

## **EXTRACTED FROM:**

Murray-Darling Basin Authority, *Sustainable diversion limit adjustment projects*  
<<https://www.mdba.gov.au/basin-plan-roll-out/sustainable-diversion-limits/sdl-adjustment-proposals-state-projects>>

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# **Sustainable diversion limit adjustment projects**

To provide flexibility, the Basin Plan includes a mechanism to adjust sustainable diversion limits in the southern Basin. The mechanism requires a suite of projects to be implemented – some projects allow Basin Plan environmental outcomes to be achieved with less water. This means that more water can remain in the system for other users, including households, industry and irrigated agriculture. Other projects improve water use so it's more efficient.

## **Supply projects**

Supply projects are improved ways to manage the Basin's rivers to more efficiently deliver water for the environment. Projects include environmental works, such as building or improving river or water management structures and changes to river operating rules, which achieve environmental outcomes, with less water.

Community input is critical to the ongoing detailed design and implementation of these projects.

Once projects move into the design phase Basin state governments will work with local communities and affected landholders to ensure these projects consider local needs.

## **Constraints projects**

Constraints projects aim to overcome some of the physical barriers that impact delivering water in the system. Constraints projects can include changes to physical features such as crossings and bridges. They can also change river operating practices and rules. They could allow water managers more flexibility in releasing and moving water through the system.

No changes to flows will occur until all third party impacts have been resolved in consultation with affected communities. Find out more about constraints.

## **Efficiency projects**

Efficiency projects are activities that change water use practices and save water for the environment.

Projects can include upgrading irrigation systems, lining water delivery channels or installing water meters, along with water productivity improvements in manufacturing or irrigated agriculture, or changes to urban water management practices to reduce water.

Efficiency projects aim to provide 450 GL more water for the environment.

These projects need to have positive or neutral socio-economic impacts on Basin communities and industries.

- [Download the register of sustainable diversion limit adjustment measures](#)
- [Download a PDF version of the list of SDL adjustment mechanism projects](#)
- [Download the Draft determination report \(which includes a map of the SDL adjustment mechanism projects - see page 20\)](#)

## Project assessment

The feasibility of each of these projects have been assessed by all Basin states, the Australian Government and the MDBA through an [agreed assessment process](#).

The status of these projects vary, with some projects at the early stages of project design and community consultation, while others are already fully operational.

**To assess the project package and determine the overall adjustment amount to sustainable diversion limits, each project was required to be [notified to the MDBA](#) by Basin state governments.**

A brief description of each project is provided below, including an indication of the status of the project and any key issues raised by Basin state governments. Basin state governments have provided solutions for issues raised. These issues will be considered through later stages of project development and will include the opportunity for community consultation.

## Recommended adjustment and next steps

Under the Adjustment Mechanism, the MDBA has determined that the implementation of all supply projects will allow 605 gegalitres additional water to remain available for industry and communities, while still achieving the same or better environmental outcomes. To achieve this, a minimum of 62 gegalitres must be obtained through efficiency projects by 2019, in order for the total adjustment to remain within the 5 per cent limit set out in the Basin Plan. Basin governments have agreed that the first priority for efficiency measures is to recover the 62 GL required by June 2019, to ensure that the full 605 GL supply adjustment comes into effect.

The adjustment to sustainable diversion limits passed the Senate in May 2018. This is just the start of the process. Basin state governments have until 2024 to work with communities, industries and engineers to further design and complete projects.

The MDBA has made a number of recommendations, including ongoing consultation and engagement from all Basin governments over the coming years. Basin state governments are committed to meaningful consultation with communities and experts in the design and implementation of projects, to ensure local and project-specific concerns and issues are considered throughout this process.

The MDBA will play a key role in monitoring the integrity of the Sustainable Diversion Limit Adjustment Mechanism and the package of projects. To achieve this the MDBA will establish transparent regular reporting processes to communicate with Basin governments and communities on the progress of individual projects, and on the package of projects as a whole. Projects also need to be approved under relevant state and Commonwealth regulations (for example the NSW Environmental Planning & Assessment Act 1979, Fisheries Management Act 1994 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999).

Community input, along with technical knowledge and on-the-ground practicalities, means these projects will adapt and change over time. The MDBA will convene technical workshops with Basin states and experts to ensure Basin governments work together and use expert advice to inform the roll-out of the projects. These workshops will provide greater transparency and will complement Basin state government engagement activities as part of implementing the projects.

- [Find out more about the outcomes of the technical workshops](#)

Supply projects: Operational rules changes and system enhancements  
2011 Snowy Water Licence Schedule 4 Amendments (RMIF)

### **Status of project:**

- Scoping
- Draft rules
- Being trialled
- In operation

States responsible: New South Wales and Victoria

This project is based on changes to Snowy River Hydro Limited's licence in 2011, which committed water to the River Murray and allows water to be released from the Snowy Hydro Scheme to the River Murray for environmental purposes.

### **Project benefits:**

- revised strategy for release will allow greater flexibility in the timing of environmental water deliveries, helping to target better environmental outcomes downstream of Hume Dam.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- monitoring of the operating regime to identify and avoid any third party impacts, including reliability of supply and water quality downstream.

### **[Find out more about the 2011 Snowy Water Licence Schedule 4 amendments to River Murray Increased Flows call out provisions](#)**

Operating rule change to the use of the Barmah-Millewa Forest Environmental Water Allocation

### **Status of project:**

- Scoping
- Draft rules
- Being trialled
- In operation

States responsible: New South Wales and Victoria

This project proposes to change the rules for use of the planned environmental water account for the Barmah-Millewa Forest. The change allows the simultaneous use of other environmental water entitlements and is a change to the operation of the River Murray.

**Project benefits:**

- allows a combination of both planned and held environmental water to be used in Barmah-Millewa Forest, giving greater flexibility and control of environmental water delivery
- minimises undesirable watering through modifying rules to take into account previous natural inundation. For example, not triggering the release of planned water if a four monthly flood has already occurred, as well as not triggering mid-summer watering events.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- demonstrating that the rule changes will not impede coordinating the use of environmental water for the Barmah-Millewa Forest with other environmental water
- considering interactions with other sustainable diversion limit adjustment projects – for example Hume Dam airspace and flexible rate of fall.

**Find out more about the review of Barmah-Millewa Environmental Water Allowance Rules**

Computer Aided River Management system for the Murrumbidgee River

**Status of project:**

- Scoping
- In development
- Being trialled
- In operation

State responsible: New South Wales

This project involves the development of an integrated computerised river management system for the Murrumbidgee, allowing enhanced operator control to meet downstream demand. Water savings, resulting from the use of the enhanced operational system, will be given enduring effect in the form of water entitlements.

**Project benefits:**

- integrating improved metering and accurate losses with inundation models allows more precise and flexible flow control for operators, with the water saved via reduced operational losses, reserved to meet environmental outcomes as/when required
- creating of a new licence will provide flexibility for environmental water holders in how water savings are used for targeted environmental outcomes.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- ensuring the project assesses and avoids any adverse impacts of reduced existing operating losses
- confirming improved river operations through ongoing monitoring and evaluation.

**Find out more information on the Computer Aided River Management Murrumbidgee proposal**

Enhanced Environmental Water Delivery (EEWD or Hydro-cues)

**Status of project:**

- Scoping
- Initiate work streams
- Being trialled
- In operation

States responsible: Victoria, New South Wales and South Australia

This project seeks to achieve enhanced environmental outcomes by increasing the ability of environmental water holders to synchronise the delivery of environmental water with increases in natural flows caused by rainfall.

The project will significantly enhance the forecasting, planning and coordination of environmental water use to maximise downstream and system-wide connectivity and environmental outcomes. The responsible states will work closely with environmental water holders, environmental water managers, catchment management organisations and water authorities to identify innovative approaches and improvements to current processes, policies, legislative and governance structures for managing environmental water. The changes will build on existing efforts and learnings about how to ensure the most effective use and delivery of environmental water in the southern-connected Basin. The project is closely linked to the delivery of constraints management projects.

**Project benefits:**

Benefits of project include improved in-channel, floodplain and wetland condition as a result of:

- the release of held environmental water aligned with operational and unregulated flows to enhance a flow event, which will help create a stronger biological stimulus in sync with environmental water requirements
- opportunities to create desired flow regimes using smaller volumes of held water that would otherwise be impossible if releases were not well aligned with natural inflow events
- increasing coordination and capacity for timely decisions in response to a natural flow event.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- developing a more detailed project implementation planning and operating regime, including further detailed assessment of operating risks and mitigation strategies
- developing a detailed monitoring and evaluation plan
- strategies to engage and involve stakeholders and communities
- ensuring the project builds on existing environmental watering knowledge and complements other operational watering approaches
- developing options for how changes to inter-jurisdictional practices will be protected in an enduring manner.

This project is currently early in a scoping and development phase. Basin governments are working together to further develop this project. More information will be available following the parliamentary process.

### **[Find out more about Enhanced Environmental Water Delivery \(PDF\)](#)**

Flexible rates of fall in river levels downstream of Hume Dam

#### **Status of project:**

- Scoping
- Draft rules
- Being trialled
- In operation

States responsible: Victoria and New South Wales

This project involves a more flexible approach to the rate of fall in river level allowed downstream of Hume Dam. This will reduce the frequency of unseasonal watering for the Barmah-Millewa Forest, in which higher river flows spill into the forest at an undesirable time of year, causing environmental impacts and increased losses.

It will also improve the dam's operational efficiency by allowing saved water to be released at another time, or allowing flexibility to create flow patterns with additional environmental benefits.

#### **Project benefits:**

- ensure better integration of environmental demands into the management of Hume Dam
- reduced risk of unseasonal watering of sites below Yarrawonga weir.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

#### **Issues to be resolved:**

The MDBA and Basin governments are continuing to monitor bank response and condition as a result of the rule change.

### **[Find out more about the flexible rate of fall project](#)**

Operating rule change to Hume Dam airspace management and pre-releases

## Status of project:

- Scoping
- Draft rules
- Being trialled
- In operation

States responsible: Victoria and New South Wales

This project seeks to gain recognition for efficiencies already achieved by moving to the adaptive management of Hume Dam airspace and pre-release protocols.

Over the last 5 years, improvements have been made to the operating arrangements to manage airspace in Hume Dam, which alter the timing and extent of pre-releases. These improvements have been made in response to changing demand patterns and operating practices.

Historically, the large majority of releases from Hume Dam occurred in summer/autumn to supply irrigation demand. Demand patterns have since changed and larger volumes are also released for the environment in late winter to early spring. Environmental releases earlier in the season reduce some of the need for pre-releases, as these releases produce additional airspace in the storage ahead of potential spring inflows. This reduces the volume of pre-releases required, particularly in the period from February to June and helps to reduce the risk of inundation to downstream communities. Overall, without increasing spill volumes, the reduction in pre-release volumes results in more water being available in Hume Dam for allocation against entitlements.

## Project benefits:

- reduces the risk of unregulated spills from Hume Dam
- allows more flexibility to generate a flow pattern that would provide additional environmental benefit.

**This project** was modelled as part of MDBA's assessment to adjust sustainable diversion limits.

## Issues to be resolved:

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the further exploration (2018 to 2024), including:

- further consideration of alternative operating arrangements that may yield similar or better outcomes
- further risk analysis of the operation of the rule changes
- the need for further stakeholder engagement if the project explores alternative arrangements.

## [Find out more information on the Hume Dam airspace management project](#)

Menindee Lakes Water Savings project (including the Lower Darling constraints key focus area)

## Status of project:

- Scoping
- Develop components
- Being trialled

- In operation

State responsible: New South Wales

The Menindee Lakes Water Saving project involves new options for infrastructure, operational, regulatory and adjustment measures designed to improve the efficiency of the Menindee Lakes system. The project will also contribute to overcoming system constraints and improve water managers' ability to achieve ecological outcomes in the Lower Darling, the Anabranch and the Lower Murray. The project proposes to move the management of the lakes to an outcomes-based approach, with greater synchronisation with climatic conditions. To do this, and to achieve water savings, the project proposes to use a series of works and operational changes including:

- new regulators at Morton-Bulka (to separate the management of Lakes Menindee and Cawndilla), and at Cawndilla Creek (to enable managed use of Lake Cawndilla as a storage option, reducing evaporative losses). The proposed independent operation of Lake Cawndilla from Lake Menindee will provide opportunities to restore Lake Cawndilla to its natural transient state, as opposed to its current artificially regulated condition for water supply
- revising trigger levels in relation to shared management arrangements between the MDBA and NSW
- revising operational rules to complement structural works
- recognising of additional inflows expected to flow into Menindee Lakes under the operation of the Basin Plan
- the ability for greater release rates from Lake Menindee, including access to residual water by enlarging the outlet structure and constructing a drainage feeder channel in the bed of the lake
- works to allow the passage of higher managed flows in the Lower Darling to achieve ecological outcomes in the Lower Darling, the Anabranch and the Lower Murray, while protecting private infrastructure from being impacted by higher managed flows
- construction of fish-ways to allow for connectivity between the northern and southern Basin fish populations.

Water savings as a result of the implementation of the project will be given enduring effect in a mechanism agreed to by Basin governments.

#### **Project benefits:**

- improving water managers' ability to achieve ecological outcomes in the Menindee Lakes, Lower Darling, the Anabranch and the Lower Murray
- reducing evaporative losses of the lakes, returning more water to the system for environmental use.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits. Because of the complexity of the project it was assessed by a multijurisdictional working group made up of representatives from all southern Basin states, the Commonwealth and the MDBA.

#### **Issues to be resolved:**

Following the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- the need for greater consultation and engagement with communities on project development and refinement
- the need for a detailed Environmental Impact Statement to assess potential impacts to the ecology of the Menindee Lakes and the Lower Darling and any potential impacts to Aboriginal cultural heritage

- the need to develop a detailed new proposed operating regime and assess potential influences on Lower Darling and wider River Murray System operation, acknowledging that implementation of the project needs to maintain downstream reliability
- a mechanism for recognition and treatment of additional protected environmental inflows from the northern Basin
- a mechanism for recognition and treatment of water savings as a result of the project
- the need for more detailed design of infrastructure, refurbishment and enhanced flood protection works.

### [Find out more information on the Menindee Lakes water savings project](#)

SDL Offsets in the Lower Murray, New South Wales (Locks 8 and 9 Weir Pool Manipulation)

#### **Status of project:**

- Scoping
- Small scale trial
- Larger trial
- In operation

State responsible: New South Wales

This project aims to improve environmental water delivery and achieve better environmental outcomes through structural changes to existing infrastructure and changes to river operation rules, to allow greater variability in weir pool levels.

Variable flowing habitat is very important for aquatic organisms and has been severely reduced in the lower Murray by the construction of locks and weirs. When river levels are held artificially high, weir pools can create unnatural inundation of connected wetlands. Lowering the level of weir pools can return wetlands to a more natural wetting/drying regime, while raising levels can allow water to reach areas that would be difficult to water under most conditions. Raising and lowering weir pool levels can therefore produce an environmental benefit relative to maintaining an artificially constant level.

The project also proposes to replace existing structures, currently preventing flow into several floodplain creeks, with regulators to allow the restoration of high flows and hydro-dynamic diversity to the creeks. Small scale manipulation to weir pool levels are currently being trialled, however larger scale manipulation cannot be conducted until the proposed infrastructure is constructed.

The final stage of the project includes the construction of a fish-way at the inlet to Lake Victoria. The fish-way would allow fish, which have developed within the lake, particularly golden and silver perch, to return to the river. These are highly migratory fish with an important role to play in the ecosystem, and their return will benefit the River Murray and the Darling River for hundreds of kilometres upstream.

Although small scale weir pool operation has been trialled for a number of years now, the fishway infrastructure aspect of the project is still in the scoping stage, with further studies such as a comprehensive Environmental Impact Statement and detailed designs to be undertaken.

#### **Project benefits:**

- increasing productivity and habitat quality, promoting habitat use by aquatic fauna and waterbirds as well as fish growth, reproduction and dispersal
- reducing water losses from evaporation.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- the need for a detailed Environmental Impact Statement to assess potential impacts of the Frenchman's Creek fishway to the ecology of Frenchman's Creek and potential impacts on cultural heritage
- further hydraulic modelling to assess capacity of the proposed works under a range of potential operating regimes
- developing strategies for coordination and management of interactions with other projects.

**Find out more information on the Locks 8 and 9 weir manipulation project**

Supply projects: Environmental works  
Belsar-Yungera floodplain management project

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

Through the construction of three large regulators, a series of smaller supporting regulators, track raising (levees) and a pipeline, this project will connect extensive areas of floodplain through tiered watering events. This project will maintain and improve flora and fauna habitat values and provide periodic breeding opportunities for wetland species, such as fish, frogs and waterbirds. Managed flows will be able to be delivered to 2370 hectares of highly valued floodplain. The works can be operated flexibly to meet the water requirements of different vegetation communities, mimicking a broad range of River Murray flows up to 170,000 megalitres per day. These works will make use of natural flow paths to increase the extent, frequency and duration of inundation from either environmental flows or pumping during low flow events.

**Project benefits:**

- restore flooding and productivity to extensive areas of river red gum woodland, black box woodland and lignum shrub land
- contribute significantly to the feeding and breeding requirements of platform-building waterbirds that nest in lignum, including colonial nesting species.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- developing further detail of environmental water requirements, including minimum watering requirements
- refining key risk mitigation strategies
- undertaking detailed consultation with local landholders.

### [Find out more information on the Belsar-Yungera floodplain management project](#)

Burra Creek floodplain management project

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

#### **Project description:**

The project aims to return a more natural inundation regime to an area of 407 hectares. This represents 33 per cent of the total forest area and almost all of the flood dependent communities found within the Burra North forest, and provides a greater extent of watering than is possible under current flows.

The works involve the construction of three large regulators, raising tracks to form levees, and the removal of barriers to flow on the floodplain to retain and regulate water over the floodplain.

#### **Project benefits:**

- restore flooding frequency and duration
- improve productivity within the creek and billabongs areas
- maintain productivity and structure of black box (*Eucalyptus largiflorens*) communities.

[This project](#) was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

#### **Issues to be resolved:**

During the [assessment process](#) conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- further develop mitigation strategies to address any associated risks with pumping to the upper floodplain.

### [Find out more information on the Burra Creek floodplain management project](#)

Gunbower National Park environmental works project

#### **Status of project:**

- Concept design
- Detailed design

- Under construction
- In operation

State responsible: Victoria

The project has been developed to enable the delivery of environmental water to the wetlands and forest of the Gunbower National Park. It will mimic a natural flood event of up to 50,000 megalitres per day across 500 hectares. This includes almost half of the permanent and temporary wetlands in the project area and 20 per cent (250 hectares) of river red gum with flood dependent understorey. The package of works include regulator and creek enhancement works. The mid forest works will consist of a 100 megalitres per day pump station location on the River Murray and a number of regulators. This will enable the provision of water to approximately 500 hectares of Gunbower National Park, which currently cannot be watered by any other infrastructure.

**Project benefits:**

- environmental water delivery to the Gunbower National Park will generate a more natural flooding regime and will promote the growth of River Red Gum flood dependent understorey and wetland vegetation, providing critical habitat and food resources for native flora and fauna.
- the project compliments the existing Gunbower works delivered under The Living Murray project.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- assessing and addressing potential water quality issues
- assessing potential interactions with other projects and develop strategies for coordination and management of any interactions.

**Find out more information on the Gunbower National Park project**

Guttrum and Benwell Forests environmental works project

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

The project will reinstate a more natural flooding regime for the Guttrum and Benwell Forests, addressing, in particular, the reduced frequency and duration of floods. The proposed works will water 1200 hectares via pump stations, including semi-permanent wetlands and 82 per cent of the river red gum forest with flood dependent understorey. The works will include two separate pump stations to deliver environmental water into Guttrum Forest, one pump station in Benwell Forest and containment works (regulators and levees) in both forests to contain water on the floodplain. The works have been designed to meet the environmental watering requirements of the ecological values by mimicking a 26,000 megalitres per day

flood event in the River Murray for Guttrum Forest and a 24,000 megalitres per day flood event for Benwell Forest.

**Project benefits:**

- the project will deliver outcomes for threatened flora and fauna, and overall healthy functioning floodplain ecosystems.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- developing mitigation strategies for managing any third party flooding risks.
- assessing potential interactions with other projects and develop strategies for coordination and management of any interactions.

**Find out more information on the Guttrum and Benwell Forests project**

Hattah Lakes North floodplain management project

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

This project will complement existing works at the Hattah Lakes icon site by enhancing flooding across higher floodplain terraces. The project will enable significantly larger inundation events to the northern Hattah Lakes floodplain and also increase the flexibility for environmental water management across the lakes. The proposed works will water an additional 1130 hectares of floodplain through the construction of two new regulators, a causeway across an existing track and 1.7 kilometres of levees along track alignments.

**Project benefits:**

- reconnect aquatic and terrestrial ecosystems by restoring hydrological function across the floodplain and, in doing so, provide the opportunity to improve the condition of biodiverse habitat for a range of species of state and national significance
- the project complements and extends the existing Hattah Lakes works delivered under The Living Murray project.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- revising the risk management strategy for potential water quality issues
- assessing potential interactions with the Hattah Lakes TLM project and develop strategies for coordination and management of any interactions.

### [Find out more information on the Hattah Lakes north floodplain project](#)

Lindsay Island (stage 2) floodplain management project

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

The Lindsay Island Floodplain Project will inundate 5152 hectares of the floodplain and connect many parts of the floodplain through tiered watering events, including areas of unique fast-flowing aquatic habitat, through to sections of black box, lignum and onto the higher alluvial terraces. The proposed works will operate in tandem with the recently completed Living Murray works at this site and Lock 7 to mimic flows of 40,000 megalitres per day to 120,000 megalitres per day. The proposed works include two components:

Primary: Berribee regulator and fishway, five containment regulators and 2.6 kilometres of levees along track alignments

Secondary: 13 regulators and associated works, and 4.9 kilometres of levees along track alignments.

#### **Project benefits:**

- restoring flooding and productivity to extensive areas of red gum woodland, black box woodland and lignum shrubland
- contributing significantly to the feeding and breeding requirements of platform-building waterbirds that nest in lignum, including colonial nesting species
- maintaining wetland habitat for sedgeland and rushlands and support populations of small-bodied fish and cryptic waterbirds such as bitterns, crakes and rails.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

#### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- assessing cumulative impacts for potential water quality issues.

### [Find out more information on the Lindsay Island \(stage 2\) project](#)

Nyah floodplain management project

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

The project will provide infrastructure to better control the frequency and duration of inundation to reinstate a watering regime matched to the ecological requirements of the significant vegetation and fauna at Nyah Vinifera Regional Park. The proposed works will water almost 500 hectares of floodplain within Nyah Forest, replicating River Murray flows of up to 25,000 megalitres per day. The works will influence over 53 per cent of the total forest area and almost all of the flood dependent vegetation communities. The works consist of four regulators, 3 on the downstream end of Parnee Malloo Creek and one on the upstream end. Additional works to contain water within the forest include 1.7 kilometres of low level track raising, forming a levee at the downstream end of the forest.

**Project benefits:**

- restoring a more natural watering regime to the river red gum and black box woodlands
- providing dependable refuge and breeding habitat for aquatic fauna and waterbirds.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- more detailed definition of environmental water requirements including minimum watering requirements
- developing further information around pumping to upper floodplain.

**Find out more information on the Nyah floodplain management project**

Vinifera floodplain management project

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

The Vinifera Floodplain project will provide infrastructure to better control the frequency and duration of inundation to reinstate a watering regime matched to the ecological requirements of the significant vegetation and fauna at Vinifera Park. The project will water up to 350 hectares of floodplain within Vinifera Forest. This represents 55 per cent of the total forest area (638 hectares) and almost all of the flood dependent vegetation communities. The proposed works involve construction of four regulators and 1.1 kilometres of low level track raising to enable control of both flood and pumped flows into and out of

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

**Project benefits:**

- inundation of the Red Gum Swamp Forest community that is managed to preserve conservation and heritage values
- inundation of flora and fauna species and ecological communities of national and Victorian conservation significance.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- providing clarification of the extent of ecological benefits and targets
- documenting environmental water requirements.

**Find out more information on the Vinifera floodplain management project**

Wallpolla Island floodplain management project

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: Victoria

The proposed works will complement existing works at the Lindsay-Wallpolla Islands icon site and the proposed works associated with the Locks 8 and 9 Weir Pool Manipulation project. This project will increase the frequency and duration of floodplain inundation across 2650 hectares, providing significant benefit to nationally important species, threatened vegetation communities, ecological values, carbon cycling and downstream water quality. This will benefit both Wallpolla Island and the broader Lower Murray region. The proposed works include four major regulators, 22 smaller containment regulators and 4.5 kilometres of levees (raised tracks). The works have been designed to complement weir pool manipulation activities (Locks 8 and 9) and connect areas of flowing aquatic habitat with sections of black box, lignum and higher alluvial terraces. This will enable watering at a landscape scale, mimicking flows of 30,000 megalitres per day to 120,000 megalitres per day.

**Project benefits:**

- increasing and improving available floodplain habitat for flood-dependent fauna and flora including River red gum, black box and alluvial grassland communities.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- clarifying the potential impact of dilution flows required to address water quality issues
- identifying erosion implications for the top of the system under maximum flow.

### **Find out more information on the Wallpolla Island project**

Riverine Recovery Project

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: South Australia

This project involves returning a number of wetlands to a more natural wetting/drying regime which results in evaporative savings. The project uses adaptive management and engineering solutions to bring back flow variations that existed before locks, weirs and causeways were built. The flows will benefit ecosystems along the River Murray between Wellington and the border of South Australia and Victoria such as the Pike, Katfish and Yatco Lagoon and wetland systems.

#### **Project benefits:**

- increasing the resilience and health of vegetation communities of the wetlands, floodplains and ecosystems along a vast stretch of the River Murray between Wellington and the SA–Victoria border
- more effective delivery of environmental water savings for environmental asset protection and restoration.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

#### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, it was identified that operating plans may need to be revised based on learnings from early operations. This issue will be resolved in the final phases of project implementation (2018 to 2024).

### **Find out more information on the Riverine Recovery project**

South East Flows Restoration Project

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: South Australia

The project will use new and widened drains within the upper south east drainage system to divert water currently draining to the ocean to en route wetlands and the Coorong South Lagoon.

**Project benefits:**

- the diverted relatively fresh water will enhance the quality of en route wetlands of the upper south east, as well as reduce salinity in the Coorong South Lagoon and enhance ecosystem resilience.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved in the final phases of project implementation (2018 to 2024), including:

- revising the initial operating plan
- undertaking further stakeholder engagement.

**Find out more information on the South east flows restoration project**

The Living Murray Environmental Works and Measures: Koondrook–Perricoota Forest Flood Enhancement Works

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

States responsible: New South Wales, Victoria and South Australia

The project involved construction of environmental water management structures including regulators and levee banks in Koondrook–Perricoota.

These works allow water managers to direct water into the forest and hold it there before it is released back to the River Murray via the Wakool River. This retention of water helps reach environmental objectives for the area while reducing the need for high flows or floods on the River Murray. Under full operating capacity, the works enable up to 16,000 ha of forest to be watered.

**Project benefits:**

- more natural flooding regimes improve environmental outcomes by providing primary food sources (carbon and other nutrients) for native flora and fauna
- a natural flood distribution pattern
- limiting drowning of red gum germinates and understory species by maintaining a natural depth profile, thereby maximising germination of these species
- providing capacity to vary flow rates in downstream systems to minimise geomorphological impacts

- incorporating Aboriginal community knowledge, values and perspectives in the management of the site through the Living Murray Indigenous Partnerships project.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved as part of the ongoing adaptive management and operation of the site, including:

- adapting the operating plan and risk mitigation in response to monitoring, operational learnings and ongoing engagement with communities
- mitigation of third party impacts
- monitoring the management of return flows and salinity.

**Find out more information on the Koondrook-Perricoota TLM project**

The Living Murray Environmental Works and Measures: Mulcra Works

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

States responsible: Victoria, New South Wales and South Australia

The Mulcra project is part of The Living Murray program and located in Murray-Sunset National Park. The environmental works were constructed in 2010-11 and 2013-14, and include five environmental regulators and associated works including sill lowering, stream rehabilitation and upgrading access tracks. This allows available environmental water to be used more efficiently and effectively in order to simulate natural flow patterns. This allows for a floodplain inundation area of 820 hectares, and increases flows through 20 kilometres of Potterwalkagee Creek. The project aims to maintain base flows through the system year-round, with a partial drying phase once every 6 to 8 years to mimic natural low flow periods.

**Project benefits:**

- inundated waterways and wetlands will provide refuges and resources for a diverse range of flora and fauna (native fish, frogs, turtles), and provide important waterbird breeding habitat
- improvements in germination and recruitment of aquatic vegetation, red gums and Lignum
- improving floodplain connectivity likely to provide important opportunities for fish passage through more natural waterways, bypassing Lock 8
- incorporating Aboriginal community knowledge, values and perspectives in the management of the site through the Living Murray Indigenous Partnerships project.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved as part of the ongoing adaptive management and operation of the site, including:

- adapting the operating plan and risk mitigation in response to monitoring, operational learnings and ongoing engagement with communities
- monitoring the management of return flows and salinity.

### **Find out more information on the Mulcra Living Murray project**

The Living Murray Environmental Works and Measures: Lindsay Island (Stage 1) Works

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

States responsible: Victoria, New South Wales and South Australia

Environmental works were constructed at Lindsay Island in 2013 and 2015 as part of the Chowilla-Lindsay-Wallpolla icon site in the Living Murray program. The package of works includes:

- Upper Lindsay River regulators (north and south inlets)
- Mullaroo Creek regulator and fishway.

These works provide base flows through the upper Lindsay River and improve the ability to deliver spring flow pulses, increase the extent of flowing habitat on Lindsay Island by about 28 kilometres. This will contribute to maintaining high quality habitat for native fish in Lindsay Island anabranches and improve the condition of riparian vegetation. In addition, the works will increase opportunities to pump water from the Lindsay River into Lake Wallawalla, providing significant expansion of the available habitat for wetland dependent species.

#### **Project benefits:**

- benefits to flow-dependent populations of threatened flora and fauna
- protection of the significant population of Murray cod in Mullaroo Creek, as well as the provision of an occasional breeding and roosting habitat for colonial water birds
- improved populations of red gum, black box and lignum shrub land will help restore productivity linkages between the river and floodplain habitats
- incorporating Aboriginal community knowledge, values and perspectives in the management of the site through the Living Murray Indigenous Partnerships project.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

#### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved as part of the ongoing adaptive management and operation of the site, including:

- adapting the operating plan and risk mitigation in response to monitoring, operational learnings and ongoing engagement with communities

- monitoring the management of return flows and salinity issues.

### **Find out more information on the Lindsay Island (stage 1) TLM project**

The Living Murray Environmental Works and Measures: Hattah Lakes Works

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

States responsible: Victoria, New South Wales and South Australia

The Hattah Lakes TLM works are designed to increase the frequency, duration and extent of flooding across the lakes and surrounding floodplain. The works aim to reinstate a more natural water regime to more than 6000 hectares of the River Murray floodplain and include:

- a new pumping station at Messenger's Crossing
- sill lowering in Chalka Creek South
- four new regulators (Messenger's, Oatey's, Cantala, Kramen) and associated works
- refurbishment of an existing regulator (Little Hattah)
- three new stop banks or levees.

The infrastructure is used to deliver water to fill the lakes every 2 to 3 years, with more extensive watering to reach the floodplain every 8 to 10 years, subject to natural cues and water availability. About half the water used in the more extensive managed water events can be returned to the River Murray by opening regulators at the end of the watering period.

The Hattah Lakes works mean that environmental outcomes can be achieved when the river is at its normal regulated level of around 7000 megalitres per day rather than requiring floods in the river of 70,000 to 140,000 megalitres per day.

#### **Project benefits:**

- regular inundation to reverse the decline of river red gums and black box populations
- improvement in floodplain productivity and vegetation health to provide benefit for native fish, such as the fly-specked hardyhead and Murray rainbowfish, and waterbirds, such as Eurasian coot and Grey Teal
- Maintenance of drought-tolerant wetland species in infrequently inundated areas to build habitat resilience
- increases in visitor numbers to the watered sites have also benefited Regional communities
- incorporating Aboriginal community knowledge, values and perspectives in the management of the site through the Living Murray Indigenous Partnerships project.

This project was modelled as part of MDBA's determination on the Sustainable Diversion Limit adjustment. [See how this project was represented in the MDBA modelling framework](#) to determine the supply contribution.

### **Issues to be resolved:**

During the [assessment process](#) conducted by Basin governments, several issues were identified and will be resolved as part of the ongoing adaptive management and operation of the site, including:

- adapting the operating plan and risk mitigation in response to monitoring, operational learnings and ongoing engagement with communities
- monitoring the management of return flows and salinity issues.

[More information on the Hattah Lakes TLM project can be found here](#)

The Living Murray Environmental Works and Measures: Gunbower Forest Works

### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

States responsible: Victoria, New South Wales and South Australia

Environmental works were constructed at Gunbower Forest in 2014 as part of The Living Murray program to restore floodplain health. The works included a package of diversion regulators and a channel to direct water from Gunbower Creek (part of the Torrumbarry irrigation system) into the forest. Existing levees along the forest boundary allow water to be contained within the national park and state forest in order to inundate river red gum forest, and permanent and semi-permanent wetlands, thereby allowing water managers to simulate a more natural flooding regime. When in operation, the works allow wide-scale watering equivalent of up to 35,000 megalitres per day across 4,800 hectares of forest.

### **Project benefits:**

- a more natural flooding regime to promote the growth of River Red Gum flood dependent understory and wetland vegetation, providing critical habitat and food resources for native flora and fauna for this Ramsar wetland
- support waterbird, colonial nesting, riverine fish and native frog species
- improving native tree canopies, reducing the encroachment of terrestrial species and weed invasion
- incorporating Aboriginal community knowledge, values and perspectives in the management of the site through the Living Murray Indigenous Partnerships project.

This project was modelled as part of MDBA's determination on the Sustainable Diversion Limit adjustment. [See how this project was represented in the MDBA modelling framework](#) to determine the supply contribution.

### **Issues to be resolved:**

During the [assessment process](#) conducted by Basin governments, several issues were identified and will be resolved as part of the ongoing adaptive management and operation of the site, including:

- adapting the operating plan and risk mitigation in response to monitoring, operational learnings and ongoing engagement with communities
- monitoring the management of return flows and salinity.

## [Find out more information on the Gunbower Forest TLM project](#)

The Living Murray Environmental Works and Measures: Chowilla Floodplain Works

### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

States responsible: South Australia, New South Wales and Victoria

The Chowilla Floodplain environmental watering infrastructure is part of The Living Murray (TLM) program of works at icon sites along the River Murray. The works ensure that environmental water recovered as part of TLM is used to achieve the ecological objectives for that site. The Chowilla Floodplain environmental works and measures involved the construction of a major environmental regulator on Chowilla Creek, and a range of complementary works around the Chowilla floodplain and wetlands to address the long-term decline in the health of the icon site. The environmental regulator enables water levels to be raised to generate broad scale inundation across the floodplain under relatively low river flow conditions.

Construction of the Chowilla Creek environmental regulator commenced in January 2010 and was completed by mid-2014. Initial testing of the structure was conducted between September and December 2014, representing a partial commissioning of the infrastructure. Further low and high level testing was undertaken in 2015 and 2016.

### **Project benefits:**

- recovery of high-value wetlands, including river red gum and black box areas
- maintaining ecological character of this Ramsar wetland site
- preserving the significant social and cultural heritage values of the site
- incorporating Aboriginal community knowledge, values and perspectives in the management of the site through the Living Murray Indigenous Partnerships project.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved as part of the ongoing adaptive management and operation of the site, including:

- adapting the operating plan and risk mitigation in response to monitoring, operational learnings and ongoing engagement with communities
- monitoring the management of return flows and salinity.

## [Find out more information on the Chowilla Floodplain TLM project](#)

Improved flow management works at the Murrumbidgee River – Yanco Creek offtake

## **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: New South Wales

This proposal aims to return the Yanco Creek system closer to a pre-development wetting/drying regime, while improving infrastructure that supplies irrigation and stock and domestic water.

The construction of a regulator and fishway at the upstream end of Yanco Creek and upgrades to Yanco Weir on the Murrumbidgee River, including a fishway, will result in more control over flows through Yanco Creek to reinstate a more appropriate regime of freshes, bank-full and overbank flows. This may provide the Commonwealth Environmental Water Holder and the Office of Environment and Heritage with more flexibility in managing flows within the Murrumbidgee River system, in particular delivering water to the mid Murrumbidgee wetlands.

## **Project benefits:**

- achieving targeted environmental outcomes more frequently via operational control and flexibility enabled by new infrastructure
- improving fish passage around the Yanco Creek offtake, supporting the valuable native fish community.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

## **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- revising and enhancing ecological objectives and targets to take into account Basin plan targets
- using floodplain inundation modelling to demonstrate how recommended flow targets and equivalent environmental outcomes will be achieved
- determining the proposed operating regime, including how it relates to the environmental water requirements of Yanco Creek
- determining the impact of alterations to return flow and diversion regimes
- further consideration of identified high risk issues and proposed mitigations.

## **[Find out more information on the Yanco Creek offtake project](#)**

Nimmie-Caira Infrastructure Modification Proposal

## **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: New South Wales

The project proposes a conversion of the existing floodway-wetland-channel operations into a low maintenance, low operational requirement, fill and spill arrangement. Under this proposed arrangement water will be delivered to ecological assets via the natural flow paths (creeks and floodways) that occupy the lowest elevations across the landscape.

The reconfigured water delivery infrastructure, enabled by the Commonwealth purchase of land and water licenses in 2012, will allow more effective delivery of environmental flows to the Nimmie-Caira floodplain and other parts of the Lowbidgee. This project, along with the Murray and Murrumbidgee Valley National Parks project, has the potential to supply significant additional environmental benefit to the area.

**Project benefits:**

- allow environmental watering needs to be met efficiently by capitalising on existing infrastructure
- provide flexibility to manage the extent and duration of inundation, while limiting the lateral distribution of water to areas where environmental values are located
- further development of a watering regime for environmental assets and values including existing lignum, red gum and black box communities.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- developing a monitoring and evaluation plan
- developing an integrated operating strategy for the Nimmie-Caira and Yanga element of the National Parks works proposal.

**Find out more information on the Nimmie-Caira infrastructure modification project**

Eastern Mount Lofty Ranges Flows for the Future Project

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: South Australia

This project proposes activities reinstate more natural flow patterns by reducing the interception of low-flow events. This will provide additional water to riverine environments in the Eastern Mount Lofty Ranges, downstream to the River Murray, Coorong, Lower Lakes and Murray Mouth.

**Project benefits:**

- restore the ability to convey natural relatively fresh water low-flows within the Eastern Mount Lofty Ranges, which will improve downstream ecological habitat conditions and general water catchment health.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- further work to refine the ecological measures and targets
- continuing risk assessment following further design and development of the project.

**Find out more information on the Eastern Mount Lofty Ranges project**

Murray and Murrumbidgee National Parks

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: New South Wales

This project involves a package of works and other measures across two different locations – Yanga National Park, near Balranald on the Lower Murrumbidgee River, and the Millewa Forest, which is part of the Murray Valley National Park near Deniliquin, on the River Murray and Edward River.

The project aims to deliver more targeted environmental watering than achieved under benchmark conditions of development and benefit public land areas exceeding 70,000 hectares. The savings are achieved by reducing “overwatering” of vegetation areas, which is caused by inadequate and obsolete infrastructure that releases or holds water within the parks. This will result in decreasing both the volume of water required and water lost to evaporation, by reducing the inundation area. Other savings are achieved by increasing capacity of structures to manage environmental water, which will reduce the need to “overtop” banks.

The Yanga National Park proposal includes two key components:

- works to enable better targeting of existing environmental water management in the northern area of the Park
- works to manage flows from the adjacent Nimmie-Caira proposed supply project.

The Millewa Forest proposal outlines several key components including:

- adding sills and regulators in the Little Edward River and Gulpa Creek to address unseasonal overwatering
- replacement of the Moira Lake Regulator to allow more active management of Moira Lake levels, so that they are able to respond to natural river flows, while preventing ingress of high summer irrigation

- works to stabilise the intersection of the Aratula Creek and Bullatale Creek irrigation supply channel, and minimise the impact of east to west flows
- a new regulator at Warwick Creek to allow managed environmental flows into the creek for benefit of small-bodied fish

#### **Project benefits:**

- significant increase in the area, frequency and duration of environmental flows to River red gum forest and sedgeland on the Yanga floodplain, via the Nimmie-Caira proposed supply project
- reducing unseasonal overwatering of ecological areas
- improving outcomes for native fish
- reducing frequency and level of flooding on private land holdings in Bullatale Creek
- reducing frequency and severity of blackwater events.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

#### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s implementation (2018 to 2024), including:

- revising the Monitoring Evaluation and Review strategy
- providing further information on the level of constraint relaxation required within both the mid Murray and Murrumbidgee to allow achievement of the proposed ecological objectives and targets
- refining environmental water requirements.

**Find out more information on the Murray and Murrumbidgee National Parks project.**

Modernising supply systems for effluent creeks – Murrumbidgee River

#### **Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: New South Wales

This project proposes to modernise the irrigation supply arrangements for diversions from the Yanco Creek system. The current arrangements require the delivery of unseasonably high flows along 800 kilometres of creeks in the Yanco system, in order to meet irrigation supply. High flows along long stretches of river results in excessive operational surplus and transmission losses to meet demands. The continuous high ‘unseasonal’ summer flows also result in poor ecological outcomes.

Key aspects of the proposal include the addition of a new weir and the replacement of existing weirs along the creek to allow automated operation, better flow control and incorporation of fishways. This allows for additional flow monitoring, alternative supplies, and changes to operating rules to improve efficiency and produce water savings within the creek system.

**Project benefits:**

- Yanco Creek supply system changed to a more efficient delivery system
- enhanced service levels for customers along the Yanco Creek system
- reduced environmental impact through reduced need for sustained periods of unseasonal flows
- greater flexibility for environmental water holders in how water savings are used for targeted environmental outcomes.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- providing more specific details on the potential ecological benefits of the measure
- developing a detailed operational plan for the creek system
- reviewing and refining risks as more detailed information becomes available during the detailed design phase
- detailed geotechnical investigations to be carried out.

**Find out more information on the Modernising Supply Systems for Effluent Creeks - Murrumbidgee River project**

South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP): Pike and Katarapko Floodplain project elements

**Status of project:**

- Concept design
- Detailed design
- Under construction
- In operation

State responsible: South Australia

The project aims to create resilient floodplains along the River Murray in South Australia, through constructing environmental works for floodplain watering on the floodplains downstream of Lock 5 (Pike floodplain) and Lock 4 (Katarapko floodplain) and, complementary environmental works, via salinity management actions, to reduce both surface and ground water salinity. The projects include the capability to raise the Lock 4 and Lock 5 weir pools to generate greater watering of the floodplain under low – medium flows. The works will open up flowing habitat for fish and aquatic organisms in a region where flowing habitat has been greatly reduced, as a result of the locks and weirs.

**Project benefits:**

- ability to manage floodplain watering regimes for ecological benefit
- targeted watering will improve ecosystem health, reduce localised soil salinity and expand the area in which soil salinity is low enough to sustain healthy vegetation.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's implementation (2018 to 2024), including:

- refining conceptual models for the Pike and Katarapko Floodplain ecological targets
- refining initial risk assessments and mitigation strategies
- revising the initial operating plan.

### **Find out more information on the SARFIIP project**

#### Constraints measures

It should be noted that five of the six constraints measures in the southern Basin have also been nominated as supply projects under the Sustainable Diversion Limit Adjustment Mechanism: Hume to Yarrawonga, Yarrawonga to Wakool Junction, South Australian Murray, Murrumbidgee and the Lower Darling (as part of the Menindee Lakes proposal). The new Goulburn project is nominated solely as a constraints measure, and therefore does not contribute to an adjustment of Sustainable Diversion Limits.

Yarrawonga to Wakool junction reach constraints measure (also nominated as a supply measure)

### **Status of project:**

- Concept design
- Community consultation
- Being trialled
- In operation

State responsible: New South Wales

This proposal investigates opportunities to work with landholders, councils and public land managers to identify and address benefits and impacts of the delivery of environmental flows up to 30,000 megalitres per day downstream of Yarrawonga Weir (with a buffer for flows up to 50,000 megalitres per day).

New South Wales will undertake extensive consultation with communities, councils, landholders and public land managers on potential options to address adverse impacts of flows. These options could include measures such as easements, and/or infrastructure such as crossings, culverts or bridges that would address potential impacts to individual land owners. Once in place, these mitigation options would then allow the delivery of flows to support improved river and wetland health outcomes. Landholder acceptance of potential works will be critical and the project will be considered in relation to the other southern connected Basin constraints projects.

### **Project benefits:**

- improved connections between rivers and floodplains
- improved capacity of rivers, floodplains and wetlands to recover after droughts or floods
- modification of on-farm infrastructure to facilitate higher flows and allow for additional ecological benefits, such as fish passage
- recharge soil moisture and improve fertility of the soil

- upgrades to public flood infrastructure to facilitate higher flows, for example levees, roads and crossings
- provide further habitat and cues for fish and bird breeding
- improved water quality as saline pools are flushed out and floodplain litter washed away to reduce the severity of blackwater events.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s ongoing design and implementation (2018 to 2024), including:

- further consultation and engagement with communities on project development and refinement
- clarification of ecological benefits of constraints measures, at the local and system scale
- investigate options to maximise the benefit that can be achieved from the coordinated implementation of individual constraints measures, in particular the constraints along the Murray stem
- working with communities and individual land owners to bring the regional level assessment of effects, mitigation and costs to a property by property level
- development of governance and project management arrangements that will enable the constraints program to progress in an integrated manner.

**Find out more information on the pre-feasibility analysis conducted by the MDBA on the Yarrowonga to Wakool Junction constraints proposal**

Murrumbidgee constraints measure (also nominated as a supply measure)

**Status of project:**

- Concept design
- Community consultation
- Being trialled
- In operation

State responsible: New South Wales

This proposal investigates opportunities to work with landholders, councils and public land managers to identify and address benefits and impacts of the delivery of environmental flows up to 40,000 megalitres per day at Wagga Wagga.

New South Wales will undertake extensive consultation with communities, councils, landholders and public land managers on potential options to address adverse impacts of flows. These options could include measures such as easements, and/or infrastructure such as crossings, culverts or bridges that would address potential impacts to individual land owners. Once in place, these mitigation options would then allow the delivery of flows to support improved river and wetland health outcomes. Landholder acceptance of potential works will be critical and the project will be considered in relation to the other southern connected Basin constraints projects.

**Project benefits:**

- improved connections between rivers and floodplains

- improved capacity of rivers, floodplains and wetlands to recover after droughts or floods
- modification of on-farm infrastructure to facilitate higher flows and allow for additional ecological benefits such as fish passage
- recharge soil moisture and improve fertility of the soil
- upgrades to public flood infrastructure to facilitate higher flows, for example levees, roads and crossings
- provide further habitat and cues for fish and bird breeding
- improved water quality as saline pools are flushed out and floodplain litter washed away to reduce the severity of blackwater events

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s ongoing design and implementation (2018 to 2024), including:

- further consultation and engagement with communities on project development and refinement
- clarification of ecological benefits of constraints measures, at the local and system scale
- investigate options to maximise the benefit that can be achieved from the coordinated implementation of individual constraints measures, in particular the constraints along the Murray stem
- working with communities and individual land owners to bring the regional level assessment of effects, mitigation and costs to a property by property level
- development of governance and project management arrangements that will enable the constraints program to progress in an integrated manner.

**Find out more information on the pre-feasibility analysis conducted by the MDBA on the Murrumbidgee constraints proposal**

Hume to Yarrawonga constraints measure (also nominated as a supply measure)

**Status of project:**

- Concept design
- Community consultation
- Being trialled
- In operation

States responsible: New South Wales and Victoria

This proposal investigates opportunities to work with landholders, councils and public land managers to identify and address benefits and impacts of the delivery of environmental flows up to 40,000 megalitres per day at the Doctors Point gauge near Albury.

New South Wales and Victoria will undertake extensive consultation with communities, councils, landholders and public land managers on potential options to address adverse impacts of flows. These options could include measures such as easements, and/or infrastructure such as crossings, culverts or bridges that would address potential impacts to individual land owners. Once in place, these mitigation options would then allow the delivery of flows to support improved river and wetland health outcomes.

Landholder acceptance of potential works will be critical and the project will be considered in relation to the other southern connected Basin constraints projects.

**Project benefits:**

- improved connections between rivers and floodplains
- improved capacity of rivers, floodplains and wetlands to recover after droughts or floods
- modification of on-farm infrastructure to facilitate higher flows and allow for additional ecological benefits such as fish passage
- recharge soil moisture and improve fertility of the soil
- upgrades to public flood infrastructure to facilitate higher flows, for example levees, roads and crossings
- provide further habitat and cues for fish and bird breeding
- improved water quality as saline pools are flushed out and floodplain litter washed away to reduce the severity of blackwater events.

**This project** was modelled as part of MDBA’s recommendation to adjust sustainable diversion limits.

**Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project’s ongoing design and implementation (2018 to 2024), including:

- further consultation and engagement with communities on project development and refinement
- clarification of ecological benefits of constraints measures, at the local and system scale
- investigating options to maximise the benefit that can be achieved from the coordinated implementation of individual constraints measures, in particular the constraints along the Murray stem
- working with communities and individual land owners to understand effects, mitigation and costs on a case by case basis at an individual property level.
- developing governance and project management arrangements that will enable the constraints program to progress in an integrated manner.

**Find out more information on the Hume to Yarrawonga constraints project**

**Find out more information on the pre-feasibility analysis conducted by the MDBA on the Hume to Yarrawonga constraints proposal**

River Murray in SA constraints measure (also nominated as a supply measure)

**Status of project:**

- Concept design
- Community consultation
- Being trialled
- In operation

State responsible: South Australia

This proposal investigates opportunities to work with landholders, councils and public land managers to identify and address benefits and impacts of the delivery of environmental flows up to 80,000

megalitres per day at the South Australian border. The proponent will undertake extensive consultation with communities, councils, landholders and public land managers on potential options to address adverse impacts of flows. These options could include measures such as easements, and/or infrastructure such as crossings, culverts or bridges that would address unacceptable impacts to individual land owners. Once in place, these mitigation options would then allow the delivery of flows to support improved river and wetland health outcomes. Landholder acceptance of potential works will be critical and the project will be considered in relation to the other southern connected Basin constraints projects.

### **Project benefits:**

- promoting longitudinal connectivity from the border to the Coorong, Lower Lakes and Murray Mouth
- promoting lateral connectivity to deliver water to the wetlands, floodplains, creeks and anabranches connected to the main river channel
- improve the capacity of rivers, floodplains and wetlands to recover after droughts or floods
- modification of on-farm infrastructure to facilitate higher flows and allow for additional ecological benefits such as fish passage
- recharge soil moisture and improve fertility of the soil
- upgrades to public flood infrastructure to facilitate higher flows, for example levees, roads and crossings
- provide habitat and cues for fish and bird breeding
- better water quality as saline pools are flushed out and floodplain litter washed away to reduce the severity of blackwater events.

**This project** was modelled as part of MDBA's recommendation to adjust sustainable diversion limits.

### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's ongoing design and implementation (2018 to 2024), including:

- further consultation and engagement with communities on project development and refinement
- clarification of ecological benefits of constraints measures, at the local and system scale
- investigating options to maximise the benefit that can be achieved from the coordinated implementation of individual constraints measures, in particular the constraints along the Murray stem
- working with communities and individual land owners to understand effects, mitigation and costs on a case by case basis at an individual property level.
- developing governance and project management arrangements that will enable the constraints program to progress in an integrated manner.

**Find out more information on the pre-feasibility analysis conducted by the MDBA on the River Murray in South Australia constraints proposal**

New Goulburn constraints measure

### **Status of project:**

- Concept design
- Community consultation
- Being trialled

- In operation

The original Goulburn constraints project was withdrawn as a supply project by notification amendment in June 2017. The Goulburn project is nominated solely as a constraints project, and therefore does not contribute to an adjustment of sustainable diversion limits.

State(s) responsible: Victoria

The project aims to enable the delivery of higher in-channel flows of up to 20,000 megalitres per day at Shepparton (17,000 megalitres per day target with a 3000 megalitres per day unregulated flow risk management buffer). The project will work with communities to understand the risks, impacts and costs, and develop feasible, practical and acceptable solutions to mitigate third party impacts. Victoria proposes to:

- undertake extensive community engagement and one on one landholder consultation
- expand the capacity to monitor rainfall and streamflow
- develop new tools that support improved water delivery operations and management
- undertake technical investigations to build better understanding of risks and uncertainties
- develop more informed assessment of potential impacts and mitigation costs;
- trial and monitor higher in-channel flow rates in an incremental way once mitigation measures are in place
- plan for investigations and implementation over a longer time-frame.

Building on this work, in close consultation with affected landholders and communities, further improvements to environmental water delivery will also be investigated. Landholder acceptance of potential mitigation activities will be critical and the project will be considered in relation to the other southern connected Basin constraints projects.

#### **Project benefits:**

- improving the connection between rivers and low-lying flood runners and wetlands
- modification of on-farm infrastructure to facilitate higher flows if required and allow for additional ecological benefits such as fish passage
- recharging soil moisture and improve fertility of the soil
- upgrading public flood infrastructure to facilitate higher flows, for example levees, roads and crossings
- providing habitat and cues for fish and bird breeding
- better water quality as saline pools are flushed out and floodplain litter washed away to reduce the severity of blackwater events.

#### **Issues to be resolved:**

During the **assessment process** conducted by Basin governments, several issues were identified and will be resolved during the project's ongoing design and implementation (2018 to 2024), including:

- further consultation and engagement with communities on project development and refinement
- clarification of ecological benefits of constraints measures, at the local and system scale
- investigating options to maximise the benefit that can be achieved from the coordinated implementation of individual constraints measures, in particular the constraints along the Murray stem

- working with communities and individual land owners to understand effects, mitigation and costs on a case by case basis at an individual property level.
- developing governance and project management arrangements that will enable the constraints program to progress in an integrated manner.

### **Find out more information on the new Goulburn constraints proposal**

#### Efficiency measures

Efficiency projects allow more water to be made available for the environment by implementing projects that make agricultural, water delivery and urban water use practices more efficient. Unlike supply and constraints projects, efficiency projects are not location specific and operate across the Basin.

Water saved through efficiency projects will, up to 2024, be progressively transferred back into the system as environmental water, forming part of the Commonwealth environmental water holdings.

At the request of the Murray–Darling Basin Ministerial Council, an **independent review by EY** was commissioned in 2017 on how best to design, target and resource efficiency measures for the SDL adjustment. The report identified that a recovery of 450 GL is possible in socio-economically neutral or positive way.

Basin Ministers continue to discuss next steps for implementation of efficiency measures.

There are currently two notified efficiency measures under the Sustainable Diversion Limit Adjustment Mechanism. Further details regarding the delivery of efficiency measures can be found at the **[Department of Agriculture and Water Resources website](#)**.

The Commonwealth’s efficiency programs have been running for a number of years. Project reviews have consistently shown benefits to the irrigator that are broad and long lasting, such as improvements to crop yield, quality and flexibility.

#### On farm irrigation efficiency and other water use efficiencies

On-farm efficiency projects may include one or more of the following measures:

- installation/upgrading/replacement of:
  - irrigation infrastructure or technology, for example pump, fertigation or drainage systems
  - water delivery/management systems and associated telemetry/controls, high-efficiency irrigation systems
  - water delivery channels, structures/regulators, sub-/surface piping, for example installing river level and channel gauges, channel decommissioning, fencing
  - remote monitoring
  - water recycle system
- changing the management of dams, weirs, locks, other river infrastructure, or improvements to irrigation practices
- changing water supply, for example replacing MDB surface supply with ground water or desalination plant water
- recharging aquifers or storing water underground
- modifying irrigated area layout or design
- reconfiguring or diversifying crops or changing cropping times to reduce water demand

- improving soil moisture holding capacity through mulching, manuring, cultivation, addressing soil acidity/alkalinity.

The Commonwealth On-Farm Further Irrigation Efficiency (COIFFIE) program is set to replace the On-Farm Irrigation Efficiency program (OFIEP) by 2019.

off-farm (Urban or industrial and mining areas) water efficiency

Water delivery infrastructure and urban/industrial/mining areas efficiency projects may include one or more of the following measures:

- Installing or upgrading:
  - bulk water infrastructure and supplies, for example transport and distribution infrastructure
  - filtration and water treatment infrastructure
  - the operation of urban water delivery infrastructure
  - water recycling and water reuse infrastructure
  - stormwater and waste water infrastructure
  - water sensitive urban design infrastructure and landscaping
  - water efficient devices and technology
  - metering and pressure management
- improving economic regulation, competition and/or governance arrangements that lead to an increase in efficiency, availability, effectiveness and/or sustainability of the urban water sector.