New South Wales
Improved flow management works at the Murrumbidgee River - Yanco Creek offtake	New South Wales
Supply Measures: Operational rules changes and system enhancements	
SDL offsets in the Lower Murray (Locks 8 & 9)	New South Wales
Enhanced Environmental Water Delivery (EEWD)	New South Wales, Victoria, South Australia
Computer Aided River Management (CARM) system for the Murrumbidgee River	New South Wales
Constraints Measures	
River Murray in South Australia constraints measure	South Australia
New Goulburn constraints measure	Victoria

Measure title	Responsible jurisdiction/s
Yarrawonga to Wakool Junction reach constraints measure	Victoria and New South Wales
Hume to Yarrawonga constraints measure	Victoria and New South Wales
Murrumbidgee constraints measure	New South Wales
Structural and operational changes at Menindee Lakes (including the Lower Darling key focus area)	New South Wales

4 Assurance of selected SDLAM measures

4.1 South East Flows restoration project

4.1.1 Project context

The South East Flows restoration project (SEFRP) aimed to enhance flows to wetlands in the Upper South East of South Australia, and provide flows to the Coorong South Lagoon.

By restoring inflows from the South East, the SEFRP sought to assist salinity management in the Coorong South Lagoon within the target range and prevent ecological degradation during periods of low flows from the River Murray.

The SEFRP augmentation sought to increase the volume, security and provide flexibility in water delivery to the Coorong South Lagoon, with additional water from further south.

4.1.2 Expected works as notified

The project comprised 2 stages. Stage 1 of the SEFRP included use of newly constructed drains and widened existing drains within the Upper South East drainage system. The works and measures included

- Ancillary structures to deliver flow from the proposed channel to local enroute wetlands (Taratap wetlands and Tilley Swamp Conservation Park)
- The weir on the Blackford Drain to divert flow into the proposed drain
- Releases made from Morella Basin to the Coorong South Lagoon at the end of the system.

Stage 2 (SEFRP augmentation) proposed to extend these works to include

- Avenue Flat/Drain K and Wilmot Drain regulators
- Lake Hawdon regulator to maintain lake levels and achieve environmental outcomes.

4.1.3 Envisaged outcomes of the notified measure

The project sought to provide additional fresh water to the Coorong and assist in the management of salinity levels in the Coorong, especially the South Lagoon. Reducing the salinity levels in the Coorong can improve the resilience of the Coorong before, during and after drought periods in the Murray–Darling Basin.

The SEFRP also sought to provide the opportunity to enhance flows to wetlands in the Upper South East, and provide significant environmental outcomes to enroute wetlands through the meeting of their water requirements.

4.1.4 Significance of contribution to volumetric adjustment

The SEFRP was expected to make a low-level, local-scale contribution to the SDL adjustment.

4.1.5 Assurance assessment

The South East Flows restoration project (SEFRP) envisaged implementation over 2 stages. SEFRP Stage 1 physical structures have been constructed and the works are capable of operating as envisaged.

The assurance confirmed that the operating plan for Stage 1 is being updated to reflect an improved understanding of ecohydrology responses and management tools for the South Coorong Lagoon.

Assurance confirmed that the Stage 2 (SEFRP augmentation) was not progressed following further investigation.

The assurance confirmed that while the Stage 2 works were not progressed, it is likely that the proposed changes to the operating plan will enable the measure to deliver similar outcomes to what was anticipated from the entire project.

4.2 Eastern Mount Lofty Ranges Flows for the Future

4.2.1 Project context

The Eastern Mount Lofty Ranges Flows for the Future (Flows for the Future) project was an environmental works measure that involved activities to reduce the interception of low flows in the Eastern Mount Lofty Ranges (EMLR) Water Resource Plan area, which extends from the Marne River catchment in the north to the Currency Creek catchment in the south. These reductions sought to provide additional flows in the region, as well as flows to the River Murray and to the Lower Lakes in South Australia.

4.2.2 Expected works as notified

The following activities were proposed to support the passage of low flows within the EMLR, including:

- Dam by-pass, siphoning or pumping solutions
- Filling in dams
- Watercourse diversion solutions
- Surrendering of water entitlements, linked with removing or altering dam or diversion infrastructure
- Surrendering of water entitlements in one place, and removing infrastructure in another
- Exchanging dams for aquifer storage and recovery, and removing dams.

One thousand, one hundred and fifty activities were initially identified.

4.2.3 Envisaged outcomes of the notified measure

The project aimed to restore natural low flow patterns within the EMLR through works that would improve the passage of low flows and freshes, to improve ecological habitat conditions.

4.2.4 Significance of contribution to volumetric adjustment

The Flows for the Future measure was expected to make a low-level, local-scale contribution to the SDL adjustment.

4.2.5 Assurance assessment

At the time of assurance, a number of low flow structures had been installed and commenced operation, contributing to an estimated long-term average annual flow of 251 ML (as at June 2021) returned to Lake Alexandrina.

The assurance found that it is likely that additional structures will enter operation between the time of assessment and 30 June 2024. The recent adoption of new low-flow devices will likely provide opportunities for site issues to be mitigated and additional structures to be implemented by 30 June 2024.

The Authority is of the view that it is likely the measure will be capable of supporting the envisaged environmental outcomes.

4.3 SDL Offsets in the Lower Murray (Locks 8 & 9)

4.3.1 Project context

The SDL Offsets in the Lower Murray measure was situated in the lowland reaches of the River Murray and Darling River in south-west New South Wales. The measure sought to provide ecological benefits to environmental assets in the locality of the River Murray and nearby Lake Victoria, including Locks 8 and 9, Frenchmans Creek, Mulcra and Wallpolla Islands and the Carrs, Capitts and Bunberoo (CCB) Creeks system.

4.3.2 Expected works as notified

The measure contained 3 components

- Locks 8 and 9 weir pool manipulation via an operating rule change to increase the variability of weir pool height and promote environmental outcomes
- Environmental works to enable CCB Creeks system connectivity
- An inlet regulator between Frenchmans Creek and Lake Victoria to provide fish passage.

4.3.3 Envisaged outcomes of the notified measure

Through weir pool manipulation, the measure sought to provide environmental benefits compared to an artificially constant weir pool level; lowering the weir pool could return wetlands to more natural wetting and drying regimes, whereas raising it could allow water to reach areas that would otherwise be difficult to apply environmental water.

The project also sought to increase the diversity and quality of aquatic habitat, promote fish populations by providing regionally important spawning and nursery areas, and support bird breeding events through habitat and food provision.

4.3.4 Significance of contribution to volumetric adjustment

The SDL Offsets in the Lower Murray measure was expected to make a medium-level, reach-scale contribution to the SDL adjustment.

4.3.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation and was progressing through final design and approval processes, including securing the necessary enduring arrangements for weir pool manipulation.

The assurance confirmed that works associated with the Carrs, Capitts and Bunberoo Creeks are likely to be in operation by 30 June 2024. However, it is unlikely that the Lake Victoria Inlet Regulator will come into operation by this date.

The Authority considers that it is likely the measure will be partially operable by 30 June 2024.

4.4 Murray and Murrumbidgee Valley National Parks SDL adjustment supply measure

4.4.1 Project context

The project consisted of 2 elements, involving of a package of proposed works and other measures at point locations across 2 areas

- Yanga (Murrumbidgee Valley National Park) near Balranald on the Lower Murrumbidgee River
- Millewa forest (Murray Valley National Park) near Deniliquin on the River Murray.

Project assurance on the Millewa works component was not conducted as the works did not form part of the underlying assumptions of the 2017 determination.[5]

4.4.2 Expected works as notified

This measure included construction of a system of modified and new works in the Yanga National Park including the following activities

- Replacement of 3 regulators
- Installation of new regulator gates, causeways and fixed crest sills across a number of regulators and floodway sills
- Replacement of existing piping with a box culvert and regulator
- Reconfiguration of the Waugorah / North Stallion system to receive flows from Waugorah Creek
- Decommissioning of the artificial Crazy Creek Channel to reinstate the historic natural channel of Ducks Nest Creek.

[5] In 2017 the Basin Official Committee advised that the Millewa component of this measure not be modelled in the draft determination. MDBA assurance of the Millewa component has therefore not been undertaken but any progress will be monitored as part of preparations for a reconciliation.

4.4.3 Envisaged outcomes of the notified measure

The proposed works in the Yanga National Park sought to provide for more efficient and effective use of water currently diverted from the Murrumbidgee River and enable environmental water to move from Nimmie-Caira into Yanga. These works sought to achieve improved environmental outcomes through increasing the area, frequency and duration of inundation from environmental flows.

4.4.4 Significance of contribution to volumetric adjustment

The Murray and Murrumbidgee Valley National Parks SDL adjustment supply measure was expected to make a low-level, local-scale contribution to the SDL adjustment.

4.4.5 Assurance assessment

At the time of conducting assurance, this measure was not yet in operation but was progressing as part of the NSW SDLAM Acceleration Program.

The Authority is of the view that that while site works have commenced, the Yanga element of the measure will not enter operation by 30 June 2024.

4.5 Modernising supply systems for effluent creeks - Murrumbidgee River

4.5.1 Project context

The Yanco Creek system is situated within the lowland reaches of the Murrumbidgee River on the Riverina Plain, between Narrandera in the north-east and the confluence of the Billabong Creek with the Edward River at Moulamein in the south-west.

The system is currently managed to deliver water to users along multiple creeks, with present arrangements requiring high flows along 800 km of creeks. This results in increased operational surplus and transmission losses. The continuous high 'unseasonal' summer flows also result in poor ecological outcomes.

4.5.2 Expected rule change as notified

The project aimed to improve operational efficiency and generate water savings within the Yanco Creek system via the following measures

- Provision of additional monitoring capability to provide enhanced information in real-time to system operators and water users on system flows and levels
- Provision of alternative supply points into the Creek system from the neighbouring irrigation corporations, at locations closer to end users, to better align demand and supply
- Codification and documentation of revised operational protocols to optimise use of the new controls and improve diversion efficiency.

Water savings from the measure were proposed to be converted into a callable general security water entitlement. A rules-based account was also proposed to be created to mitigate third party impacts in the New South Wales Murray arising from captured operational surplus flows.

4.5.3 Envisaged outcomes of the measure

The measure sought to allow for an enhanced environmental watering regime through reducing the current dominance of unnaturally high flows due to diversions throughout the irrigation season. This would allow for greater variability in flows to achieve environmental outcomes. The measure would also promote improvements in fish habitat and fish movement through the introduction of flows, as well as fishways and block bank modifications.

4.5.4 Significance of contribution to volumetric adjustment

The Modernising supply systems for effluent creeks – Murrumbidgee River measure was expected to make a low-level, local-scale contribution to the SDL adjustment.

4.5.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation and was progressing as part of the NSW SDLAM Acceleration program.

The Authority's view is that the key components of the measure, including the construction of new and upgraded weirs, will not be operational by 30 June 2024. The assurance confirmed that certain elements of the developed measure are likely to be operable by 2024, including the additional monitoring capability and the provision of alternative supply points into the Creek system.

The creation of the environmental water entitlement will be critical to ensuring that these efficiencies support the envisaged environmental outcomes.

4.6 Improved flow management works at the Murrumbidgee River - Yanco Creek offtake

4.6.1 Project context

The Yanco Creek offtake from the Murrumbidgee River is situated approximately 20 km west of the town of Narrandera, New South Wales. Proposed works for the measure were to be implemented at 2 sites; Yanco Creek and Murrumbidgee River, downstream of the Yanco Creek offtake and nearby the site of the Yanco Weir.

4.6.2 Expected works as notified

The proposed works included a new Yanco Creek regulator and fishway, an increased weir pool level at Yanco weir and a new Murrumbidgee Regulator at Yanco weir, as well as an associated fishway.

The measure sought to increase the proportion of higher flows that reach the mid-Murrumbidgee and lower Murrumbidgee wetlands downstream of the Yanco Weir.

The proposed structures would allow for targeted diversion of water into the Yanco system to reinstate a more appropriate regime of freshes, bank-full and overbank flows.

4.6.3 Envisaged outcomes of the measure

Anticipated environmental benefits associated with the measure stemmed from the ability to more frequently target watering events for Mid-Murrumbidgee Wetlands, Lower Murrumbidgee Floodplain Wetlands, and the Murrumbidgee River indicators.

The measure sought to enable increased inundation extents in the mid-Murrumbidgee wetlands during environmental watering. Additionally, the proposed infrastructure sought to improve fish passage by addressing the non-functionality of existing structures.

4.6.4 Significance of contribution to volumetric adjustment

The improved flow management works at the Murrumbidgee River – Yanco Creek offtake measure was expected to make a low-level, local-scale contribution to the SDL adjustment.

4.6.5 Assurance assessment

At the time of conducting assurance, the measure was in the process of being rescoped and a final design for the measure was not yet available.

The Authority is of the view that is it unlikely that the measure will enter operation by 30 June 2024.

As a result of community input and associated design work, the Yanco weir pool level options being considered are lower than originally envisaged in 2017. The impact of this change on envisaged environmental outcomes cannot be assured until the design and operating strategy are finalised.

4.7 Computer Aided River Management (CARM) system for the Murrumbidgee River

4.7.1 Project context

The Murrumbidgee River is a complex regulated river which provides bulk water supplies from 2 main storages, Blowering and Burrinjuck Dams, to meet the water needs of major irrigation areas (Coleambally and Murrumbidgee), other private diverters, important Ramsar wetlands and key towns in the Riverina region.

The Computer Aided River Management (CARM) system is a tool for river operators to enhance decision-making; it is a fully integrated hydrodynamic model which incorporates hydraulic, hydrologic and forecasting models to manage catchment inflows, releases, deliveries and use of water resources more efficiently and transparently.

4.7.2 Expected rule change as notified

The provision of more reliable forecasts of tributary inflows and real-time daily river flows through CARM sought to provide river operators with the ability to make dam release decisions with more

confidence. This would in turn generate a stored operational surplus that could contribute to a supply adjustment under SDLAM.

4.7.3 Envisaged outcomes of the measure

Due to the expected efficiency gains in the operation of the Murrumbidgee system and storages, the measure proposed the creation of an environmental water entitlement and rules-based account to allow for water savings to be used for environmental watering.

4.7.4 Significance of contribution to volumetric adjustment

The CARM measure was expected to make a medium-level, reach-scale contribution to the SDL adjustment.

4.7.5 Assurance assessment

The CARM decision support system was implemented in 2019 and is in place, as notified.

The assurance found that while the CARM decision support system was operational and providing for more efficient management of the Murrumbidgee system, the envisaged benefit of the CARM measure to the environment via an environmental water entitlement and rules-based account has not yet been realised, as the accounts are yet to be created.

The Authority considers that this measure is not yet capable of achieving expected environmental outcomes. The Authority considers it likely the required entitlements will be created by 30 June 2024.

4.8 Enhanced Environmental Water Delivery

As the MDBA is contracted as the delivery agent for the Enhanced Environmental Water Delivery (EEWD) measure on behalf of Basin governments, a panel of experts with relevant skills and experience was engaged to conduct assurance for this measure.

4.8.1 Project context

The EEWD proposal was a representation of a future hydrological regime to reflect changes to the planning, delivery, site management and evaluation of environmental water management for the southern connected Basin. The measure was to be implemented in the River Murray, Murrumbidgee, Lower Darling and Goulburn catchments.

4.8.2 Expected works as notified

The measure proposed policy and operational improvements in environmental water delivery in 3 key areas

- Aligning the release of held environmental water with unregulated flows
- Making efficient use of channel capacity through the implementation of the Constraints Management Strategy to allow increased managed flows up to higher regulated limits
- Coordinating environmental water releases across tributaries of the southern Basin.

The measure was to be implemented through co-ordinated collaborative actions across all relevant jurisdictions in South Australia, New South Wales, and Victoria, and at the Commonwealth level.

4.8.3 Envisaged outcomes of the measure

The measure sought to

- Create stronger biological stimuli or 'natural cues' in synch with natural climate signals through aligning environmental water releases with unregulated flows
- Improve in-channel, floodplain, wetland and end-of-system outcomes through allowing for increased management of flows up to higher regulated limits
- Maximise downstream and system-wide connectivity outcomes through coordinated environmental water releases.

Cumulatively, these actions aimed to increase the peak and duration of flow events and reinstate more natural regimes for freshes as well as inner-floodplain connectivity and end-of-system flows.

4.8.4 Significance of contribution to volumetric adjustment

The EEWD measure was expected to make a high-level, system-scale contribution to the SDL adjustment.

4.8.5 Assurance Assessment

As noted above, the following assessment was undertaken by an external assurance panel. A copy of the assurance finding is in Appendix A.

The Independent Assurance Panel (IAP) has completed an assessment of the Enhanced Environmental Water Delivery (EEWD) SDL Adjustment Mechanism measure. The aim of this work was to assess the extent to which the EEWD project would be operable by June 2024, able to deliver environmental benefits and to contribute to the SDL adjustment volume.

At the time of conducting assurance, the notified measure was not in operation. The IAP considers that the changes proposed to the planning, management and delivery of environmental water are not yet fully supported by the necessary new tools and enduring arrangements which would reliably support the envisaged environmental outcomes to be achieved and therefore an SDL offset as per the notified measure.

The EEWD measure relies on completion of a range of interlinked activities, and work is actively underway on developing the tools and systems needed to implement this measure. The rule changes, new planning systems and decision support tools necessary to implement the EEWD project will be designed and prototyped, but enduring changes to deliver the notified outcomes will not be fully implemented by June 2024.

Some of the activities required for the EEWD project are expected to be operable to a limited degree by June 2024. Development and application of an improved operational planning model for the River Murray is likely to be completed and operational, and will support some enhanced environmental water delivery outcomes. The improved planning and coordination concepts being

developed and designed are already being migrated into environmental water management within the limits of current systems and within regulated flow limits, offering some improved outcomes.

The IAP's assessment has not identified any technical issues that would prevent the full implementation of the EEWD project and achievement of the notified outcomes in due course; however, implementation will not be completed by June 2024. Achievement of all the notified outcomes is also reliant on implementation of the Constraints Measures projects.

Victorian Murray Floodplain Restoration Projects

4.9 Lindsay Island (Stage 2) floodplain management project

4.9.1 Project context

Lindsay Island is situated on the River Murray floodplain in north-western Victoria, near the South Australian border and downstream from the junction of the Murray and Darling Rivers. The island constitutes one of 3 anabranch systems that form the Lindsay–Wallpolla islands that are part of the Chowilla Floodplain and Lindsay–Wallpolla icon site.

4.9.2 Expected works as notified

The Lindsay Island (Stage 2) floodplain management project was an environmental works measure. There were 2 components to the measure's proposed works:

- Primary works, including construction of the Berribee Regulator and fishway, 5 containment regulators and 2.6 km of levees along track alignments
- Secondary works, including construction of 13 regulators and associated works, as well as 4.9 km of levees along track alignments.

The proposed works were expected to be operated in tandem with The Living Murray (TLM) works at this site (Lindsay Stage 1) and Lock 7, which combined would be capable of mimicking flows of 40,000 ML/day to 120,000 ML/day.

4.9.3 Envisaged outcomes of the measure

The measure sought to inundate 5,152 ha of the floodplain and connect parts of the floodplain through tiered watering events, including areas of unique fast-flowing aquatic habitat, sections of Black Box and lignum, and higher alluvial terraces.

In particular, the measure sought to provide for the continuity of stream-flow and improve the condition of Mullaroo Creek, the mid to lower Lindsay River and the wider lower Murray floodplain (i.e. Chowilla, Wallpolla Island, Mulcra Island and the Carrs, Capitts and Bunberoo Creek system).

4.9.4 Significance of contribution to volumetric adjustment

The Lindsay Island (Stage 2) floodplain management project environmental works project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.9.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation.

On 20 April 2023, the Victorian Water Minister announced that the project had been paused. The Authority is of the view that the measure will not enter operation by 30 June 2024.

The assurance found that the proposed infrastructure for the 'secondary component' of the measure differs from the notified works. The assurance also found that the developed measure may exceed the inundation area originally envisaged.

4.10 Wallpolla Island floodplain management project

4.10.1 Project context

The Wallpolla Island floodplain management project was located in Victoria on the River Murray floodplain, downstream of the junction of the Murray and Darling Rivers and approximately 40 km west of Mildura. Along with Lindsay and Mulcra Islands, Wallpolla Island forms part of the anabranch system within the broader Lindsay–Wallpolla TLM icon site.

4.10.2 Expected works as notified

The proposed works included 4 major regulators, 22 smaller containment regulators and 4.5 km of levees (raised tracks).

The proposed works sought to complement existing TLM works at the icon site. They were also designed to complement weir pool manipulation activities at Locks 8 and 9 to enable watering at a landscape scale, mimicking flows ranging from 30,000 to 120,000 ML/day.

4.10.3 Envisaged outcomes of the measure

This project sought to increase the frequency and duration of floodplain inundation across 2,650 ha, providing significant benefit to nationally important species, threatened vegetation communities, ecological values, carbon cycling and downstream water quality. Specifically, the proposed works sought to provide

- A mosaic of hydrological regimes and habitat types across Wallpolla Island
- Enhanced connectivity between floodplain elements, the floodplain and the river
- Continuity of stream-flow and condition through Wallpolla Creek and associated watercourses and to the wider lower Murray floodplain including Chowilla Floodplain (South

Australia), Lindsay Island (Victoria), Mulcra Island (Victoria) and the Carrs, Capitts and Bunberoo Creek system (New South Wales).

4.10.4 Significance of contribution to volumetric adjustment

The Wallpolla Island floodplain management project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.10.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation.

On 20 April 2023, the Victorian Water Minister announced that the project has been paused. The Authority is of the view that the measure will not enter operation by 30 June 2024.

The assurance confirmed that the physical structures for the developed measure align those originally envisaged.

4.11 Hattah Lakes North floodplain management project

4.11.1 Project context

The Hattah Lakes are located in north-western Victoria on the western bank of the River Murray between Robinvale and Mildura. The project area is situated within the Murray-Kulkyne Park and the Hattah-Kulkyne National Park.

4.11.2 Expected works as notified

The measure sought to complement TLM works at the Hattah Lakes icon site by enhancing flooding across higher floodplain terraces and increasing the flexibility for environmental water management across the Lakes. Proposed works included the construction of 2 new regulators, a causeway across an existing track and 1.7 km of levees along track alignments.

4.11.3 Envisaged outcomes of the measure

The Hattah Lakes North measure sought to target Chalka Creek North and Bitterang North habitats.

The measure aimed to restore flooding and productivity to extensive areas of Red Gum and Black Box woodland and improve the quality and extent of habitat for a wide range of native species, including threatened species.

The overarching objective of water management at Chalka Creek North was to protect and restore the productivity and integrity of floodplain vegetation and its capacity to support floodplain fauna.

The objective for Bitterang North was to provide important flood-dependent habitat components for terrestrial vertebrate fauna when the Lakes are dry and to retain the capacity to provide a productive and diverse wetland habitat when the Lakes are inundated.

4.11.4 Significance of contribution to volumetric adjustment

The Hattah Lakes North floodplain management project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.11.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation but was in the final stages of environmental approval.

The Authority is of the view that it is unlikely that the measure will enter operation by 30 June 2024 due to a delay in the environmental approval process and commencement of construction.

The assurance confirmed that the developed measure would likely achieve a reduced maximum floodplain inundation area to what was originally envisaged.

4.12 Belsar-Yungera floodplain management project

4.12.1 Project context

The Belsar-Yungera floodplain is located on the River Murray floodplain, approximately 30 km upstream of the Euston weir, near Robinvale in North West Victoria. The floodplain complex includes Belsar and Yungera Islands which are formed by anabranches of the River Murray, including Narcooyia, Bonyaricall and Yungera Creeks.

4.12.2 Expected works as notified

The measure sought to connect extensive areas of floodplain through tiered watering events through the construction of 3 large regulators, a series of smaller supporting regulators, track raising (levees) and a pipeline (to allow use of temporary pumps).

4.12.3 Envisaged outcomes of the measure

The measure was expected to maintain and improve flora and fauna habitat values and provide periodic breeding opportunities for wetland species, such as fish, frogs and waterbirds.

The proposed works sought to enable managed flows to be delivered to 2,370 ha of highly valued floodplain, representing one third of the total area. The works were expected to be operated flexibly to meet the water requirements of different vegetation communities and be capable of mimicking a broad range of River Murray flows up to 170,000 ML/day.

4.12.4 Significance of contribution to volumetric adjustment

The Belsar-Yungera floodplain management project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.12.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation but was in the final stages of environmental approval.

The Authority is of the view that it is unlikely that the measure will enter operation by 30 June 2024 due to a delay in construction commencement.

The assurance confirmed that the developed measure would likely have a similar maximum inundation area to the notified measure.

4.13 Burra Creek floodplain management proposal

4.13.1 Project Context

The Burra Creek floodplain is located on the western bank of the River Murray upstream of its junctions with the Murrumbidgee and Wakool Rivers. Burra Creek is a 54 km anabranch of the River Murray that diverges from the river near Piangil and re-joins in the north.

4.13.2 Expected works as notified

The project was expected to remove existing blockages to environmental flows in Burra Creek and use 3 structures to retain and regulate water over the floodplain.

The removal of 2 barriers in Burra Creek sought to allow the Burra North section of the channel to be able to completely fill with water when River Murray flows exceed 20,000 ML/day.

To prolong floodplain inundation, a regulator was proposed to be constructed on the Creek near the junction with the River Murray to control outflow.

Existing tracks were to be raised to enable retention of water on the floodplain.

4.13.3 Envisaged outcomes of the measure

The Burra Creek floodplain management project works aimed to water 407 ha of the Burra North floodplain and enable a more natural inundation regime. In the absence of sufficient flows in the River Murray to provide inflows to the site, the proposed works also included watering of the floodplain through use of temporary pumps.

The proposed works were to be operated to meet environmental watering targets in response to prevailing flow in the River Murray and ecological cues. A key environmental outcome sought from the project was maintaining productivity and the structure of Black Box communities. Targeted operation of the works in conjunction with environmental flows would enable an average frequency of inundation equivalent to 30,000 ML/day flow events.

4.13.4 Significance of contribution to volumetric adjustment

The Burra Creek floodplain management project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.13.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation and was progressing through the environmental approval process.

The Authority is of the view that it is unlikely that the measure will enter operation by 30 June 2024 due to a delay in commencement of construction.

The assurance confirmed that the developed measure would likely achieve or have a similar maximum floodplain inundation area as originally envisaged.

4.14 Vinifera floodplain management project

4.14.1 Project context

The Vinifera floodplain is located in the Nyah Vinifera Park on the western bank of the River Murray, 30 km north of Swan Hill.

4.14.2 Expected works as notified

The Vinifera floodplain management project aimed to water up to 350 ha of floodplain within Vinifera Forest. This represents 55% of the total forest area and targets almost all the flood dependent communities.

The works involved construction of 4 regulators and raising 1,087 metres of low-level track to enable control of both flood and pumped flows into and out of Vinifera Creek.

Water would be delivered to the site through a combination of natural inflows or temporary pumping when river flows are insufficient.

4.14.3 Envisaged outcomes of the measure

The proposed measure sought to restore flooding frequency and duration to improve productivity to areas of creeks, wetlands, swamp and Red Gum forest.

4.14.4 Significance of contribution to volumetric adjustment

The combined VMFRP package of measures (of which the Vinifera floodplain management project comprises part) was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.14.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation and was progressing through the environmental approval process.

The Authority is of the view that it is unlikely that the measure will enter operation by 30 June 2024 due to a delay in commencement of construction.

The assurance confirmed that the developed measure would likely achieve or have a similar maximum floodplain inundation area as originally envisaged.

4.15 Nyah floodplain management project

4.15.1 Project context

The Nyah floodplain management project was located in the Nyah Vinifera Regional Park on the western bank of the River Murray, 30 km north of Swan Hill in northwest Victoria. This floodplain includes 913 ha of wetland, forest and woodland areas and encompasses an elongated basin that is drained by Parnee Malloo Creek, a seasonal anabranch of the River Murray.

4.15.2 Expected works as notified

The project sought to provide infrastructure to better control the frequency and duration of inundation to reinstate a watering regime aligned to the ecological requirements of the significant vegetation and fauna at Nyah Park. The proposed works included construction of regulators at both ends of Parnee Malloo Creek and track raising to enable control of both flood and pumped flows into and out of the Creek.

4.15.3 Envisaged outcomes of the measure

The proposed works sought to inundate almost 500 ha of flood dependant habitat using much lower River Murray flows. The proposed works aimed to replicate the flood extent of River Murray flows of up to 25,000 ML/day.

The proposed works would allow for operational flexibility to meet the different water regimes of the various vegetation communities found within the Nyah Park. Under a restored water regime, the wetland and flooded forest areas would provide a refuge and breeding habitat for aquatic fauna and waterbirds.

4.15.4 Significance of contribution to volumetric adjustment

The combined VMFRP package of measures (of which the Nyah floodplain management project comprises part) was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.15.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation and was progressing through the environmental approval process.

The Authority is of the view that it is unlikely that the measure will enter operation by 30 June 2024 due to a delay in commencement of construction.

The assurance confirmed that the developed measure would likely achieve or have a similar maximum floodplain inundation area as originally envisaged.

4.16 Guttrum and Benwell State Forests environmental works project

4.16.1 Project context

Guttrum and Benwell Forests, situated on the River Murray floodplain downstream of Koondrook in northern Victoria, are River Red Gum floodplain forests of significant ecological importance in the Murray–Darling Basin. With a combined area of 1,930 ha the forests supports rare and threatened species and stands of large old trees.

4.16.2 Expected works as notified

The proposed works included the construction of 2 separate irrigation channels to deliver environmental water into Guttrum Forest, and one channel in Benwell Forest. The proposal included construction of regulators, levees and raised access tracks in both forests to contain water on the floodplain.

4.16.3 Envisaged outcomes of the measure

Works under this project were designed to meet the environmental watering requirements of Guttrum and Benwell Forests by mimicking a 26,000 ML/day flood event in the River Murray for Guttrum Forest, and a 24,000 ML/day flood event for Benwell Forest.

Delivery of environmental water via the irrigation channel system would enable watering of the priority habitat types including 99% of the semi-permanent wetlands and 82% of the River Red Gum flood dependent understorey, a total area of 1,200 ha across both forests.

4.16.4 Significance of contribution to volumetric adjustment

The Guttrum and Benwell Forests environmental works project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.16.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation.

On 20 April 2023, the Victorian Water Minister announced that the project has been paused. The Authority is of the view that the measure will not enter operation by 30 June 2024.

The assurance confirmed that the developed measure would likely achieve or have a similar maximum floodplain inundation area as originally envisaged.

4.17 Gunbower National Park environmental works project

4.17.1 Project context

The Gunbower National Park is located on the mid-Murray floodplain in northern Victoria. It sits within the broader Gunbower Forest, an internationally recognised wetland system in the Murray–Darling Basin. The Forest forms part of the Gunbower–Koondrook–Perricoota Forest icon site under the TLM Initiative, together with the Koondrook–Perricoota Forest in New South Wales.

4.17.2 Expected works as notified

The project sought to enable the delivery of environmental water to the wetlands and forest of the Gunbower National Park that cannot be currently watered by other infrastructure. The project was designed to mimic a natural flood event of up to 50,000 ML/day across 500 ha.

The main package of works included the construction of a diversion weir including a short pipeline, a regulator in Camerons Creek, an irrigation channel offtake regulator and a forest regulator at the Old Cohuna Main channel and forest intersection. Proposed ancillary works included remedial works on levees, construction of access tracks, a hardstand area for temporary pump and piping, and upgrades to 3 road crossing culverts.

4.17.3 Envisaged outcomes of the measure

The project sought to enable the reinstatement of a more natural water regime that protects and enhances the ecological values within the Gunbower National Park, and where possible, supports values in downstream areas of Gunbower Forest.

Specific desired outcomes included healthy River Red Gum flood dependent understorey and associated temporary wetlands, drought refuge habitat for fauna, and healthy wetland bird communities through improved access to food and habitat that promote breeding and recruitment.

4.17.4 Significance of contribution to volumetric adjustment

The Gunbower National Park environmental works project is part of the combined VMFRP package of measures, which was expected to make a high-level, local-scale contribution to the SDL adjustment.

4.17.5 Assurance assessment

At the time of conducting assurance, the measure was not yet in operation.

On 20 April 2023, the Victorian Water Minister announced that the project has been paused. The Authority is of the view that the measure will not enter operation by 30 June 2024 due to a delay in commencement of construction.

The assurance confirmed that the developed measure may exceed the inundation area originally envisaged. This is due to a change in the proposed method of water delivery, enabling inundation of additional areas including Middle Gunbower, Pig Swamp and Emu Hole Lagoon.

Constraints Measures

4.18 River Murray in South Australia constraints measure

4.18.1 Project context

The River Murray in South Australia constraints measure forms part of the Basin Plan's Constraints Management Strategy, along with other measures in New South Wales and Victoria. The removal or easing of constraints has been identified as key to achieving enhanced environmental outcomes and will provide opportunities for environmental watering of an additional 35,000 hectares (ha) of floodplain in South Australia, New South Wales and Victoria.

This measure aimed to support the removal or easing of constraints, along with associated mitigation measures, to achieve some of the enhanced environmental outcomes identified in the Constraints Management Strategy.

4.18.2 Expected rule change as notified

The notified measure sought to address the physical and policy constraints to the delivery of regulated flows up to 80,000 ML/day at the South Australian border. This would be achieved by a combination of capital works and other mitigation activities, including operational, policy, and various land management arrangements. Proposed activities included

- Negotiating agreements with landholders for easements or other measures to allow inundation of low lying land
- Relocating private pumping infrastructure to river banks above anticipated flow levels, or improving infrastructure to allow pumps to be easily moved
- Increasing the height of low lying infrastructure, including crossings and roads, above anticipated flow levels
- Implementing erosion control measures to maintain public and private land after inundation
- Implementing notification systems so the community can undertake management measures prior to and during higher flows.

The relaxation of upstream constraints was identified as integral to the delivery of higher flows to South Australia. Accordingly, the relaxation of constraints as a package of measures across New South Wales, Victoria and South Australia to ensure the connectivity of the Basin and overall restoration of the River Murray's health.

4.18.3 Envisaged outcomes of notified measure

This measure aimed to achieve the environmental objectives of filling wetlands, flushing organic matter to improve water quality, providing organic matter and other food sources between the floodplain and river channel, and improving lateral and longitudinal connectivity to facilitate movement of fish and other fauna.

4.18.4 Significance of contribution to volumetric adjustment

The combined constraints measures program (of which the River Murray in South Australia constraints measure comprises part) was expected to make a high-level, system-scale contribution to the SDL adjustment.

4.18.5 Assurance assessment

At the time of assurance, the measure was not yet in operation.

The assurance confirmed that the development and implementation of policies and procedures to enable an operating environment of 80,000 ML/day at the South Australian border (such as advanced warnings and notifications) are progressing.

The assurance also confirmed that the project was progressing through the Stage 2 Early Works Project to improve public and private assets to further support the proposed operating environment.

The assurance confirmed that project implementation is likely to be completed by 30 June 2024. The Authority is of the view that the measure is likely to enter operation by 30 June 2024.

While the following constraints measures were within the scope of assurance, detailed assessments were not undertaken due to lack of detail in the form of project designs and implementation plans.

4.19 New Goulburn constraints measure

4.19.1 Project context

The New Goulburn constraints measure encompassed the mid and lower sections of the Goulburn River. The mid Goulburn section extends from Lake Eildon to Goulburn Weir, and the lower section extends from Goulburn Weir to the River Murray near Echuca.

4.19.2 Expected rule change as notified

The current operational water delivery limit at Shepparton is 8,500 ML/day. The project aimed to enable the delivery of higher in-channel flows of up to 20,000 ML/day (17,000 ML/day target with a 3,000 ML/day unregulated flow risk management buffer).

4.19.3 Significance of contribution to volumetric adjustment

This measure was not notified as a supply measure and therefore does not contribute to the SDL adjustment.

4.19.4 Assurance Assessment

At the time of conducting assurance, the notified measure was not yet in operation and the scope and nature of the constraints management measures was under development. Victoria is continuing stakeholder engagement and business plan development.

The assurance confirmed a delay in progress and there remains several major outstanding steps before the measure can enter into operation. The Authority is of the view that the measure will not enter operation by 30 June 2024.

4.20 Yarrawonga to Wakool Junction reach constraints measure

4.20.1 Project context

The Yarrawonga to Wakool Junction reach encompasses the mid-Murray downstream of Yarrawonga Weir to the Wakool Junction including the Edward, Wakool and Niemur Rivers. There is currently a range of constraints which prevent the passage of higher environmental flows in this reach. The current threshold for winter and spring months is 10,600 ML/day.

4.20.2 Expected rule change as notified

This measure explored the potential for relaxing the current flow constraints to 30,000 ML/day at Yarrawonga, and up to 50,000 ML/day under certain circumstances. This would be achieved through trial flows as well as investigation and implementation of practical mitigation strategies to enable passage of managed flows without unacceptable third-party risks.

4.20.3 Significance of contribution to volumetric adjustment

The Yarrawonga to Wakool Junction reach constraints measure is part of the combined constraints measures program, which was expected to make a high-level, system-scale contribution to the SDL adjustment.

4.20.4 Assurance Assessment

At the time of conducting assurance, the notified measure was not yet in operation and the scope and nature of the constraints management measures was still under development.

New South Wales is continuing to progress program development through expanding stakeholder engagement and developing key policy frameworks to support program delivery.

The assurance confirmed a delay in progress and there remains several outstanding steps before the measure can enter into operation. The Authority is of the view that the measure will not enter operation by 30 June 2024.

4.21 Hume to Yarrawonga constraints measure

4.21.1 Project context

The Hume to Yarrawonga reach refers to the River Murray channel and associated anabranches between Hume Dam and Yarrawonga Weir. Regulated flows to meet downstream demands in the Hume to Yarrawonga reach are currently restricted to 25,000 ML/day at Doctor's Point, which is downstream of the Kiewa River confluence and upstream of Albury-Wodonga.

4.21.2 Expected rule change as notified

This measure explored the potential for relaxing the current flow constraints to 30,000 ML/day at Yarrawonga, and up to 50,000 ML/day under certain circumstances. This would be achieved through trial flows as well as investigation and implementation of practical mitigation strategies to enable passage of managed flows without unacceptable third-party risks.

4.21.3 Significance of contribution to volumetric adjustment

The Hume to Yarrawonga constraints measure is part of the combined constraints measures program, which was expected to make a high-level, system-scale contribution to the SDL adjustment.

4.21.4 Assurance Assessment

At the time of conducting assurance, the notified measure was not yet in operation and the scope and nature of the constraints management measures was still under development.

New South Wales is continuing to progress program development through expanding stakeholder engagement and developing key policy frameworks to support program delivery.

The assurance confirmed a delay in progress and there remains several outstanding steps before the measure can enter into operation. The Authority is of the view that the measure will not enter operation by 30 June 2024.

4.22 Murrumbidgee constraints measure

4.22.1 Project context

The proposed relaxation of flow constraints in the Murrumbidgee valley would allow for increased flows at environmentally beneficial times from the major headworks storages (Burrinjuck and Blowering Dams) to the confluence of the Murrumbidgee and Murray Rivers below Balranald.

4.22.2 Expected rule change as notified

This measure explored the potential for relaxing the current flow constraints to 40,000 ML/day at Wagga Wagga. This would be achieved through trial flows as well as investigation and implementation of practical mitigation strategies to enable passage of managed flows without unacceptable third-party risks.

4.22.3 Significance of contribution to volumetric adjustment

The Murrumbidgee constraints measure is part of the combined constraints measures program, which was expected to make a high-level, system-scale contribution to the SDL adjustment.

4.22.4 Assurance Assessment

At the time of conducting assurance, the notified measure was not yet in operation and the scope and nature of the constraints management measures was still under development.

New South Wales is continuing to progress program development through expanding stakeholder engagement and developing key policy frameworks to support program delivery.

The assurance confirmed a delay in project progress and there remains several outstanding steps before the measure can enter into operation. The Authority is of the view that the measure will not enter operation by 30 June 2024.

4.23 Structural and operational changes at Menindee Lakes (including Lower Darling key focus area)

4.23.1 Project context

The Lower Darling River System extends from the Menindee Lakes storages to the upstream limit of the Wentworth Weir pool near Burtundy.

The Menindee Lakes system are key storages in the Lower Darling system, supplying towns and water users along the Murray and Lower Darling rivers. The proposed works were primarily located around the Menindee Lakes, with some works distributed along the Lower Darling River.

4.23.2 Expected works as notified

The measure included a package of works, including infrastructure works, structural adjustment measures, changes to institutional arrangements and operating rules, and concurrent measures.

4.23.3 Significance of contribution to volumetric adjustment

The structural and operational changes at Menindee Lakes measure was expected to make a high-level, system-scale contribution to the SDL adjustment.

4.23.4 Assurance Assessment

At the time of conducting assurance, the notified measure was not yet in operation and rescoping activities had not yet been finalised.

The Authority is of the view that the measure as notified will not enter operation by 30 June 2024.

Assurance indicates that the rescoped measure will not deliver the benefits originally envisaged within the project notification.

5 Authority's view on reconciliation

5.1 Current assessment

Considering the 2023 assurance findings, the Authority is of the view that under current Basin Plan settings a reconciliation will be required in 2024.

The Authority considers that the SDLAM package of measures will not be operational as notified. This is due to several key measures being significantly rescoped or otherwise unable to be delivered and operational by 30 June 2024. The Authority is also of the view that a number of measures will operate differently to what was originally envisaged.

In conjunction with the findings of previous years' SDLAM assurance reports, of the original 37 SDLAM measures

- 14 measures are currently operational
- 6 are likely to be operable by 30 June 2024
- 16 will not be or are unlikely to be operable by 30 June 2024
- 1 was not progressed nor modelled.

This assessment is represented in Figure 4 which shows the likelihood of SDLAM measures being operable by 30 June 2024.

In 2022 the Authority estimated a revised supply contribution of between 290 to 415 GL[6], noting that

- the estimated volume is presented as a range, as there is still uncertainty regarding the degree to which measures will be implemented and the effects of incomplete measures upon complete measures
- the range provided is not binding for the purpose of a reconciliation
- the range is an estimate only, and could be an under or overestimate
- it is reflective of the Authority's assessment of project progress at a point in time
- the range is anticipated to fluctuate as projects continue to be implemented.

A 290 to 415 GL/y supply contribution would equate to a shortfall of 190 to 315 GL/y from the expected 605 GL/y contribution.

While the Authority affirms the 2022 estimate of the potential supply contribution remains relevant, the Authority is of the view that the potential shortfall will be at the higher end of this forecast. This is due to assurance findings in 2023 that additional measures will not be in operation by 30 June 2024.

[6] Sustainable Diversion Limit Adjustment Mechanism: 2022 Assurance Report (mdba.gov.au)

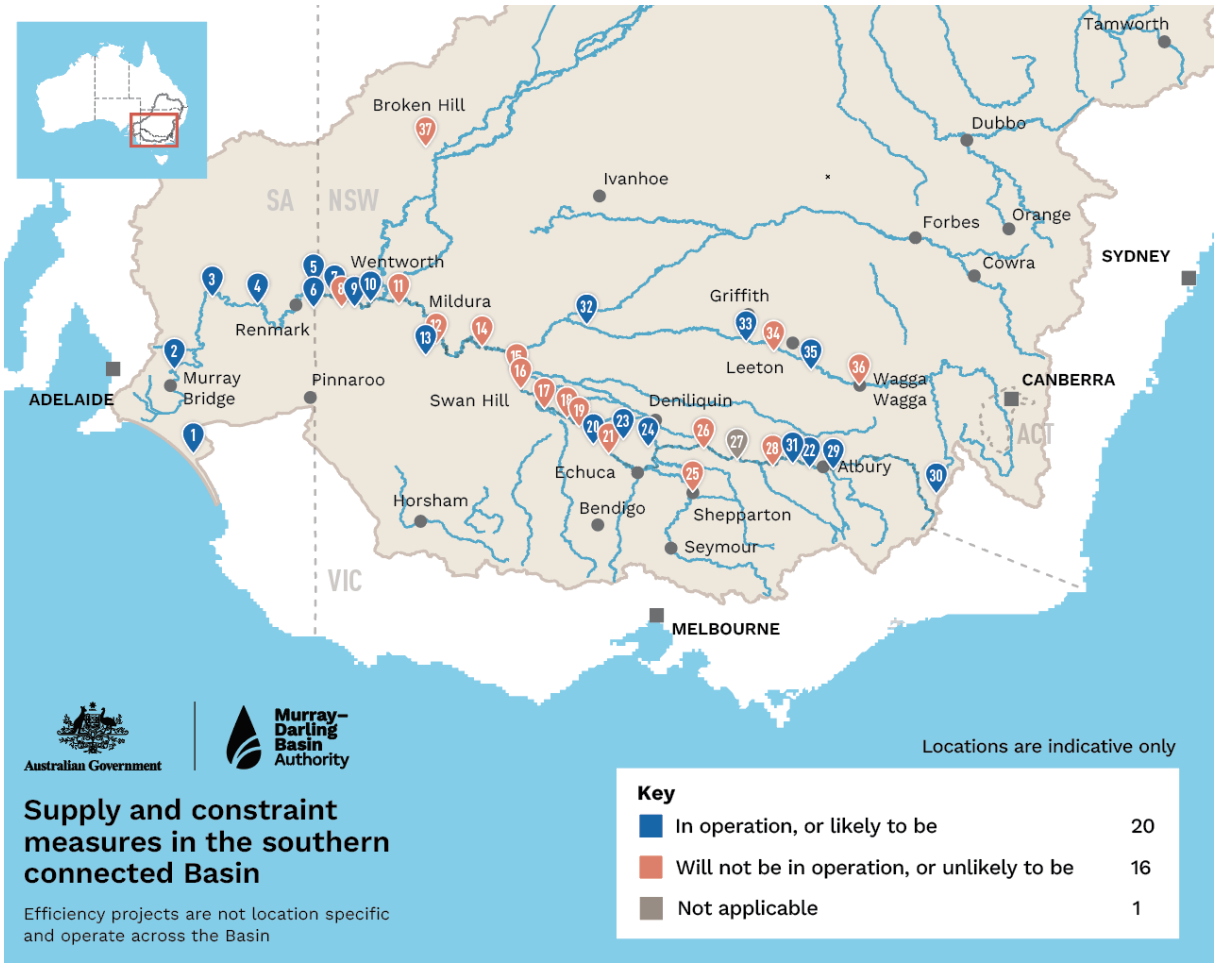

Figure 4. Likelihood of SDLAM measures being operable by 30 June 2024.

Note: While notified, the Improved Regulation of the River Murray measure (27) was not progressed and not modelled in the 2017 determination and does not contribute to an SDL offset.

5.2 Summary of assurance on SDLAM measures

Table 2 summarises the assurance findings of SDLAM measures in terms of operability and capability at 30 June 2024 and the anticipated materiality of project changes on modelled outcomes.[7] Projects that will not, or are unlikely to be in operation at 30 June 2024 are anticipated to be material to an SDL adjustment. This informs the Authority's view that the realised shortfall will likely be in the higher end of the Authority's estimated shortfall of 190 to 315 GL/y from the expected 605 GL/y contribution.

Table 2 Summary of assurance on SDLAM measures

	Measure title	Assurance Year	Authority Assurance Assessment	
			Operability at 30 June 2024	***Capability at 30 June 2024 and anticipated materiality on modelled outcomes***
1	**South East Flows restoration project**	See section 4.1 of this report, above.	Complete and operational.	Works will operate differently to what was notified. No material impact is anticipated.
2	**Eastern Mount Lofty Ranges Flows for the Future**	See section 4.2 of this report, above.	In progress and currently operational.	If implemented, likely to be capable of achieving envisaged outcomes. No material impact is anticipated.
3	**South Australian Riverland Floodplain Integrated Infrastructure Program (SARFIIP)**	This project underwent detailed assurance in 2022.	Complete and operational.	Assurance found the maximum inundation area achievable is greater than notified. This may result in a material impact.
4	**Riverine Recovery Project**	This project underwent detailed assurance in 2021.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.
5	**TLM environmental works and measures: Chowilla Floodplain works**	This project underwent detailed assurance in 2022.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.
6	**River Murray in South Australia constraints measure** (also nominated as a supply measure)	See section 4.18 of this report, above.	Likely to be operable.	If implemented, likely to be capable of operating as notified. No material impact is anticipated.
7	**TLM environmental works and measures: Lindsay Island (Stage 1) works**	This project underwent detailed assurance in 2022.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.
8	**Lindsay Island (stage 2) floodplain management project**	See section 4.9 of this report, above.	Will not be operable.	N/A
9	**TLM Environmental Works and Measures: Mulcra Island**	This project underwent detailed assurance in 2022.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.

[7] Anticipated materiality was assessed based on measures' operability and capability at 30 June 2024, compared to the notified measure. As the calculation of the supply contribution is based on the operation of a package of SDLAM measures, a precise view on materiality cannot be established until reconciliation modelling of the final package of measures is undertaken.

Measure title		Assurance Year	Authority Assurance Assessment	
			Operability at 30 June 2024	***Capability at 30 June 2024 and anticipated materiality on modelled outcomes***
10	**SDL Offsets in the Lower Murray (Locks 8 & 9)**	See section 4.3 of this report, above.	Likely to be operable.	If implemented, works will operate differently to what was notified. No material impact is anticipated.
11	**Wallpolla Island floodplain management project**	See section 4.10 of this report, above.	Will not be operable.	N/A
12	**Hattah Lakes North floodplain management project**	See section 4.11 of this report, above.	Unlikely to be operable	N/A
13	**TLM environmental works and measures: Hattah Lakes works**	This project underwent detailed assurance in 2022.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.
14	**Belsar–Yungera floodplain management project**	See section 4.12 of this report, above.	Unlikely to be operable.	N/A
15	**Burra Creek floodplain management project**	See section 4.13 of this report, above.	Unlikely to be operable.	N/A
16	**Vinifera floodplain management project**	See section 4.14 of this report, above.	Unlikely to be operable.	N/A
17	**Nyah floodplain management project**	See section 4.15 of this report, above.	Unlikely to be operable.	N/A
18	**Guttrum and Benwell Forests environmental works project**	See section 4.16 of this report, above.	Will not be operable.	N/A
19	**Murray and Murrumbidgee Valley National Parks SDL adjustment supply measure**	See section 4.4 of this report, above.	Unlikely to be operable.	N/A
20	**TLM environmental works and measures: Gunbower Forest works**	This project underwent detailed assurance in 2021.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.
21	**Gunbower National Park environmental works project**	See section 4.17 of this report, above.	Will not be operable.	N/A
22	**Flexible Rates of Fall in River Levels Downstream of Hume Dam**	This project underwent detailed assurance in 2022.	Complete and operational.	Assurance found the measure is capable of exceeding notified flow rates. This may result in a material impact.
23	**TLM environmental works and measures: Koondrook–Perricoota Forest Flood enhancement works**	This project underwent detailed assurance in 2021.	Complete and operational.	Works will operate differently to what was notified. A material impact is anticipated.
24	**Barmah–Millewa Forest Environmental Water Allocation**	This project underwent detailed assurance in 2022.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.

Measure title		Assurance Year	Authority Assurance Assessment	
			Operability at 30 June 2024	***Capability at 30 June 2024 and anticipated materiality on modelled outcomes***
25	**New Goulburn constraints measure** (this measure was not nominated as a supply measure and does not contribute an SDL offset)	See section 4.19 of this report, above.	Will not be operable.	N/A
26	**Yarrawonga to Wakool Junction reach constraints measure** (also nominated as a supply measure)	See section 4.20 of this report, above.	Will not be operable.	N/A
27	**Improved Regulation of the River Murray** (this measure does not contribute an SDL offset)	Although notified, Basin governments agreed that this project would not be considered in the 2017 SDLAM determination and does not contribute an SDL offset.	N/A	N/A
28	**Hume to Yarrawonga constraints measure** (also nominated as a supply measure)	See section 4.21 of this report, above.	Will not be operable.	N/A
29	**Hume Dam airspace management and pre-release rules**	This project underwent detailed assurance in 2022.	Complete and operational.	Capable of achieving envisaged outcomes. No material impact is anticipated.
30	**2011 Snowy Water Licence Schedule 4 Amendments to River Murray Increased Flows Call Out Provisions**	This project underwent detailed assurance in 2022.	Likely to be operable.	If implemented, likely to be capable of operating as notified. No material impact is anticipated.
31	**Enhanced Environmental Water Delivery** (EEWD or Hydro-cues)	See section 4.8 of this report, above. Given the MDBA's role as delivery agent for the EEWD project on behalf of Victoria, New South Wales and South Australia, the Authority engaged external support to undertake an independent assessment of this project and its contribution to the reconciliation determination.	Likely to be operable.	If implemented, will operate differently to what was notified. A material impact is anticipated.
32	**Nimmie Caira Infrastructure Modifications Proposal**	This project underwent detailed assurance in 2021.	Complete and operational.	Works will operate differently to what was notified. No material impact anticipated.
33	**Modernising supply systems for effluent creeks – Murrumbidgee River**	See section 4.5 of this report, above.	Likely to be operable.	If implemented, works will operate differently to what was notified. A material impact is anticipated.

Measure title		Assurance Year	Authority Assurance Assessment	
			Operability at 30 June 2024	***Capability at 30 June 2024 and anticipated materiality on modelled outcomes***
34	**Improved flow management works at the Murrumbidgee River – Yanco Creek offtake**	See section 4.6 of this report, above.	Unlikely to be operable.	N/A
35	**Computer Aided River Management system (CARM) for the Murrumbidgee River**	See section 4.7 of this report, above.	Likely to be operable.	If implemented, likely to be capable of operating as notified. No material impact anticipated.
36	**Murrumbidgee constraints measure** (also nominated as a supply measure)	See section 4.22 of this report, above.	Will not be operable.	N/A
37	**Structural and operational changes at Menindee Lakes (including the Lower Darling constraints key focus area)**	See section 4.23 of this report, above.	Will not be operable.	N/A

5.3 Looking Forward

Some SDLAM measures are already achieving positive environmental outcomes enabling more water to remain available for consumptive use.

However, considering findings from assurance reports over 3 years, the Authority is of the view that a number of measures will operate differently to what was originally envisaged. A number of measures will also not be delivered by 30 June 2024.

The conduct of a reconciliation will provide for the adjustment of SDLs to reflect which supply measures are in place and operational.

Appendix A - Enhanced Environmental Water Delivery assurance assessment

DGCONSULTING

Your ref: MD006428
Our ref: P426

30 June 2023

Sir Angus Houston AK AFC
Chair
Murray–Darling Basin Authority
Via email

Dear Sir Angus,

Enhanced Environmental Water Delivery Project Assurance 2023

The Independent Assurance Panel (IAP) has completed an assessment of the Enhanced Environmental Water Delivery (EEWD) SDL Adjustment Measure project. The aim of this work was to assess the extent to which the EEWD project would be operable by June 2024, able to deliver environmental benefits and to contribute to the SDL adjustment volume.

At the time of conducting assurance, the notified measure was not in operation. The IAP considers that the changes proposed to the planning, management and delivery of environmental water are not yet fully supported by the necessary new tools and enduring arrangements which would reliably support the envisaged environmental outcomes to be achieved and therefore an SDL offset as per the notified measure.

The EEWD measure relies on completion of a range of interlinked activities, and work is actively underway on developing the tools and systems needed to implement this measure. The rule changes, new planning systems and decision support tools necessary to implement the EEWD project will be designed and prototyped, but enduring changes to deliver the notified outcomes will not be fully implemented by June 2024.

Some of the activities required for the EEWD project are expected to be operable to a limited degree by June 2024. Development and application of an improved operational planning model for the River Murray is likely to be completed and operational, and will support some enhanced environmental water delivery outcomes. The improved planning and coordination concepts being developed and designed are already being migrated into environmental water management within the limits of current systems and within regulated flow limits, offering some improved outcomes.

The IAP's assessment has not identified any technical issues that would prevent the full implementation of the EEWD project and achievement of the notified outcomes in due course; however, implementation will not be completed by June 2024. Achievement of all the notified outcomes is also reliant on implementation of the Constraints Measures projects.

The IAP acknowledges the valuable assistance provided by MDBA staff and EEWD project team members to our assurance work.

Sincerely

Peter Hoey
Chair

Garry Smith
Member

Brett Tucker
Member

Office locations – *First Nations Country*
Adelaide – *Kaurna Country*
Canberra – *Ngunnawal Country*
Goondiwindi – *Bigambul Country*
Griffith – *Wiradjuri Country*
Mildura – *Latji Country*
Murray Bridge – *Ngarrindjeri Country*
Wodonga – *Dhudhuroa Country*

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