Goulburn-Murray: Sedimentary Plain (GS8c)

INITIAL SDL ASSESSMENT RESULT

The Authority is **confident** that the SDL continues to reflect an environmentally sustainable level of take and **proposes the SDL is maintained**.

However, groundwater decline poses a localised risk to *groundwater dependent ecosystems (GDEs), surface water – groundwater connectivity* and the *productive base*.

The Authority will continue to work with **Victoria** to ensure that the appropriate rules and management arrangements are in place to manage localised and Unit-scale issues.

Figure 1: Goulburn-Murray Sedimentary Plain SDL Resource Unit

The Authority is assessing whether the Sustainable Diversion Limit (SDL) for the Goulburn-Murray Sedimentary Plain SDL Resource Unit (the **Unit**) continues to support environmental outcomes and reflect an environmentally sustainable level of take (ESLT).

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 trends in groundwater levels and salinity support environmental outcomes, the Authority's confidence in that assessment, and the consequence of an 'at risk' finding.

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 available on the MDBA website.

About this Unit (as at June 2024)

Aquifer Storage/size (GL)	926,497
SDL as at June 2025	223.0
Entitlement volume (GL/y)	214.94
Recharge estimate range (GL/y)[1]	110-450
Average annual take (2012/13–2022/23, GL/y)	112.83
Significant surface connections	Kiewa (SS3), Ovens (SS4), Goulburn (SS6), Broken (SS5), Campaspe (SS7), and Loddon (SS8)

The Water Resource Plan (WRP) that supports this Unit commenced on 13 June 2020. The WRP includes the rules and arrangements that Victoria is using to manage this Unit and maintain sustainability.

[1] Recharge estimate range is derived from three estimates of recharge: Modelled 450 GL/y, SY2 (diffuse) 193 GL/y and Chloride Mass Balance (CMB) 110 GL/y.

Utilisation at the time of the review

This Unit includes all groundwater from the land surface to 200 metres below the surface or 50 metres below the base of the Tertiary (Palaeogene and Neogene) sediments, whichever is the deeper. The assessment reflects that there are several signification connections to surface water resources in this Unit.

The SDL for this Unit was set at the BDL of 203.5 GL/y, which was very close to the preliminary extraction limit (PEL) of 205.3 GL/y and was determined by numerical modelling. At the time of setting the SDL, Victoria raised concerns about the limit. In response, the Basin Plan included a requirement for a review of the SDL and BDL by November 2014. Based on the recommendations of the review panel, the Authority increased the SDL to 223.0 GL/y in July 2018 and added a Basin Plan requirement that the WRP must include rules to manage any risks of take to the ESLT characteristics (Basin Plan ss.10.21, 10.35D).

Management settings specific to this SDL resource unit are set out in the Water Resource Plan. Under the Victorian water planning framework, there are several groundwater management areas (GMAs) in this Unit. In each GMA, there are separate local management plans with rules specific to the GMA, which are not accredited in the WRP. Local management rules prescribe resource condition limits, trading of entitlement, the setting of trigger levels to enable water sharing in times of shortage, and rules to manage the impacts of groundwater pumping intensity.

Victoria launched the Groundwater Management 2030 (GM2030) in 2022. Outcomes include improving evidence-based groundwater management with modern tools and supporting streamlined and effective licensing, trade rules and controls on groundwater use.

Figure 2 below identifies that take has varied over time, with inter-annual variations linked to climate conditions, with reductions in use observed in recent wet years from 2021/22 to 2022/23. The annual take averaged 51% of the SDL over the period 2012/13 to 2022/23.

Medium-to-high level declines in aquifer water levels are concentrated in the Campaspe, Loddon, Goulburn-Broken and Katunga areas. Recent years of higher rainfall have led to stabilisation in some parts of the SDL resource unit, but declines are continuing to occur at a medium rate in the areas noted above.

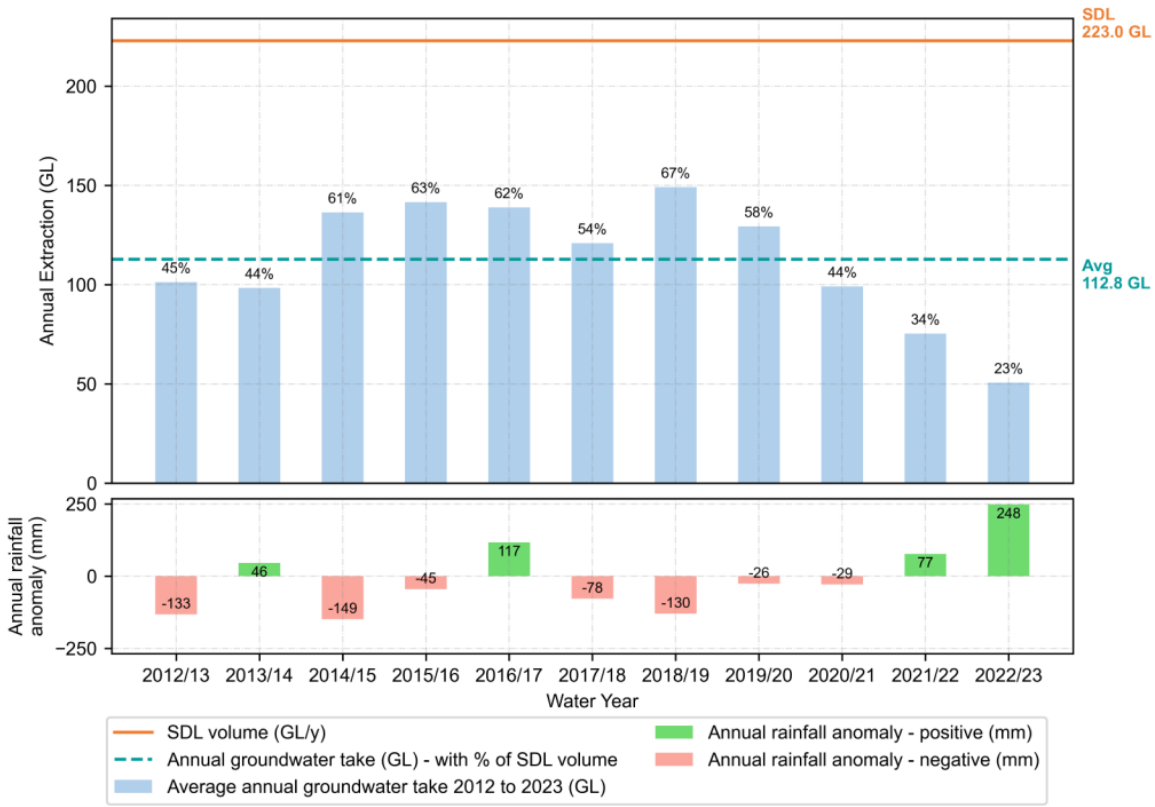

Figure 2: Average annual take (2012/13 – 2022/23)

Environmental outcomes at time of the Review

Likelihood and confidence

Groundwater level and water quality (salinity) trends

Table 1 presents a compilation of the groundwater level and salinity trend for this Unit, and the Authority's *confidence* in that assessment (i.e. low (L), medium (M) or high (H) surety of the finding).

Understanding the groundwater level and salinity trend assessment (Table 1)

For those characteristics informed by groundwater level: The table lists the *percentage of monitoring bores* that are exhibiting either a rising or declining trend in water levels (the remainder refer to bores for which a statistically significant trend could not be detected). A percentage of 30% or greater in the *declining* category indicates a risk to groundwater levels supporting the relevant assessment characteristic.

For those characteristics assessed by reference to water quality: The table lists the *percentage of monitoring bores* that are exhibiting either a rising or declining trend in water quality (the remainder refer to bores for which a statistically significant trend could not be detected). A rising/stable trend means that water quality (salinity) is improving.

Regarding confidence: a single dot indicates low confidence in the trend data, two dots indicate moderate confidence, and three dots indicate high confidence.

The percentages are based on number of monitoring bores providing data over the short and long-term periods. In some Units the number of monitoring bores has decreased over time, and this is accounted for in the

percentages. Also, when necessary, a Unit assessment will further explore the detailed data under the assessments to determine if localised declining trends persist.

Productive base is defined as the capacity of an aquifer to provide a sustainable supply of water for environmental and consumptive uses (domestic, agricultural, and industrial) without compromising the long-term health and function of the resource and dependent ecosystems.

Assessment characteristic	Short term trend (past 12 years)			Long term trend (past 40 years)		
	Rising/ stable	Declining	Confidence	Rising/ stable	Declining	Confidence
Groundwater Dependent Ecosystems (GDEs)	19%	26%	●●○	17%	43%	●●○
Surface water – groundwater connectivity	17%	25%	●●○	20%	37%	●●○
Productive base	19%	27%	●●○	19%	43%	●●○
Water quality	4%	0%	●○○	31%	9%	●●○

Table 1: Groundwater level and salinity trend assessment over the past 12 and 40 years.

As can be seen, three of the four groundwater characteristics have been identified as having a long-term **declining trend** in more than 30% of monitoring bores across the Unit:

- *GDEs* (moderate confidence)
- *surface water-groundwater connectivity* (moderate confidence)
- *productive base* (moderate confidence)

A deeper examination of the underlying data reveals that this Unit has experienced statistically significant declines in multiple areas. The declines in some of these areas have improved in the short-term but there are still declines of 0.1 to 1 metre per year evident in the Campaspe, Loddon, Goulburn-Broken and Katunga areas.

It is noted that Victorian management of groundwater includes some deliberate lowering of the water table to prevent soil salinisation after unwanted historical increases but this predominantly occurs in the Goulburn-Murray: Shepparton Irrigation Region (GS8a) SDL resource unit, not in this unit.

Other lines of evidence

In the relevant WRP risk assessment, risks to GDEs are assessed as low, risk to the productive base is assessed as medium and the risks to connectivity were not assessed. This information has been considered in the consequence assessment for these characteristics.

Risks to water quality are assessed as very high as there is the potential for saline groundwater migration into fresher zones due to irrigation or changes in hydraulic gradients. This risk is not yet manifesting in either the long or short-term water quality monitoring data.

Recharge and utilisation information

Tables 2 and 3 below provide a summary of recharge information, and an assessment of the likelihood of full utilisation of the SDL. This information is relevant because it enables a comparison of recharge relative to take (current and by reference to the SDL) and how sensitive the Unit is to change in recharge (i.e. variability in conditions year to year) and increases in actual take.

Understanding modelled recharge information (Table 2)

The 'proportions' presented below can also be interpreted as a percentage. For example, a proportion of 1.29 indicates that the SDL is 129% of (or 29% above) the recharge rate.

If the SDL as a proportion of recharge is 1:1 they are equal, and if it is **more than 0.9**, risk is indicated because take is approaching the level of recharge.

'Buffering' relates to how big total aquifer storage is compared to recharge. An aquifer with a very large total storage will offer high buffering because it will take a long time for changes in recharge to affect overall groundwater levels. In that scenario, the aquifer is described as having 'low' sensitivity to changes in recharge. The reverse applies where total aquifer storage is relatively small. In that case it would have 'high' sensitivity to changes in recharge. Buffering has been categorised using the *proportion of aquifer storage to recharge estimate* as follows: Low buffering = 29 to 111, moderate buffering = >111 to 333, and high buffering = >333.

Recharge information					
Status of recharge knowledge base (modelled)	Proportion of SDL to recharge (modelled)	Proportion of aquifer storage to recharge estimate (modelled)			Proportion of average annual take to recharge (modelled)
		Modelled	Buffering	Sensitivity	
Best available	0.5 No additional indicated	2,058	High	Low	0.25

Table 2: Modelled recharge estimates as a proportion of the SDL, total aquifer storage and average annual actual take; this assessment has drawn on the SY1 (modelled) as the best available recharge information.

Potential likelihood of full utilisation of the SDL						Current % Average annual take
Very unlikely	Unlikely	About as likely as not	More likely than not	Likely	Very likely	
		●				51

Table 3: Likelihood of take increasing to the SDL

Annual groundwater take is 51% of the SDL, and it is assessed that use of the full SDL is **about as likely as not**. Under both scenarios (i.e. a continuation of existing take, or an increase of take to the

SDL), the proportion of take to recharge is less than 0.9, and hence there is no additional risk to assessment characteristics if use were to increase to the SDL.

The aquifer storage indicates that there is **high buffering** and that the total resource will have a relatively **low sensitivity** to an increase in use or changes in recharge.

Consequence assessment

The risk assessment has detected declining trends in water levels at more than 30% of monitoring bores in the long-term dataset corresponding to the *GDEs, surface water - groundwater connectivity* and the *productive base* characteristics. Hence a consequence assessment has been undertaken which describes the nature of potential impact, the likely spatial scale of impact and the potential impact on key values. Table 4 presents the outcome of the consequence assessment.

Understanding the consequence assessment (Table 4)

Potential nature of impact describes the potential impact of groundwater level or water quality decline on connected GDE (including whether the GDE supports significant sites or communities), connectivity and/ or impacts on the productive base.

Spatial scale is assigned as either: Low, site specific/local; Moderate, sub-unit; or High, SDL unit to Basin scale impacts.

Key values include: impact on connected GDEs and connected surface water, and, if known, the significant sites or communities they support (Ramsar, TLM Icon sites, EPBC-listed values). Impact on the productive base which may include impacts to provisioning and other ecological services.

Final rating: a low rating requires no further action. Medium or High ratings will require a response.

Characteristic	Nature of impact	Spatial scale of impact	Impact on key values	Final rating
GDEs	Potential to reduce discharge to surface water systems, which could lead to compromised condition of vegetation.	**Moderate** Sub-unit	**High** • TLM sites (Barmah-Millewa Forest and Gunbower Forest). • Widespread GDEs mapped across the area, with high value GDE areas in areas of decline (esp. Katunga, mid-Loddon and Campaspe).	**MEDIUM**
SW-GW connectivity	Potential increase in losing streams, (therefore increase in loss of surface water to groundwater). Potential reduction in base flows and low flows in surface water systems, which are important for supporting ecological values such as native fish.	**Moderate** Sub-unit	**High** • Campaspe and Loddon baseflows are dependent on SW-GW connectivity. • Ovens and Kiewa are highly connected to groundwater.	**MEDIUM**

Productive base	Potential impacts on provisioning services. Structural integrity of aquifer potentially compromised.	**Moderate** Sub- unit	**High** • Medium to high rates of decline in Campaspe, Loddon, Goulburn-Broken and Katunga areas	**MEDIUM**

Table 4: outcome of consequence assessment

Drivers of impact

In this Unit, the *GDEs, surface water – groundwater connectivity* and the *productive base* have been identified to be at risk. The initial assessment has identified declining groundwater levels due to groundwater take as a driver, with the rate of recharge (which encapsulates climate change impacts to date) an exacerbating factor. The Authority will test this assessment and the relative contribution of different drivers to this result.

Environmental outcomes under a fully utilised SDL and climate impacted future

Full use of the SDL

Many groundwater units across the Basin experience water take which is substantially less than the SDL, but it is important that the work of the Basin Plan Review is conducted with awareness of the effects of a fully utilised SDL — it is the SDL that must reflect an ESLT.

As summarised in Tables 3 and 4, the initial assessment has considered a scenario where take increased and use reached up to the SDL. This analysis considered new information about diffuse recharge as a proportion of the SDL, our knowledge of total aquifer storage, and average annual actual take. The analysis used an SDL to recharge proportion of 0.9 or more as an indicator of potential risk to maintaining groundwater levels within resource condition limits that support assessment characteristics.

Climate change through to the 2036 Basin Plan Review and 2050

Table 5 presents a summary of the anticipated environmental impacts of climate change for the Unit by reference to the future recharge estimates.

SY2 climate scenario	Trend towards 2036		SY2 climate scenario	Trend towards 2050	
	Recharge greater than SDL	Recharge less than SDL		Recharge greater than SDL	Recharge less than SDL
	Low Risk	High Risk		Low Risk	High Risk
Warmer and slightly wetter	●		Hotter and slightly wetter	●	
Warmer and drier	●		Hotter and drier		●
Warmer and much drier		●	Hotter and much drier		●

Table 5: Risk to assessment characteristics at full use of SDL using estimates of future recharge under future climate

The comparison of SDL to recharge under a range of plausible climate futures indicates a high level of additional risk would occur under a drier climate, and this risk is anticipated to increase over decades to come. Hence at the level of the SDL, the potential existing risks to *GDEs, surface water – groundwater connectivity* and the *productive base* would further increase.

Initial Assessment

On the balance of all 3 Lines of Enquiry, the initial assessment has found that the Authority **is confident that the SDL reflects an environmentally sustainable level of take**, but there is a localised risk to *GDEs, surface water - groundwater connectivity* and the *productive base*.

Consideration of Response

Given this initial assessment identifies that groundwater level decline in the Unit poses a risk to *GDEs, surface water - groundwater connectivity* and the *productive base*, the Authority will work with the Victorian government to identify appropriate responses, and to understand whether management rules and arrangements are in place and suitable to address this risk.

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

- Targeted changes to rules or management settings

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

Evidence summary

In addition to the standard evidence sources presented in the *Summary of Assessment Approach* on the MDBA website, the following specific evidence sources were used for this Unit:

- Goulburn Murray Water (2025) Lower Campaspe Valley Water Supply Protection Area Groundwater Management Plan. 20250925_2024_2025_Annual_Report_Lower_Campaspe_Valley_WSPA_GMP.pdf Document ref: A5478631
- How is groundwater managed? - Goulburn Murray Water
- What are the groundwater allocations this season? - Goulburn Murray Water
- Vic Department of Environment, Land, Water and Planning (DEWLP) (2022) Groundwater-managment-2030.pdf

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.