

Goulburn (SS6)

INITIAL SDL ASSESSMENT RESULT

It is **likely** that the SDL reflects an environmentally sustainable level of take for this unit.

The Authority's initial assessment has also **identified a risk** that environmental outcomes for *flows and connectivity*, *ecosystem functions* and *native vegetation* are not being met for this Unit.

Pattern of flow is the **likely** leading driver of risk due to the inability to deliver higher in-channel flows and water to the floodplain in the lower Goulburn River.

The Authority is **proposing further work with the Victorian government** through 2026 to consider the most appropriate response to address this risk. This will include an examination of flow drivers and constraints to flow to inform the Authority's recommendation on response.

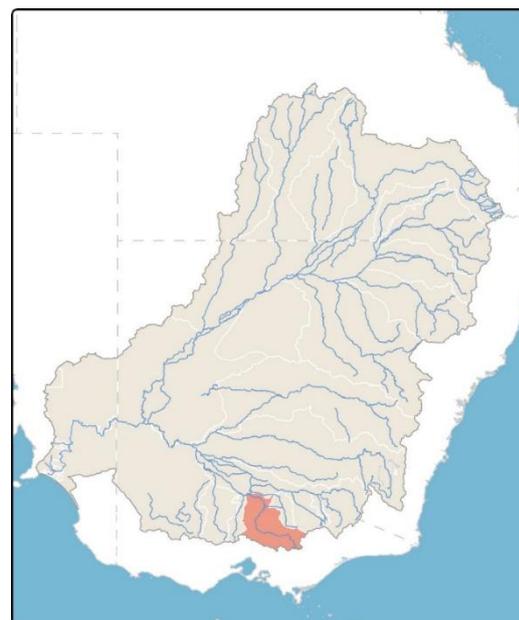


Figure 1: Goulburn SDL Resource Unit

The Authority is assessing whether the Sustainable Diversion Limit (SDL) for the Goulburn SDL Resource Unit (the **Unit**) continues to support environmental outcomes and reflect an environmentally sustainable level of take (ESLT). This initial assessment refers only to outcomes in this Unit.

This Assessment Summary provides an overview of the factors which are relevant to that work and the Authority's initial view. The summary draws on three 'Lines of Enquiry', engaging with the likelihood that flow regimes support environmental outcomes, the Authority's confidence in that assessment, and the consequence of an at risk finding. Line of Enquiry 2 – full Basin Plan implementation – has been considered as the primary line of enquiry. Assumptions for each Line of Enquiry are documented in the *Summary of Assessment Approach* available on the MDBA website.

Information on the Lines of Enquiry and methodology used in this assessment is available in the *Summary of Assessment Approach* and the *SDL Assessment and Response Framework*. Information on the *Basin Plan Review Discussion Paper* and process for making a submission are also available on the MDBA website.

About this Unit (as at June 2024)

Ramsar sites	None
Contribution to Basin water	11% of the total water available in the Murray-Darling Basin
Key waterways	Goulburn River (570km); Tributaries: Rubicon, Acheron, Yea and Broken Rivers.
Water storages	Lake Eildon (3,334 GL), Goulburn Weir (26 GL), Waranga Basin (432 GL)
Significant groundwater connections	Goulburn-Murray: Shepparton Irrigation Region (GS8a), Goulburn-Murray: Highlands (GS8b) & Goulburn-Murray: Sedimentary Plain (GS8c)

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The Water Resource Plan (WRP) that supports this Unit commenced on [13 June 2020](#). The WRP includes the rules and arrangements that Victoria are using to manage this Unit and maintain sustainability. Further information on water recovery for this SDL Resource Unit is available at the Department of Climate Change, Energy, the Environment and Water’s [surface water recovery factsheet](#).

Current condition

Figure 2 below summarises the observed environmental condition in the Unit (as at June 2024).

The Authority assessed that *native fish* are in **poor** condition. *Flows and connectivity* are considered in **good** condition whilst all other themes are considered to be in **moderate** condition. The Authority has medium confidence in the condition assessment of all themes.

There is high degree of variation in environmental outcomes across the Unit. The mid Goulburn River refers to the reach between Lake Eildon and Goulburn Weir, whilst the lower Goulburn refers to the reach between Goulburn Weir to the Murray River. Significant volumes of water can be diverted from Goulburn Weir to the Waranga Basin (a major irrigation water storage). Most environmental water delivery targets outcomes in the lower Goulburn River, and the Goulburn River also acts a vital contributor to support multiple downstream objectives in the River Murray system, including consumptive demand and environmental requirements.

The assessment of poor condition for *native fish* is on the basis of a range of missing fish species, poor recruitment of most identified species and continuous stocking of introduced species. Fish populations in the lower reaches of the Goulburn River are considered to be in better condition, partly due to the provision of environmental flows targeting native fish outcomes.

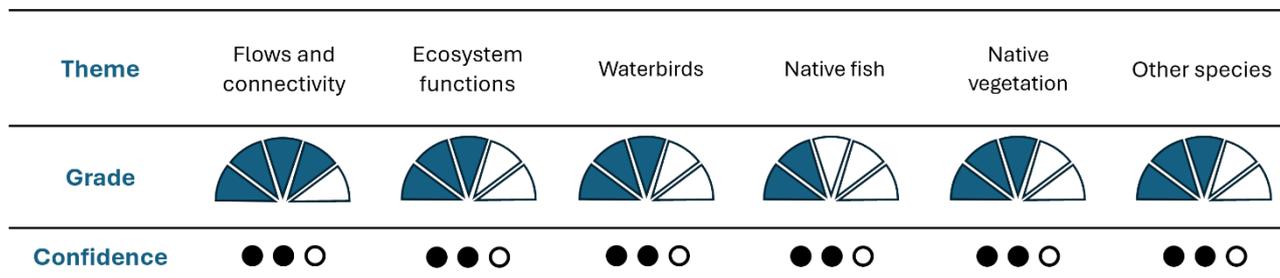


Figure 2. Environmental condition assessment in the Unit. Across each theme environmental condition is graded as *Very Poor*, *Poor*, *Moderate*, *Good* or *Very Good* (as indicated by segments) and confidence in this grading is assessed as *Low*, *Medium* or *High* (as indicated by dots) or *Data Deficient* (as indicated by grey dots). ‘Other species’ refers to animals including frogs, platypuses and turtles.

Environmental outcomes under a fully implemented Basin Plan

Table 1 presents a compilation of:

- the *likelihood* that flows will support environmental outcomes for the six surface water themes for this Unit; and
- the Authority’s *confidence* in that assessment, i.e. low (L), medium (M) or high (H) surety of the finding.

The findings in Table 1 consider condition monitoring, assessment of the relative achievement of Environmental Watering Requirements (EWRs) under river model scenarios, and other relevant evidence that provided additional information. Information on the methodology and EWRs used in this assessment is available in the *Summary of Assessment Approach* and the *SDL Assessment and Response Framework*.

The likelihood that the pattern and volume of flow will support the objectives for each ecological theme								
Theme	Line of enquiry	Very unlikely	Unlikely	About as likely as not	More likely than not	Likely	Very likely	Confidence
Flows and connectivity	LoE 1	[Dark Orange]	[Light Orange]	●	[Light Blue]	[Medium Blue]	[Dark Blue]	● ● ●
	LoE 2			●				● ● ●
Ecosystem functions	LoE 1	[Dark Orange]	[Light Orange]	●	[Light Blue]	[Medium Blue]	[Dark Blue]	● ● ●
	LoE 2			●				● ● ●
Waterbirds	LoE 1	[Dark Orange]	[Light Orange]		●	[Medium Blue]	[Dark Blue]	● ● ○
	LoE 2			●	● ● ○			
Native fish	LoE 1	[Dark Orange]	[Light Orange]		●	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 2			●	● ○ ○			
Native vegetation	LoE 1	[Dark Orange]	[Light Orange]	●	[Light Blue]	[Medium Blue]	[Dark Blue]	● ● ●
	LoE 2			●				● ● ●
Other species	LoE 1	[Dark Orange]	[Light Orange]		●	[Medium Blue]	[Dark Blue]	● ● ●
	LoE 2			●	● ● ●			

Table 1: Initial likelihood assessment of the flows supporting the objectives for ecological themes in Unit. Note: LoE 1 refers to Line of Enquiry 1 - current Basin Plan implementation and LoE 2 refers to Line of Enquiry 2 - full Basin Plan implementation. ‘Other species’ refers to animals including frogs, platypuses and turtles.

Under both Line of Enquiry 1 and Line of Enquiry 2 it is assessed as **about as likely as not** that the flow requirements are supporting objectives for *flows and connectivity*, *ecosystem functions* and *native vegetation*, and that there is a high level of confidence in that assessment.

For those themes in which the likelihood assessment is rated **about as likely as not**, the MDBA have explored additional lines of evidence to determine whether a consequence assessment is warranted. This process drew on a broader suite of available information to further explore whether there is risk or compromise to the ESLT and the relative influence of the level of take or other identified drivers. This step applied Authority expertise and insight – based on a range of considerations, options, and trade-offs in light of the Basin’s contextual operating environment – to determine the best available information. For this Unit, the evidence summarised in the [Constraints Relaxation Implementation Roadmap](#) (and referenced studies) has been a primary supporting line of evidence for the likelihood assessment, specifically in relation to flow pattern requirements to achieve floodplain outcomes.

The *flows and connectivity*, *ecosystem functions* and *native vegetation* themes are considered ‘at risk’ and were taken through to a further consequence assessment step.

Outcomes for the *waterbirds*, *native fish* and *other species* themes have been identified as **more likely than not** to be supported by the pattern and volume of flow under Lines of Enquiry 1 and 2.

This assessment draws on MDBA model scenarios and associated ecological analysis. Contemporary river system models developed for the Basin Plan Review draw on improved calibration, higher quality datasets and a more realistic representation of hydrological and operational processes across the Basin. The MDBA will continue to explore the model analysis with Basin state partners and other stakeholders to test assumptions and uncertainties. Further modelling and analysis are planned in 2026 to ensure the final assessment draws on best available science and knowledge, and it is anticipated that this process will increase shared confidence in the model analysis and findings.

Consequence assessment

Condition assessments and modelled flow data indicate potential risks to *flows and connectivity*, *ecosystem functions* and *native vegetation* themes. A consequence assessment, primarily considering Line of Enquiry 2, has been undertaken for these themes (Table 2).

Theme	Nature of impact	Spatial scale of impact	Impact on key values	Final Rating
Flows and Connectivity	Constraints to flow and altered flow patterns are impacting lateral connectivity limiting overbank flows essential for floodplain vegetation, waterbirds, frogs, turtles and macro and micro-invertebrates.	Moderate- SDL unit impact	Yes – one or more Basin-wide Environmental Watering Strategy (BWS) outcomes for connectivity are affected	HIGH
Ecosystem function	Altered flow regimes have simplified instream hydraulics, with reduced flow diversity and channel complexity limiting habitat types and sediment transport. Reduced frequency of overbank flows has reduced organic matter and carbon exchange, increasing litter loads and the risk of hypoxic events.	Moderate – SDL unit impact	Yes - Includes BWS Important Assets	HIGH
Native Vegetation	Prolonged high flows in summer along the lower Goulburn have negative impacts on instream and riparian vegetation along lower parts of riverbank resulting in death or reduced fitness for both mature and juvenile plants. Inability to deliver higher in-channel or overbank flows along lower Goulburn impacting on riparian vegetation and flood-dependent vegetation.	Moderate- SDL unit impact	Yes - BWS outcomes for native vegetation affected	HIGH

Table 2: Consequence assessment results.

Drivers of impact

In this Unit, *flows and connectivity*, *ecosystem functions*, and *native vegetation* rated as **high** in the consequence assessment. The initial assessment has identified flow pattern and ongoing constraints to delivery as leading drivers of this outcome, characterised by reduced lateral connectivity.

Longitudinal connectivity along the length of the river is being supported, however lateral connectivity to the lower Goulburn wetlands, billabongs and floodplain is currently constrained. Operational flow limits are in place to avoid impacting irrigator pumps, third party landholders and recreational users. Managed environmental flows in the lower Goulburn can only be delivered up to approximately half bankfull. Without the delivery of higher flows up to bankfull or overbank, *ecosystem functions* and exchange between the lower Goulburn River and its wetlands and floodplain are reduced. This also has implications for *native fish* due to reduced flow variability and habitat availability in particular for small-bodied wetland/floodplain specialist species.

Native vegetation outcomes in the lower Goulburn are primarily impacted by two separate drivers. The first driver is that managed flows are unable to be delivered for *native vegetation* within low-lying wetlands and the floodplain due to operational constraints. A second key driver relates to unseasonably high baseflows which can occur across summer and early autumn associated with inter-valley transfers (IVT) to the Murray River. These unseasonal, prolonged flows have the potential to negatively impact riverbank vegetation and riverbank stability.

Environmental outcomes under a climate impacted future

For a description of anticipated climate impacts across the Basin see the *Summary of Assessment Approach* available on the MDBA website.

The future climate is uncertain. The MDBA has applied a set of climate model scenarios to explore the ecological effects of climate change against a plausible range of future climates. Table 3 presents a summary of the anticipated environmental impacts of climate change for the Unit by reference to the likelihood of flow regimes being met for the six environmental themes. The shaded bars represent the plausible range of future climates, and the black dots represent the anticipated likelihood under a median (50th percentile) future climate scenario.

The likelihood that the pattern and volume of flow will support the objectives for each ecological theme

Theme	Line of enquiry	Very unlikely	Unlikely	About as likely as not	More likely than not	Likely	Very likely	Confidence
Flows and connectivity	LoE 3 (~2030s)	[Dark Orange]	[Light Orange]	[Grey]	[Light Blue]	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 3 (~2050s)							● ○ ○
Ecosystem functions	LoE 3 (~2030s)	[Dark Orange]	[Light Orange]	[Grey]	[Light Blue]	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 3 (~2050s)							● ○ ○
Waterbirds	LoE 3 (~2030s)	[Dark Orange]	[Light Orange]	[Grey]	[Light Blue]	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 3 (~2050s)							● ○ ○
Native fish	LoE 3 (~2030s)	[Dark Orange]	[Light Orange]	[Grey]	[Light Blue]	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 3 (~2050s)							● ○ ○
Native vegetation	LoE 3 (~2030s)	[Dark Orange]	[Light Orange]	[Grey]	[Light Blue]	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 3 (~2050s)							● ○ ○
Other species	LoE 3 (~2030s)	[Dark Orange]	[Light Orange]	[Grey]	[Light Blue]	[Medium Blue]	[Dark Blue]	● ○ ○
	LoE 3 (~2050s)							● ○ ○

Table 3: Assessment of the flows supporting the objectives for ecological themes at 2030 and 2050 levels of global warming in the Unit. Note: LoE 3 (~2030s) refers to Line of Enquiry 3 - possible future 2030s hydroclimate sequences and LoE 3 (~2050s) refers to Line of Enquiry 3 - possible future 2050s hydroclimate sequences. Confidence in this grading is assessed as *Low*, *Medium* or *High*. ‘Other species’ refers to animals including frogs, platypuses and turtles.

For this Unit, a consistent finding across the plausible range is that *flows and connectivity*, *ecosystem functions* and *native vegetation* are anticipated to be the most exposed to climate change. The 2025 Sustainable Yields and the MDB Outlook demonstrated that water availability and runoff are very likely to decline throughout the southern Basin such that there is likely to be reduced inflows and higher evaporation rates. This is expected to see an increasing risk to channel connectivity, declining water quality driven by dissolved oxygen and water temperatures, and increased risk of habitat contraction likely driven by an increase in the likelihood and severity of bushfires due to drier fuels, reduced breeding and vegetation recruitment opportunities and survival rates, restricted migration, and shrinking refuge habitats during drought sequences.

Initial Assessment

On the balance of all three Lines of Enquiry, **the Authority’s initial assessment is that there is a risk that environmental outcomes are not being met in this Unit.** *Flows and connectivity*, *ecosystem functions* and *native vegetation* have been identified as ‘at risk’ themes, and it is anticipated that climate change will exacerbate the risks into the 2030s and beyond.

Flow has been identified as a leading driver of this finding, specifically deficiencies in lateral connectivity. The SDL is one factor that determines the pattern of flow in the river and the extent to which it is supporting environmental outcomes, but there are many other important factors such as water sharing rules, management arrangements, and decisions made by environmental water holders.

It is likely that the SDL reflects an environmentally sustainable level of take, but additional investigation is warranted. The Authority are proposing further work is required to explore all contributing factors before a determination on the SDL can be made.

As Basin Plan implementation is still underway, the MDBA has made assumptions about water recovery under the 450GL program, the completion of infrastructure and rules projects under the SDL Adjustment Mechanism (SDLAM), and the completion of the 2026 SDLAM Reconciliation.

Consideration of response

The Authority is proposing more work with the Victorian government to further explore the specific flow drivers and the most appropriate response to this initial assessment. This work will include additional modelling, analysis and other lines of evidence to ensure the findings for the Basin Plan Review report are based on robust evidence and the best available scientific knowledge.

The Goulburn River is a major tributary of the Murray, with environmental water outflows from the river (called environmental water return flows) providing an important contribution to the health of the downstream Murray. Addressing constraints to flow within the lower Goulburn River is expected to better support both local and broader system environmental outcomes.

The Authority will continue work with the Victorian and other Basin governments to implement key findings from the [Constraints Relaxation Implementation Roadmap](#) and facilitate more coordinated delivery across the southern Basin constraints projects.

High-level response options currently under consideration for this Unit include:

- Environmental works and measures, including:
 - Addressing constraints for flow delivery in the lower Goulburn River
 - Projects that enable managed flow delivery to discrete wetlands.
- Targeted changes to rules or management settings
- Change the Sustainable Diversion Limit
- Review environmental objectives and outcomes

The risks of a changing climate continue to be actively considered in the Basin.

Noting this finding, the Basin Plan settings in connection with monitoring, evaluation and assessment activities warrant review as they apply to this Unit. Other relevant factors include planning by the Victorian government for the management of local and site-specific areas of concern to maintain environmental outcomes. The Authority supports the continuing efforts of environmental water managers and river operators to make the most of water delivery to support the Basin's environmental outcomes. These efforts continue to evolve in response to new techniques and emerging knowledge, and are often required to balance multiple (and sometimes competing) environmental objectives across a range of geographic scales.

Evidence summary

The standard evidence sources are presented in the *Summary of Assessment Approach* on the MDBA website.

The Authority utilised the best available evidence. Through the Basin Plan Review 12-week public consultation process, and the subsequent consideration of submissions and engagements over the course of the 2026 Basin Plan Review, the Authority will continue to build on the evidence used through the initial SDL Assessments to address uncertainties and knowledge gaps.