



Australian Government



# Proposed groundwater amendments to the Basin Plan – additional information



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### **Acknowledgement of the Traditional Owners of the Murray–Darling Basin**

The Murray–Darling Basin Authority acknowledges and pays respect to the Traditional Owners, and their Nations, of the Murray–Darling Basin, who have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters. The MDBA understands the need for recognition of Traditional Owner knowledge and cultural values in natural resource management associated with the Basin.

The approach of Traditional Owners to caring for the natural landscape, including water, can be expressed in the words of Darren Perry (Chair of the Murray Lower Darling Rivers Indigenous Nations) —

*‘the environment that Aboriginal people know as Country has not been allowed to have a voice in contemporary Australia. Aboriginal First Nations have been listening to Country for many thousands of years and can speak for Country so that others can know what Country needs. Through the Murray Lower Darling Rivers Indigenous Nations and the Northern Basin Aboriginal Nations the voice of Country can be heard by all’.*

This report may contain photographs or quotes by Aboriginal people who have passed away. The use of terms ‘Aboriginal’ and ‘Indigenous’ reflects usage in different communities within the Murray–Darling Basin.

## Contents

Glossary.....	5
Background.....	6
Groundwater reviews.....	6
Alignment with state plans .....	7
Proposed groundwater amendments.....	8
Chapter 1 - Definitions .....	8
Chapter 3 - Water resource plan area boundaries .....	8
Chapter 6 – SDL resource units and compliance methodology .....	11
Chapter 10 - Local management rules and adjustment to review provision.....	16
Schedule 4 - Changes to matters relating to groundwater SDL resource units.....	18
Appendix A: Schedule 4 proposed NSW and Qld SDL resource unit definitions.....	27
Appendix B: Outline of Scientific knowledge.....	31
Overview .....	31
Western Porous Rock SDL resource unit.....	32
Eastern Porous Rock WRP area.....	32
Goulburn-Murray Sedimentary Plains SDL resource unit.....	32
Appendix C: Outline of the socioeconomic analysis .....	34
Overview .....	34
Optimising environmental, economic and social outcomes .....	34
Socio-economic analysis .....	35
Change to compliance methodology .....	38

## Glossary

**Baseline diversion limits (BDL)** for each groundwater SDL resource unit represents the Murray–Darling Basin Authority's (the Authority) determination of the limits on groundwater use under the existing water management arrangements at the time the Basin Plan was made. The groundwater BDLs for each SDL resource unit were determined on the following basis:

- Where a state water management plan or proposed plan was in place, the BDL was the plan limit. If the plan limit was more than the level of entitlement, the BDL was the level of entitlement.
- Where there was no state water management plan, the BDL was the entitlement along with the effect of any rules managing extraction.
- Where there was a cross-border agreement for groundwater management, the extraction limit under the agreement was the BDL.

The **register of take** is a database that records the permitted and actual take from each surface and groundwater SDL resource unit. The purpose of the register of take is to assist with determining, whether there has been compliance with the SDL for each SDL resource unit and the amount of any non-compliance (section 6.08).

**Sustainable diversion limits (SDL)** represent the maximum long-term annual average quantities of water that can be taken on a sustainable basis from Basin water resources as a whole, and from each SDL resource unit. The *Commonwealth Water Act 2007* requires that this reflect an environmentally sustainable level of take.

**SDL resource unit** describes a geographical area which contains a set of water resources. Boundaries of groundwater SDL resource units are based on geology, hydrogeology, state planning boundaries and other administrative arrangements.

**Water resource plans (WRPs)** set out how water resources will be managed. They will be developed by the basin states, or in certain circumstances by the Authority, for approval by the Commonwealth Water Minister.

A **water resource plan area** is a geographical area, of which there are 14 for surface water, 16 for groundwater and an additional six for surface water and groundwater combined. As far as possible, the boundaries match those of existing state water management areas.



## Background

The proposed amendments to groundwater-specific provisions in the Basin Plan relate to:

- Chapter 1 - Definitions
- Chapter 3 - WRP area boundaries
- Chapter 6 - Compliance methodology
- Chapter 10 - Local management rules and adjustment to review provision
- Schedule 4 - Changes to:
  - BDLs and SDLs
  - SDL resource unit boundary definitions

The proposed amendments stem from a number of drivers. These include:

- the outcomes of groundwater reviews specified in the Basin Plan and resulting negotiations between Authority and basin states
- requests by basin states to align the Basin Plan with their state water management plans.

## Groundwater reviews

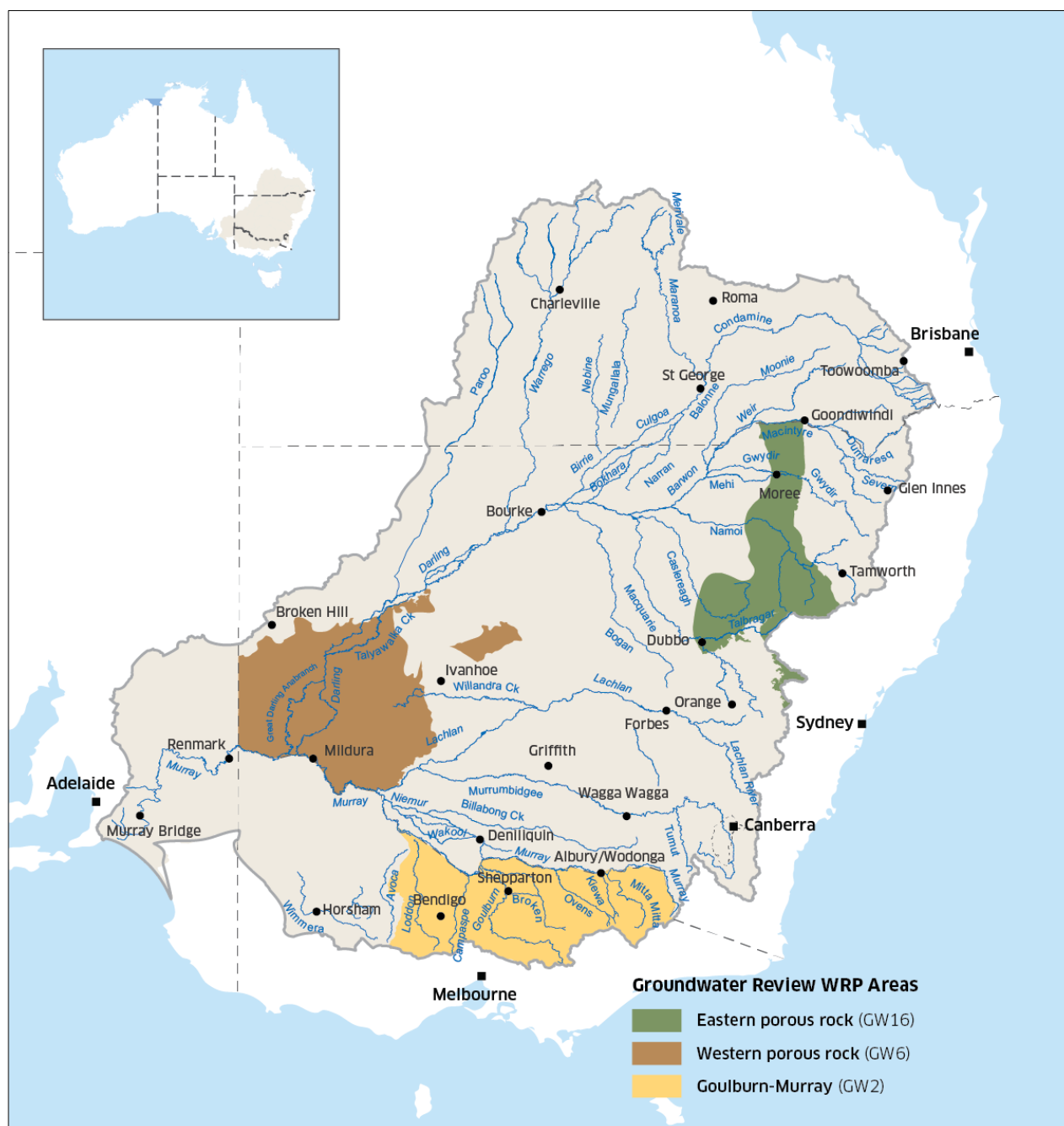
When the Basin Plan was being finalised in 2012, concerns were raised by the New South Wales (NSW) and Victorian (Vic) Governments in relation to the groundwater SDLs in three Water Resource Plan areas (two in NSW and one in Vic). In response, the Basin Plan included a requirement that the BDLs and SDLs for the three areas would be reviewed by November 2014 (section 6.06(6) to (9)). These three areas (Figure 1) are:

- Western Porous Rock SDL resource unit (GS50) (NSW);
- Eastern Porous Rock WRP area (GW16) (NSW); and
- Goulburn–Murray: Sedimentary Plain SDL resource unit (GS8) (Vic).

The Basin Plan also states the type of information to be considered in each review and identifies the process for selecting experts to undertake the reviews.

As per the provisions of the Basin Plan, a review panel was assembled to undertake each review. Also, to ensure the most up to date information was available to the review panels, the Authority, in partnership with the relevant state, appointed a consultant to bring together and synthesise the relevant information for each review. The [review reports and associated synthesis reports](#) have been published on the MDBA website and are further discussed in Appendix B.

In summary, each review recommended that the SDLs under consideration could be increased “once assurances have been given by the relevant state to demonstrate that the resource will be managed by state policies and plans so as to limit impacts to acceptable levels.” This outcome reflects the view of the review panels that a less conservative approach to setting SDLs could be considered if suitable management actions are in place to manage the potential impacts of increased groundwater take.



**Figure 1: Groundwater WRP areas containing the groundwater review areas**

## Alignment with state plans

Since the completion of the reviews, a number of other technical and administrative groundwater issues have been identified by the states. These mainly relate to the WRP area boundaries, SDL resource unit boundary definitions and descriptions of the groundwater resources. These have been requested by NSW, Victoria (Vic) and Queensland (Qld) and are aimed at ensuring alignment with state water management plans to reduce complexity and administrative burden. These issues have been addressed in the amendments.

## Proposed groundwater amendments

### Chapter 1 - Definitions

The proposed amendments to Chapter 1 of the Basin Plan are linked to the addition of a new groundwater compliance method discussed under the Chapter 6 section of this document. The proposed amendments to Chapter 1 are minor and technical in nature.

### Chapter 3 - Water resource plan area boundaries

Chapter 3 of the Basin Plan identifies the 36 water resource plan (WRP) areas. There are 14 surface water, 16 groundwater and six surface and groundwater WRP areas under the Basin Plan. Chapter 3 also specifies the water accounting period for the WRP areas, which is the 12 months after 1 July of any year.

Section 3.06 of the Basin Plan contains reference to datasets that identify the boundaries of the groundwater WRP areas. It currently refers to [the dataset held by the MDBA](#) “at the commencement of the Basin Plan”. The proposed changes in Chapter 3 are to update maps and spatial datasets. This will also necessitate amendments to Schedule 4. There will be no changes to ACT, SA and Vic WRP area boundaries. These proposed boundary changes will only affect the NSW and Qld WRP areas.

A similar proposed amendment to Chapter 6 will recognise changes to the SDL resource unit boundaries as a result of the state water planning area changes.

#### **NSW groundwater WRP amalgamations and boundary changes**

NSW has requested a number of changes be made to groundwater WRP areas. This includes the amalgamation of four WRP areas into two WRP areas to align the Basin Plan areas more closely to the NSW water sharing plan boundaries. The amalgamations are:

- Western Porous Rock WRP area (GW6) and Eastern Porous Rock WRP area (GW16) into NSW Murray Darling Basin Porous Rock WRP area; and
- Lachlan and South Western Fractured Rock WRP area (GW11) and New England Fractured Rock and Northern Basalts WRP area (GW17) into NSW Murray Darling Basin Fractured Rock WRP area.

As part of the proposed NSW WRP area amalgamation the Oaklands Basin SDL resource unit (GS38) will now be included in the NSW Murray–Darling Basin Porous Rock WRP area.

NSW has also notified the Authority that a number of groundwater source boundaries have been refined since Basin Plan finalisation. These refinements affect WRP boundaries and should be reflected in the electronic map files held by the Authority. These proposed boundary changes will occur in the following WRP areas:

- Darling Alluvium (GW7);
- Western Porous Rock (GW6);
- Murray Alluvium (GW8);
- Murrumbidgee Alluvium (GW9);
- Lachlan and South Western Fractured Rock (GW11);
- Macquarie-Castlereagh Alluvium (GW12);



- Namoi Alluvium (GW14);
- Eastern Porous Rock (GW16); and
- New England Fractured Rock and Northern Basalts (GW17).

In NSW these boundary changes result in changes to the areas of the WRPs. The percentage of change is less than 1% of the NSW Murray–Darling Basin area. The area changes do not change the SDLs in the associated SDL resource units. The changes are shown in Figure 2.

In order to be consistent with proposed changes to definitions of SDL resource units (discussed under the groundwater Schedule 4 changes section of this document), changes also need to be made to the NSW WRP area definitions in section 3.06 of the Basin Plan.

### Queensland groundwater WRP amalgamations and boundary changes

Qld has requested the amalgamation of two of its WRP areas: Queensland Border Rivers WRP area (GW19) and Moonie WRP area (GW20) into Queensland Border Rivers–Moonie WRP plan area. As part of this amalgamation, Qld has requested that two SDL resource units be merged. This is discussed under the groundwater Chapter 6 section of this document.

This proposed amendment provides for more efficient use of resources and reduces the administrative burden on both Qld and the Authority. There are no impacts on any of the limits currently set in either of the WRP areas or the SDL resource units. The changes are shown in Figure 2.

Overall the number of WRP areas will now decrease from 36 to 33. Table 1 displays the changes.

**Table 1: Proposed WRP area changes**

Basin Plan 2012 WRP areas	Water resource	Proposed WRP areas
14	Surface water	14
16	Groundwater	14
6	Surface and Groundwater	5
36	Total	33

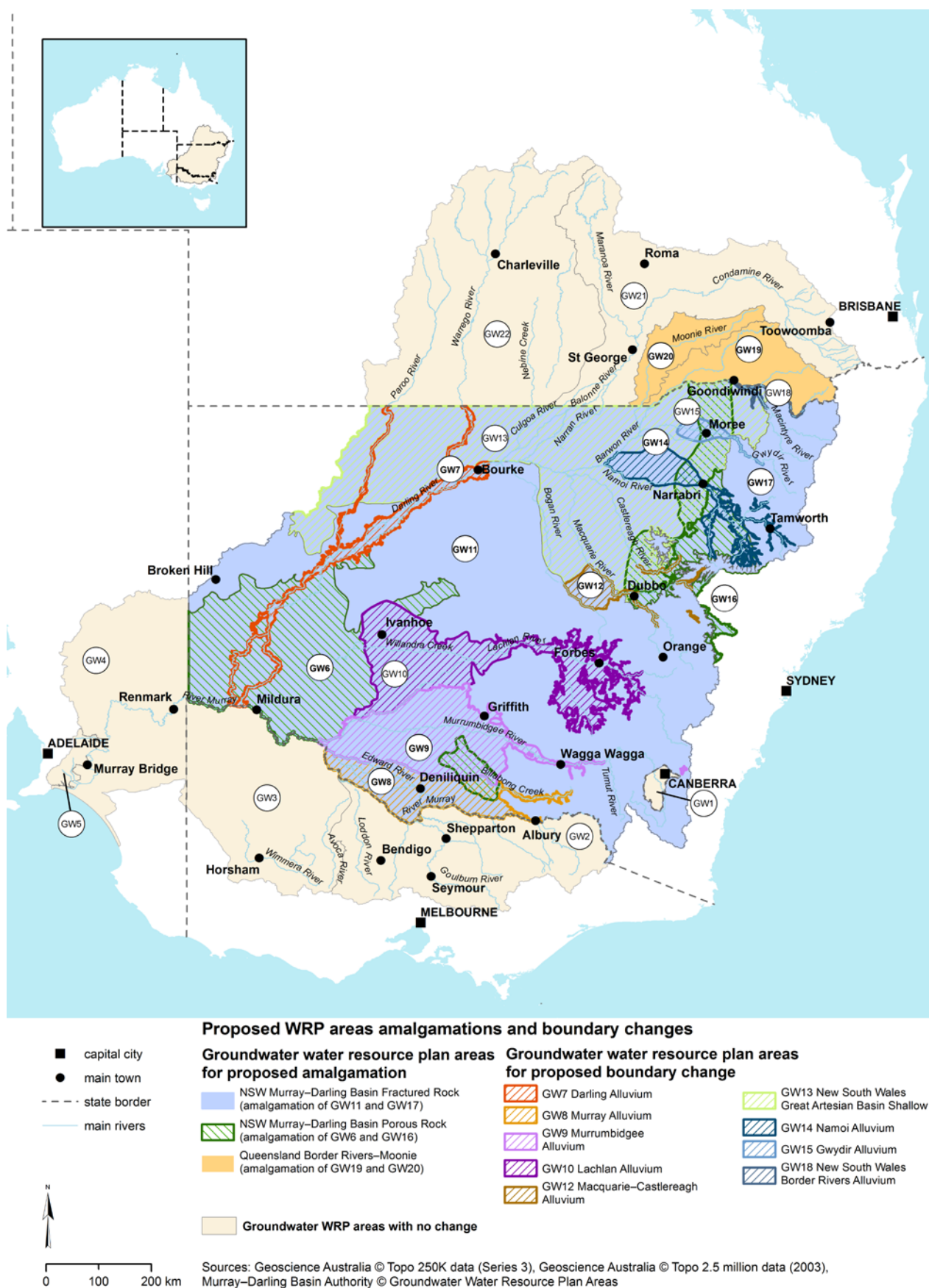


Figure 2: Proposed WRP boundary changes

## Chapter 6 – SDL resource units and compliance methodology

### SDL resource units

Chapter 6 of the Basin Plan deals with the following items:

- the identification of the SDL resource units  
There are 29 surface water SDL resource units (Schedules 2 and 3) and 66 groundwater SDL resource units (Schedule 4). There are 81 groundwater SDLs, as a number of the groundwater SDL resource units have multiple SDLs to account for the different aquifers described in these units.
- the long term average sustainable diversion limits, including the shared reduction requirements for surface water resources
- the requirements for reviews, including three groundwater reviews
- the SDL compliance method
- the risk allocation requirements from a reduction in diversion limits.

Section 6.03 of the Basin Plan contains reference to [spatial datasets held by the Authority](#) that identify the boundaries of the groundwater SDL resource units “at the commencement of the Basin Plan”. NSW, Qld and Vic have requested changes to SDL resource unit boundaries, which result in changes to maps and datasets referenced in Chapter 6 (s6.03) and Schedule 4.

### Groundwater Compliance methodology

#### Background to existing compliance method

Each year from 1 July 2019 the basin states will be required to report to the Authority:

- the volume of water extracted during a water year (annual actual take) from a surface or groundwater SDL resource unit; and
- the volume that is allowed to be extracted during a water year (annual permitted take) from the same surface or groundwater SDL resource unit.

The two volumes will be recorded for each SDL resource unit in a Register of Take. The difference between the two volumes will also be recorded. If annual permitted take is greater than annual actual take a credit will be recorded. If annual actual take is more than the annual permitted take a debit will be recorded.

A compliance test will then be undertaken by the Authority for each SDL resource unit. The debits and credits accumulated from 1 July 2019 will be summed and non-compliance will occur if the accumulated debits are greater than the accumulated credits plus 20% of the annual SDL. The non-compliance will not apply if a state has a reasonable excuse.

Over time, credits and debits are expected to balance out in surface water SDL resource units. As a result of the difference between the total basin wide groundwater SDL (3,334 GL/y) and the current average basin wide groundwater take (1,374 GL/y) an annual groundwater SDL credit of approximately 1,950 GL will accumulate. The credit will continue to accumulate without a practical limit and well beyond any feasible extraction. For example, after ten years there may be an accumulated groundwater SDL credit of 19,500 GL.

Due to the types of groundwater systems in the basin, it is unlikely that much of this groundwater will ever be used. The groundwater SDL credit is an outcome of the accounting method used for

the compliance test and this issue was raised during the Vic groundwater review which recommended that “the Authority should investigate and address the issue of excess SDL credits.” After consulting with the basin States, it was agreed that the current compliance method was not appropriate for groundwater and that an additional groundwater specific compliance method that did not lead to an accumulation of excess credits should be considered by the Authority.

### **Proposed groundwater compliance method**

After consulting the basin states, the Authority proposes that a 10-year rolling average compliance method be used for groundwater SDL resource units (while the existing compliance method remains for surface water). Under the proposed method, a non-compliance with a groundwater SDL in a water year will occur if:

- the average annual actual take over the 10 year period ending with that water year is greater than:
  - the average annual permitted take over the same period, and
  - the basin state does not have a reasonable excuse for the excess.

Table 2 and Figure 3 provide a demonstration of how the compliance method will operate after 2028. It demonstrates the relationship between the SDL, permitted and actual take and how a non-compliance could potentially occur in an example groundwater SDL resource unit.

An interim approach is required for the first nine years before the ten-year rolling average compliance method can be fully introduced. From 1 July 2019 to 30 June 2028 the Authority proposes a non-compliance with an SDL will occur if:

- the cumulative sum of annual actual take in each water year since 1 July 2019 is greater than:
  - the cumulative sum of annual permitted take for the same period plus 20% of the annual SDL for the SDL resource unit, and
  - the Basin state does not have a reasonable excuse for the excess

This compliance test is essentially the same as the current Basin Plan method.

Table 3 and Figure 4 provide a demonstration of how the compliance method will operate between 2019 and 2028. It demonstrates the relationship between the cumulative SDL, cumulative permitted and cumulative actual take and how a non-compliance could potentially occur in an example groundwater SDL resource unit.

The following tables and figures demonstrate how both of the proposed compliance methods would be applied in a SDL resource unit. The 20% tolerance is proposed to be retained to 2028 to provide for no change as compared to the current Basin Plan method. It will not be continued beyond 2028 as discussions with the states concluded that it was unnecessary.

An additional amendment is proposed to the compliance method for groundwater in line with a similar provision that is being introduced for surface water (refer proposed section 6.11(5) of the Basin Plan). In general terms, this amendment allows for the removal of any debits in the compliance test associated with water recovery that may occur after 30 June 2019.

More specifically, if the particular circumstance that is used as an example of ‘reasonable excuse’ applies (i.e. ‘where, for reasons beyond a basin state’s control, the Australian government has not achieved the water recovery target that it has set for itself in relation to the SDL resource unit’; refer proposed section 6.12C (4)(b)), then the amount associated with this circumstance will be removed from the compliance test in subsequent years. This example, which is already provided for in the Basin Plan, refers to the Australian government’s commitment to ‘bridge the gap’ to the SDLs under the Basin Plan. This issue is also discussed in the Plain English Summary relation to surface water on page 28, under the section ‘Removal of cumulative debits in a particular circumstance’.



Proposed groundwater amendments to the Basin Plan– additional information

**Table 2: Example operation of the proposed groundwater compliance method post 2028**

	2019/ 20	2020/ 21	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	2027/ 28	2028/ 29	2029/ 30	2030/ 31	2031/ 32
SDL	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Annual permitted take	55.0	55.0	45.0	52.5	37.5	55.0	60.0	55.0	35.0	50.0	55.0	60.0	45.0
Annual actual take	60.0	45.0	55.0	45.0	45.0	57.5	62.5	57.5	27.5	40.0	57.5	62.5	40.0
Rolling average annual permitted take over 10 years (A)										50.0	50.0	50.5	50.5
Rolling average annual actual take over 10 years (B)										49.5	49.3	51.0^	49.5
Compliance test actual >=													

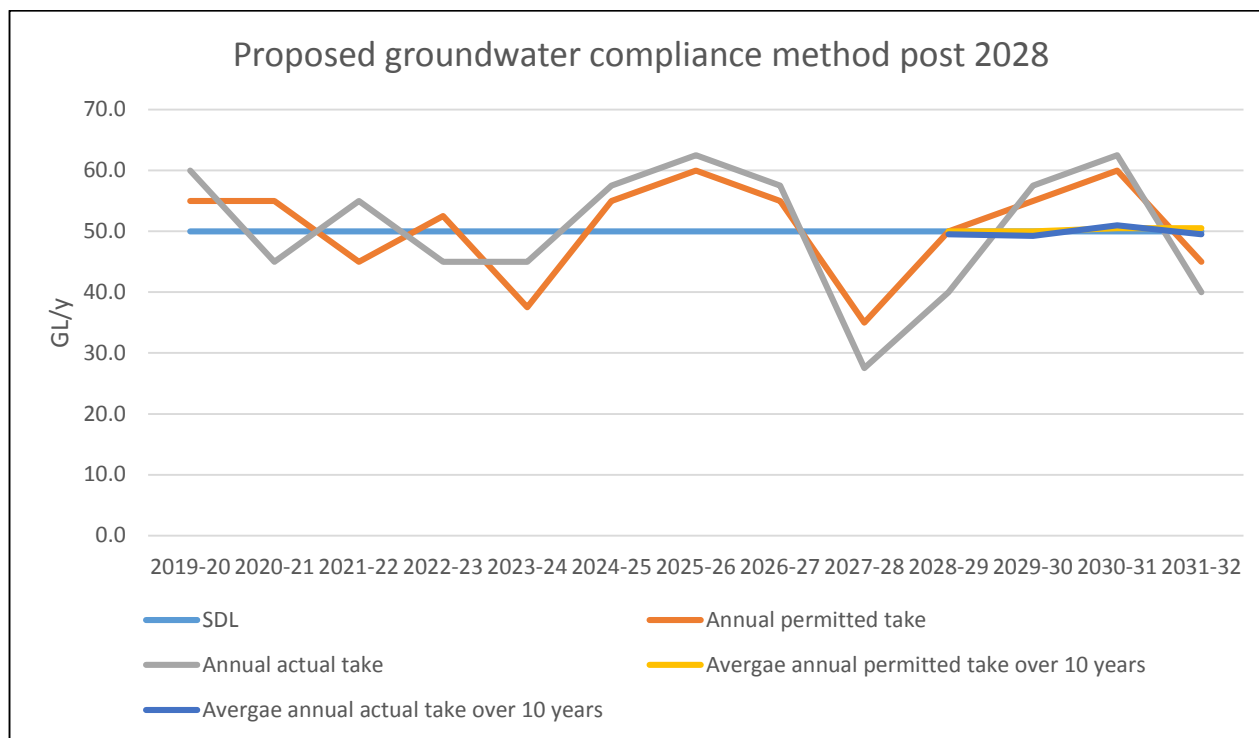
^ There will be a non-compliance unless a state has a reasonable excuse for the excess

**Table 3: Example operation of the proposed groundwater compliance method 2019 – 2028**

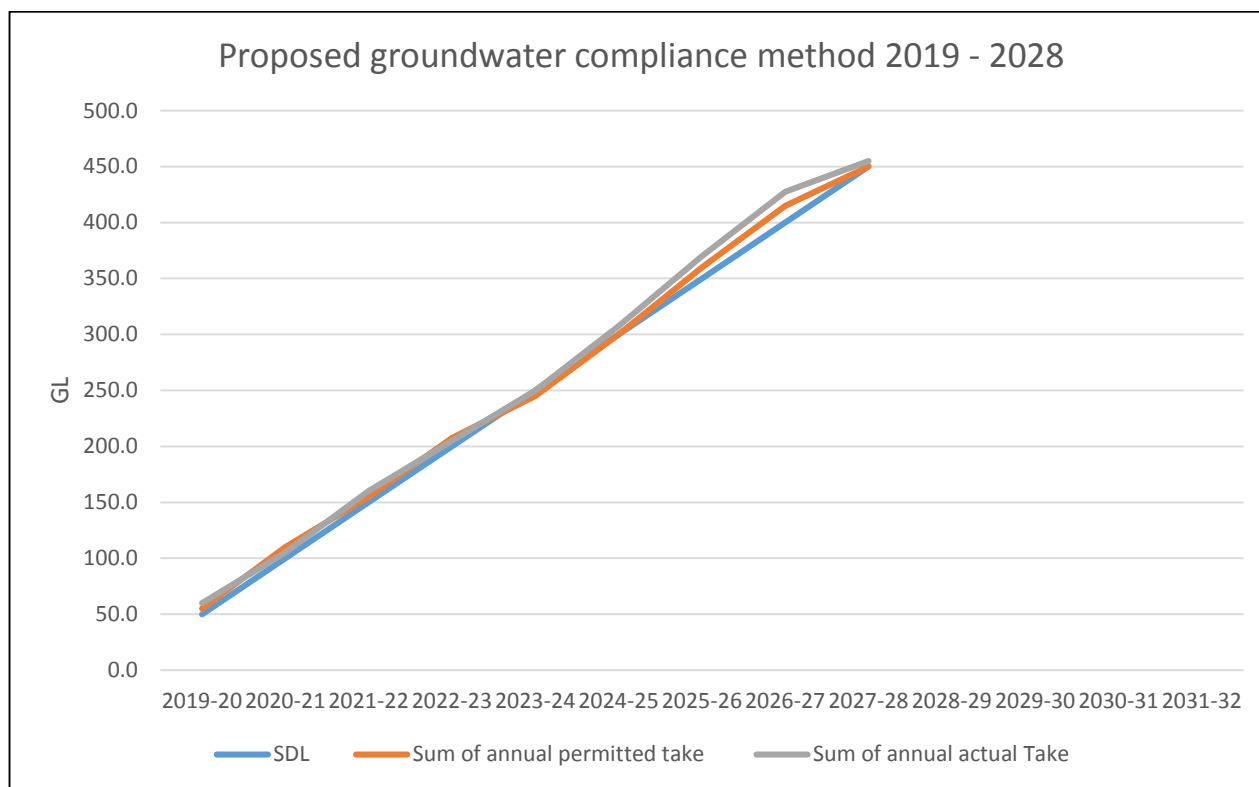
	2019/ 20	2020/ 21	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	2027/ 28
SDL	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Annual permitted take	55.0	55.0	45.0	52.5	37.5	55.0	60.0	55.0	35.0
Annual actual take	60.0	45.0	55.0	45.0	45.0	57.5	62.5	57.5	27.5
Sum of annual permitted take	55.0	110.0	155.0	207.5	245.0	300.0	360.0	415.0	450.0
Sum of annual actual take	60.0	105.0	160.0	205.0	250.0	307.5	370.0*	427.5^	455.0
Compliance test (actual > permitted plus 20% of SDL)									

\* Although cumulative actual take is greater than cumulative permitted take it is compliant as the 20% of the SDL tolerance is applied

^ There will be a non-compliance unless a state has a reasonable excuse for the excess



**Figure 3: Example operation of the proposed groundwater compliance method post 2028**



**Figure 4: Example operation of the proposed groundwater compliance method 2019 – 2028**

## Chapter 10 - Local management rules and adjustment to review provision

Chapter 10 of the Basin Plan provides the requirements with which a WRP must comply to be accredited. It includes parts on:

- the form of the WRP
- the application of SDLs
- local water management rules and their application
- interception activities
- water quality objectives and targets
- trade rules that relate to groundwater
- addressing risks to the water resource
- measuring and monitoring
- extreme events
- Indigenous values and uses.

### Changes to groundwater local management rules

The Authority has worked closely with NSW and Vic to determine how best to implement the recommendations of the review panels. The focus of much of the discussion was on the element of the recommendations which states “once assurances have been given by the relevant state to demonstrate that the resource will be managed by state policies and plans so as to limit impacts to acceptable levels.”

It was agreed to link the proposed changes in SDLs to mandatory management controls in the review areas. In other words, any risks associated with increasing the SDLs are offset by mandatory local management rules.

The discussions focused on the part of the Basin Plan (Chapter 10, Part 4) that enables the inclusion of local management rules to manage potential impacts on:

- groundwater dependent ecosystems (section 10.18)
- groundwater and surface water connections (section 10.19)
- the ability of groundwater systems to continue to be productive (section 10.20)
- groundwater quality (section 10.21).

In order to implement the recommendations of the review panels, a new section (section 10.21A) is proposed to be included in the Basin Plan to make the local management rules mandatory in the review areas as follows:

- in the two NSW review areas, mandatory rules will be required for all four of the above factors
- in the Vic review area, mandatory rules are only required to cover the ability of groundwater systems to continue to be productive (section 10.20) and groundwater quality (section 10.21). The decision for mandatory rules addressing two risks reflects the risks identified during the development of the SDL and the discussion and recommendations of the review panel.

While working with Basin States on the mandatory local management rules, there were also few questions raised around the interpretation of section 10.20 and section 10.21. To ensure that these issues were addressed, minor amendments have been proposed to clarify these two

sections. The proposed changes will allow for some change in a groundwater system due to groundwater extraction before management action is required.

### **Section 10.20 amendments**

Section 10.20(1) of the Basin plan currently specifies that:

a water resource plan must be prepared having regard to whether it is necessary for it to include rules which ensure that:

- a) there is no structural damage to an aquifer (whether within or outside the water resource plan area) arising from take within the long-term annual diversion limit for an SDL resource unit; and
- b) hydraulic relationships and properties between groundwater and surface water systems, between groundwater systems, and within groundwater systems are maintained.

The reference to ‘no structural damage to an aquifer’ could be interpreted to mean that even the smallest impact on an aquifer (e.g. the drilling of a basic rights bore) could be interpreted as causing structural damage. The Authority has recognised that the clause needs to be amended to enable reasonable implementation of the Basin Plan. The proposed change specifies:

A water resource plan must be prepared having regard to whether it is necessary for it to include rules which ensure that the operation of the plan does not compromise:

- a) the overall structural integrity of the aquifer (whether within or outside the water resource plan area) arising from take within the long-term annual diversion limit for an SDL resource unit; or
- b) the overall hydraulic relationships and properties between groundwater and surface water systems, between groundwater systems, and within groundwater systems.

### **Section 10.21 amendments**

In regards to section 10.21(1) the Basin Plan currently specifies that:

A water resource plan must be prepared having regard to whether it is necessary for it to include rules to prevent elevated levels of salinity and other types of water quality degradation within a groundwater SDL resource unit.

This could be interpreted as the smallest increase in salinity would require a management action. Given natural salinity can vary from period to period the Authority has recognised the current clause is overly prescriptive. The proposed change specifies:

A water resource plan must be prepared having regard to whether it is necessary for it to include rules that support the maintenance of water quality within a groundwater SDL resource unit against the effects of elevated levels of salinity and other types of water quality degradation.

As the objective of these clauses is to enable sensible management of groundwater resources the proposed amendments to sections 10.20 and 10.21 represent a clarification of the intent of these clauses rather than a change in policy.

## Review provision

The NSW review panels also recommended an appropriate review process for these mandatory rules. To address this, an addition is proposed to section 10.47, which will provide an opportunity for NSW and Vic to review the effectiveness of the local management rules whenever any review of the water resource plan is undertaken.

Now that the Authority has completed its review of the long-term average SDLs and BDLs for three groundwater areas as required by section 6.06(6) of the Basin Plan, the Authority proposes removing the spent sections relating to these reviews.

## Schedule 4 - Changes to matters relating to groundwater SDL resource units

Schedule 4 of the Basin Plan currently lists 81 groundwater SDL resource units, including name, SDL volume, BDL volume and the groundwater resources covered by each resource unit.

### Proposed BDL and SDL changes

As previously stated the NSW and Vic review panels supported an increase in SDL volumes in the review areas (Table 5). This reflects the view of the panels that a less conservative approach to setting SDLs than that taken by the Authority can be used if suitable management actions are in place to manage the potential impacts of increased groundwater take.

The Authority also received a request from South Australia to amend a number of BDL and SDL volumes in the South Australian Murray Region WRP area to account for some minor inaccuracies in the BDL and SDL volumes as provided by SA at the time of the making of the Basin Plan.

In total, the proposed SDL changes will affect eight SDLs and two BDLs across five WRP areas (two in NSW, two in VIC and one in SA). A discussion on the proposed SDL changes by state follows. The proposed SDL changes increase the Basin-wide total for groundwater SDLs from 3,334 GL/y to 3,494 GL/y (an increase of 159.9 GL/y). Figure 4 displays the locations of all the groundwater WRP areas with proposed changes to SDLs.

### NSW SDL changes

The proposed changes to the SDLs in NSW are consistent with the recommendations from the review process. For the Western Porous Rock and the Eastern Porous Rock WRP areas the proposed SDLs are the volumes requested by NSW.

### Victoria SDL changes

The proposed changes to the SDLs in Vic reflect two recommendations from the Vic review panel. The proposed SDL change to the Goulburn-Murray: Sedimentary Plain SDL resource unit is the volume requested by Vic and recommended by the Vic review panel. The review panel recommended the change to 222.9 GL/y, the Authority subsequently rounded this up to 223.0 GL/y.

There are also proposed changes to the BDLs and SDLs stemming from the proposed adoption of the changes to the Vic state water planning areas. The proposed changes to BDL and SDL volumes reflect the review recommendation that “the revised definition proposed by DEPI (Vic



government) for the sedimentary plains/highland boundary be adopted and the area changed accordingly.” This applies to:

- Goulburn–Murray Highlands SDL resource unit (GS8);
- Wimmera–Mallee: Sedimentary Plain SDL resource unit (GS9); and
- Wimmera–Mallee: Highlands SDL resource unit (GS9).

The SDL change in the Goulburn–Murray Highlands SDL resource unit also address an inconsistency in the application of the recharge risk assessment methodology (RRAM) used to determine the SDLs for highland areas across the NSW/Vic state border. As the RRAM used the area of a resource unit to as a factor in determining the SDL, changing the boundary of a resource unit and hence the area will change the SDL. The change of SDL in the Goulburn–Murray Highlands SDL resource unit is a combination of adopting a consistent method across the NSW/Vic state boundary and a change in the resource unit area.

The small proposed changes (each 0.6 GL/y, with a net change of 0 GL/y) in the SDL volumes of two of the Wimmera–Mallee SDL resource units (Sedimentary Plain and Highlands) are a result of a small boundary changes and hence area changes. The area change is an outcome of the application of the Victorian review panel recommending the revision of the sedimentary plains/highland boundary being applied in the Wimmera-Mallee WRP area.

### **SA SDL changes**

South Australia also requested an amendment to a number of BDLs and SDLs in the SA Murray Region WRP area to account for some minor inaccuracies in the BDL and SDL volumes. The proposed changes transfers 2.14 GL/y of entitlement associated with a salt interception scheme from the BDL of the Mallee (Murray Group Limestone) (GS3) SDL resource unit to the BDL of the SA Murray Salt Interception Schemes (GS7) SDL resource unit (Table 5).

This transfer also reduces SDL of the Mallee (Murray Group Limestone) SDL resource unit by 2.14 GL/y. There is no change to the SDL of the SA Murray Salt Interception Schemes SDL resource unit as the current SDL allows for more take than the current BDL. In discussions with SA it was agreed not to change the SDL (Table 5) as it is sufficient for the expected growth in use by salt interception schemes in the SDL resource unit in the short to medium term.

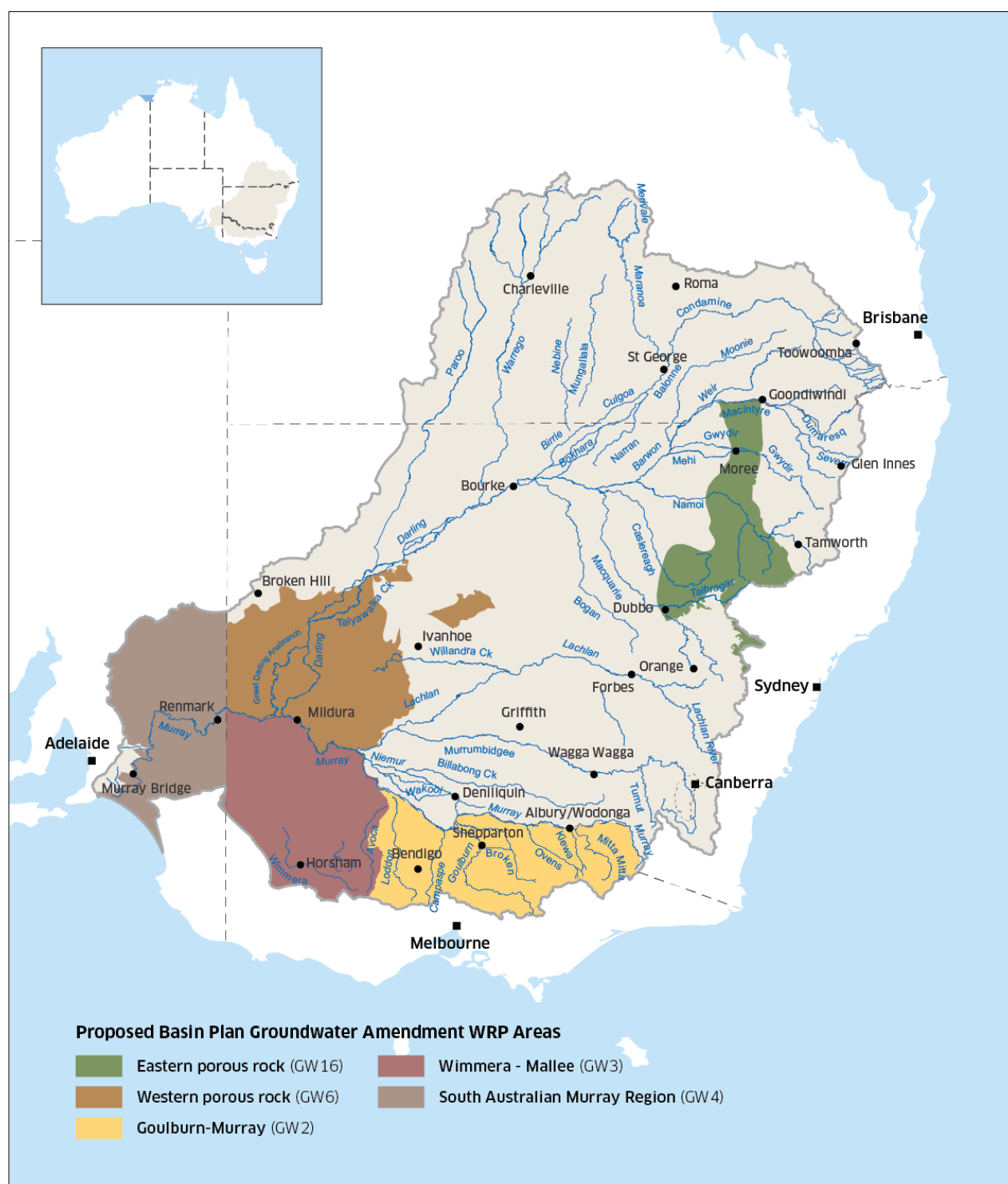


Figure 4: WRP areas with proposed groundwater SDL changes

**Table 5: Proposed Groundwater BDL and SDL changes**

Resource unit	Basin Plan BDL (GL/y)	Proposed BDL (GL/y)	Basin Plan SDL (GL/y)	Proposed SDL (GL/y)	SDL change (GL/y)	State Plan Limit
<i>Western Porous Rock WRP Area (NSW) (GW6)</i>						
Western Porous Rock SDL (GS50)	63.1	No change	116.6	226.0	+109.4	530.5
<i>Eastern Porous Rock WRP Area (NSW) (GW16)</i>						
Gunnedah – Oxley Basin SDL (GS17)	22.1	No change	114.5	127.5	+13.0	205.6
Sydney Basin SDL (GS41)	3.12	No change	17.2	19.1	+1.9	60.4
<i>Goulburn-Murray WRP Area (Vic) (GW2)</i>						
Goulburn-Murray: Sedimentary Plain SDL (GS8)	203.5	No change	203.5	223.0	+19.5	223.0
Goulburn-Murray Highlands SDL (GS8)	38.3	No change	50.5	68.7	+18.2	41.6
<i>Wimmera-Mallee (groundwater) WRP Area (Vic) (GW3)</i>						
Wimmera-Mallee: Sedimentary Plain SDL (GS9)	68.9	No change	190.7	190.1	-0.6	68.9
Wimmera-Mallee Highlands SDL (GS9)	1.26	No change	2.14	2.75	+0.6	1.26
<i>SA Murray WRP Area (SA) (GW4)</i>						
Mallee (Murray Group Limestone) (GS3)	65.7	63.6	65.7	63.6	-2.1	63.6
SA Murray Salt Interception Schemes (GS7)	11.1	13.2	28.6	28.6	No change	13.2
<b>Total</b>					<b>+159.9</b>	

## Proposed changes to resource unit boundaries

### NSW boundary changes

NSW has requested that the vertical definitions of some NSW groundwater SDL resource units be revised. This is in order to align with existing NSW water sharing plans and allows for separate accounting from buried resources.

The Basin Plan (Schedule 4) currently defines the groundwater resources of these SDL resource units as 'all groundwater' in or below a particular area, which indicates that whatever unit is at the surface of the ground goes to the centre of the earth. This is problematic where a groundwater resource is located above another groundwater system, effectively burying it. It causes inaccurate accounting in cases where extraction is from the buried resource (Figure 5).

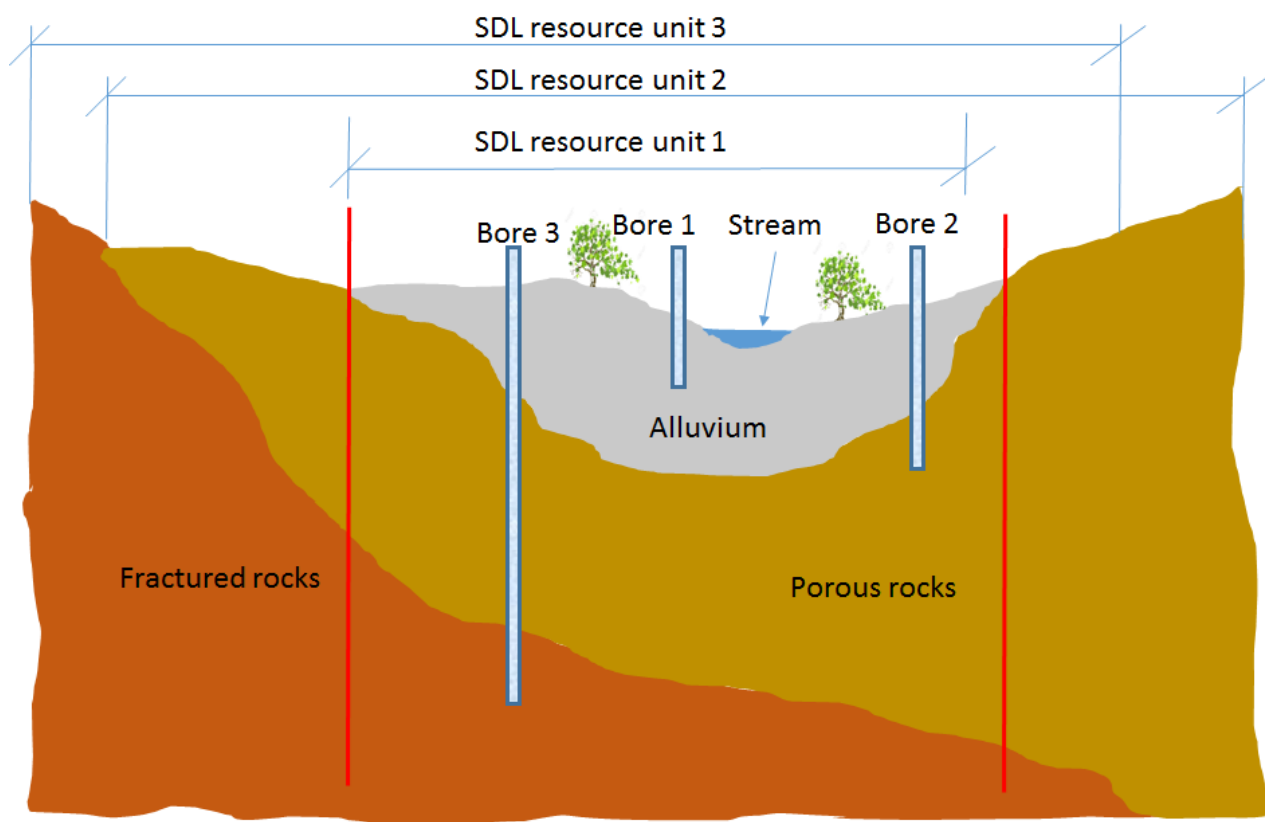


Figure 5: Buried groundwater SDL units

Under the current Basin Plan definition of the alluvial resource, the groundwater in the hard rock (fractured or porous) groundwater system within the boundary of the alluvial unit (red lines) is considered part of the alluvial system (brown area). This means water extracted from bore 1, 2 and bore 3 will be accounted for against the alluvium SDL. The extraction from bore 2 should be accounted for against the porous rocks system and from bore 3 should be accounted for against the fractured rocks groundwater system.

The Authority supports this proposal as it will align the Basin Plan with the state definition of its groundwater units and ensure the accounting of groundwater take is assigned to the correct SDL resource unit. Appendix A provides a list of the 44 affected NSW SDL resource units and the proposed definitions. The proposed changes are being undertaken to:

- align the Basin Plan SDL resource unit boundaries with the state water management boundaries

- improve groundwater accounting and reduce the administrative issues for the Authority and states
- provide greater consistency in the definitions of the Basin Plan SDL resource units.

There are no changes to the BDLs or the SDLs of the affected NSW groundwater SDL resource units as a result of these boundary changes.

### **Qld boundary changes**

As a result of the merging of the two WRP areas, Qld also requested that two SDL resource units be merged. The proposed merge will see the Sediments above the Great Artesian Basin: Border Rivers (GS57) and Sediments above the Great Artesian Basin: Moonie (GS59) merged to form the Sediments above the Great Artesian Basin: Border Rivers–Moonie. The proposed change will include the combining of the BDLs and SDLs in each resource unit. The total volume across the new SDL resource unit will be the same as that of the two SDL resource units (BDL of 0.14 GL and a SDL of 46.9 GL).

The issue of changing the definitions of the vertical definitions of groundwater SDL resource units is also proposed for Qld. Appendix A provides a list of the 15 affected Qld SDL resource units and proposed definitions.

With the exception of the merged SDL resource units, there are no changes to the BDLs or the SDLs of the affected Qld groundwater SDL resource units as a result of these boundary changes.

### **Victorian groundwater SDL resource unit boundary changes**

There are also proposed changes to the SDL resource unit boundaries from the proposed adoption of the changes to the Vic state water planning areas. The proposed changes to SDL resource unit boundaries reflects the review recommendation that 'the revised definition proposed by DEPI (Vic government) for the sedimentary plains/highland boundary be adopted and the area changed accordingly.' This applies to:

- Goulburn–Murray Highlands SDL resource unit (GS8)
- Wimmera–Mallee: Sedimentary Plain SDL resource unit (GS9)
- Wimmera–Mallee Highlands SDL resource unit (GS9).

The proposed changes to the Victorian SDL resource unit boundaries only affect the internal boundaries between the sedimentary plains and highland SDL resource units without causing changes to Victorian WPR area boundaries. The proposed SDL resource unit changes in Victoria are shown in Figure 6.

The changes to the Vic groundwater SDL resource units boundaries have changed the SDLs for these units as discussed in the Proposed BDL and SDL changes section of this document.



Proposed groundwater amendments to the Basin Plan– additional information

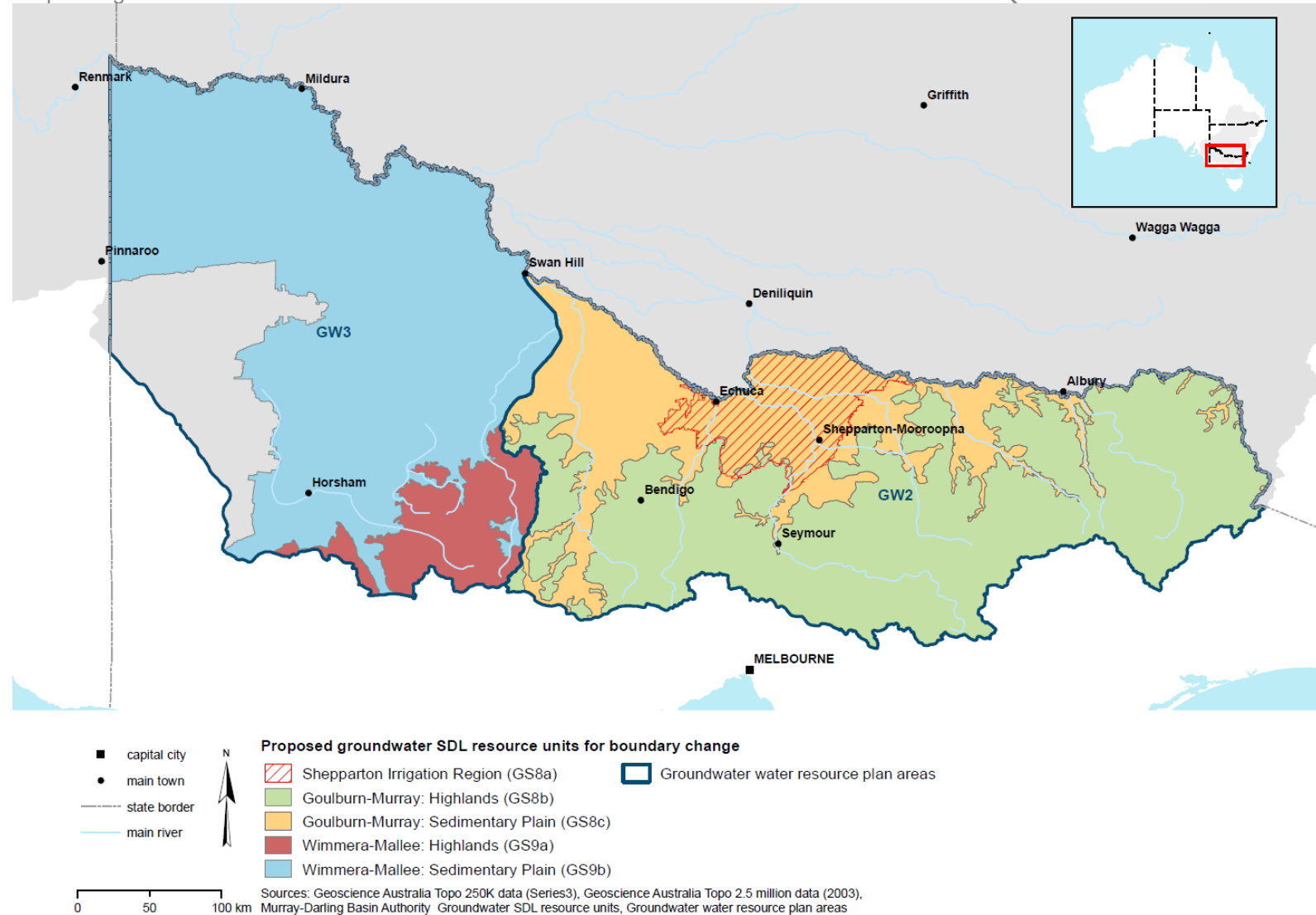


Figure 6: Proposed Vic groundwater SDL resource units

**SDL resource unit code changes**

There are currently nine groundwater SDL resource units that have a single GS code (Schedule 4, Column 1) that refers to separate SDL resource units with separate BDL and SDL volumes. The Authority proposes to revise the coding by adding a second order letter (a, b or c) to individual GS codes, thereby distinguishing between individual SDL resource units.

Amended GS codes are shown in Table 6 and Figure 6.

**Table 6: Proposed groundwater SDL resource unit codes**

Item	SDL Resource Unit	Existing GS code	Proposed GS code
2	Goulburn-Murray: Shepparton Irrigation Region	GS8	GS8a
3	Goulburn-Murray: Highlands	GS8	GS8b
4	Goulburn-Murray: Sedimentary Plain	GS8	GS8c
5	Goulburn-Murray: deep	GS8	GS8d
6	Wimmera-Mallee: Highlands	GS9	GS9a
7	Wimmera-Mallee: Sedimentary Plain	GS9	GS9b
8	Wimmera-Mallee: deep	GS9	GS9c
9	Mallee (Pliocene Sands)	GS3	GS3a
10	Mallee (Murray Group Limestone)	GS3	GS3b
11	Mallee (Renmark Group)	GS3	GS3c
12	Peake-Roby-Sherlock (unconfined)	GS5	GS5a
13	Peake-Roby-Sherlock (confined)	GS5	GS5b
16	Angas Bremer (Quaternary Sediments)	GS1	GS1a
17	Angas Bremer (Murray Group Limestone)	GS1	GS1b
19	Marne Saunders (Fractured Rock)	GS4	GS4a
20	Marne Saunders (Murray Group Limestone)	GS4	GS4b
21	Marne Saunders (Renmark Group)	GS4	GS4c
26	Lower Murray Alluvium (shallow; Shepparton Formation)	GS27	GS27a

Item	SDL Resource Unit	Existing GS code	Proposed GS code
27	Lower Murray Alluvium (deep; Renmark Group and Calivil Formation)	GS27	GS27b
31	Lower Murrumbidgee Alluvium (shallow; Shepparton Formation)	GS28	GS28a
32	Lower Murrumbidgee Alluvium (deep; Calivil Formation and Renmark Group)	GS28	GS28b
74	St George Alluvium: Condamine-Balonne (shallow)	GS61	GS61a
75	St George Alluvium: Condamine-Balonne (deep)	GS61	GS61b

## Appendix A: Schedule 4 proposed NSW and Qld SDL resource unit definitions

Table A1. Proposed NSW and Qld SDL resource unit definitions

Item	SDL Resource Unit	Proposed definition
<b>NSW Murray Darling Basin Porous Rock water resource plan area (GW6)</b>		
22	Western Porous Rock (GS50)	All groundwater contained within all sediments of Cenozoic age, excluding groundwater in items 26 and 27
23	Gunnedah Oxley Basin MDB (GS17)	All groundwater contained within all rocks of Permian, Triassic, Jurassic, Cretaceous and Cenozoic age within the outcropped and buried areas. All groundwater contained within all unconsolidated alluvial sediments within the outcropped areas. Excluding groundwater in items 44, 45, 47, 49, 53, 57, 60, 61 and 62
24	Sydney Basin MDB (GS41)	All groundwater contained within all rocks of Permian, Triassic, Jurassic, Cretaceous and Cenozoic age within the outcropped and buried areas. All groundwater contained within all unconsolidated alluvial sediments within the outcropped areas
25	Oaklands Basin (GS38)	All groundwater contained within all rocks of Permian and Triassic age.
<b>Darling Alluvium water resource plan area (GW7)</b>		
26	Upper Darling Alluvium (GS42)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
27	Lower Darling Alluvium (GS23)	All groundwater contained within alluvial sediments of Quaternary age below the surface of the ground.
<b>Murray Alluvium water resource plan area (GW8)</b>		
28	Billabong Creek Alluvium (GS13)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
29	Lower Murray Alluvium (shallow; Shepparton Formation) (GS27a)	All groundwater contained within all alluvial sediments below the surface of the ground, to a depth of 20 metres.
30	Lower Murray Alluvium (deep; Renmark Group and Calivil Formation) (GS27b)	All groundwater contained within all unconsolidated alluvial sediments deeper than 20 metres below the ground surface
31	Upper Murray Alluvium (GS46)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
<b>Murrumbidgee Alluvium water resource plan area (GW9)</b>		
32	Lake George Alluvium (GS21)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
33	Lower Murrumbidgee Alluvium (shallow; Shepparton Formation) (GS28a)	All groundwater contained within the alluvial sediments to a depth of 40 metres or to the bottom of the Shepparton Formation, whichever is the deeper.

Item	SDL Resource Unit	Proposed definition
34	Lower Murrumbidgee Alluvium (deep; Calivil Formation and Renmark Group) (GS28b)	All groundwater contained within the Calivil Formation and Renmark Group unconsolidated alluvial sediments greater than 40m depth.
35	Mid-Murrumbidgee Alluvium (GS31)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
<b>Lachlan Alluvium water resource plan area (GW10)</b>		
36	Belubula Alluvium (GS12)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
37	Lower Lachlan Alluvium (GS25)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
38	Upper Lachlan Alluvium (GS44)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
<b>NSW Murray Darling Basin Fractured Rock water resource plan area (GW11)</b>		
39	Adelaide Fold Belt (GS10)	All groundwater, excluding groundwater in item 22.
40	Kanmantoo Fold Belt (GS19)	All groundwater, excluding groundwater in items 22, 26, 27, 33, 34 and 37.
41	Lachlan Fold Belt (GS20)	all groundwater, excluding groundwater in items 23, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 42, 45, 47, 48, 49, 50, 51, 52, 53, 57, 60 and 62.
42	Orange Basalt (GS39)	All groundwater contained within all basalt of Cenozoic age and all unconsolidated alluvial sediments.
43	Young Granite (GS51)	All groundwater.
44	Inverell Basalt (GS18)	All groundwater contained within all basalt of Cenozoic age and all unconsolidated alluvial sediments
45	Liverpool Ranges Basalt (GS22)	All groundwater contained within all basalt of Cenozoic age and all unconsolidated alluvial sediments
46	New England Fold Belt (GS37)	All groundwater excluding groundwater in items 44, 45, 58, 59, 60, 61, 63, 64 and 65.
47	Warrumbungle Basalt (GS49)	All groundwater contained within all basalt of Cenozoic age and all groundwater contained within all unconsolidated alluvial sediments.
<b>Macquarie-Castlereagh Alluvium water resource plan area (GW12)</b>		
48	Bell Valley Alluvium (GS11)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
49	Castlereagh Alluvium (GS14)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground, except water contained in the unconsolidated alluvial sediments between the top of the high banks of the river.
50	Coolaburragundy–Talbragar Alluvium (GS15)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
51	Cudgegong Alluvium (GS16)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
52	Lower Macquarie Alluvium (GS26)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
53	Upper Macquarie Alluvium (GS45)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.



Item	SDL Resource Unit	Proposed definition
<b>NSW Great Artesian Basin Shallow water resource plan area (GW13)</b>		
54	NSW GAB Surat Shallow (GS34)	All groundwater contained within: (a) all geological formations to a depth of 60 metres below the surface of the ground, and (b) all unconsolidated alluvial sediments.
55	NSW GAB Warrego Shallow (GS35)	All groundwater contained within: (a) all geological formations to a depth of 60 metres below the surface of the ground, and (b) all unconsolidated alluvial sediments.
56	NSW GAB Central Shallow (GS36)	All groundwater contained within: (a) all geological formations to a depth of 60 metres below the surface of the ground, and (b) all unconsolidated alluvial sediments.
<b>Namoi Alluvium water resource plan area (GW14)</b>		
57	Lower Namoi Alluvium (GS29)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
58	Manilla Alluvium (GS30)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
59	Peel Valley Alluvium (GS40)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
60	Upper Namoi Alluvium (GS47)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
61	Upper Namoi Tributary Alluvium (GS48)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
<b>Gwydir Alluvium water resource plan area (GW15)</b>		
62	Lower Gwydir Alluvium (GS24)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground
63	Upper Gwydir Alluvium (GS43)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground
<b>NSW Border Rivers Alluvium water resource plan area (GW18)</b>		
64	NSW Border Rivers Alluvium (GS32)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
65	NSW Border Rivers Tributary Alluvium (GS33)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
<b>Queensland Border Rivers-Moonie water resource plan area (GW19)</b>		
66	Queensland Border Rivers Alluvium (GS54)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
67	Sediments above the Great Artesian Basin: Fractured Rock (GS55)	All groundwater contained within igneous and metamorphic rocks, excluding groundwater in item 66.
68	Sediments above the Great Artesian Basin: Border Rivers-Moonie (GS57)	All groundwater contained within all consolidated sediments above the Great Artesian Basin, excluding groundwater in item 66.
69	St George Alluvium: Moonie (GS62)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
<b>Condamine-Balonne water resource plan area (GW21)</b>		

Item	SDL Resource Unit	Proposed definition
70	Condamine Fractured Rock (GS53)	All groundwater contained within igneous and metamorphic rocks.
71	Queensland MDB: deep (GS56)	All groundwater in aquifers below the Great Artesian Basin.
72	Sediments above the Great Artesian Basin: Condamine–Balonne (GS58)	All groundwater contained within all consolidated sediments above the Great Artesian Basin.
73	Sediments above the Great Artesian Basin: Condamine–Balonne (shallow) (GS61)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground excluding groundwater in item 74.
74	St George Alluvium: Condamine–Balonne (deep) (GS61)	All groundwater contained within the lower part of the all unconsolidated alluvial sediments occupying the Dirranbandi Trough that lies below the middle leaky confined bed.
75	Upper Condamine Alluvium (Central Condamine Alluvium) (GS64a)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
76	Upper Condamine Alluvium (Tributaries) (GS64b)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
77	Upper Condamine Basalts (GS65)	All groundwater contained within all volcanic (basalt) rocks.
<b>Warrego-Paroo-Nebine water resource plan area (GW22)</b>		
78	Sediments above the Great Artesian Basin: Warrego–Paroo–Nebine (GS60)	All groundwater contained within all consolidated sediments above the Great Artesian Basin.
79	St George Alluvium: Warrego–Paroo–Nebine (GS63)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.
80	Warrego Alluvium (GS66)	All groundwater contained within all unconsolidated alluvial sediments below the surface of the ground.

## Appendix B: Outline of Scientific knowledge

*This appendix responds to subsection 47(2) of the Water Act 2007 (Cwlth), which requires the proposed Basin Plan groundwater amendment Plain English Summary to include an outline of the scientific knowledge used as the basis for the proposed amendments to the Basin Plan.*

*Note: Appendix C provides an outline of the socioeconomic analysis used as the basis for the proposed amendments to the proposed groundwater related amendments to the Basin Plan.*

### Overview

When the Basin Plan was being finalised in 2012, concerns were raised by the New South Wales (NSW) and Victorian (Vic) Governments in relation to the groundwater SDLs in three WRP areas (two in NSW and one in Vic). In response the Basin Plan included a requirement that the baseline diversion limits (BDLs) and sustainable diversion limits (SDLs) for the three areas would be reviewed by November 2014 (section 6.06(6) to (9)). These three areas are:

- Western Porous Rock SDL resource unit (NSW)
- Eastern Porous Rock WRP area (NSW)
- Goulburn–Murray: Sedimentary Plain SDL resource unit (Vic).

In prescribing the groundwater reviews the Basin Plan (s6.06(8)) requires each groundwater SDL review to consider “all relevant information about the SDL resource unit, including modelling, state planning and policy arrangements, and an evaluation of the appropriateness of any precautionary factors associated with setting”.

The Basin Plan also specifies the process for selecting experts to undertake the reviews. The experts identified for the reviews include the available members of the Independent Expert Scientific Committee on Coal Seam Gas and Coal Mining and two individuals with expertise in groundwater or groundwater management nominated by the relevant state. The Authority also nominated two individuals with expertise in groundwater or groundwater management to each panel. In consultation with the relevant state, the Authority appointed the review panels and specified terms of reference for the review committee.

The Authority and states also agreed on an independent expert to produce a synthesis report of the available information for each reviewed area. The reports which were provided to the review panels comprised all relevant knowledge and information about the SDL resource unit, including modelling, state planning and policy arrangements, and an evaluation of the appropriateness of any precautionary factors associated with setting the SDL.

The Authority and basin states supplied groundwater maps, extraction levels, models and other information for the synthesis report. The synthesis report underpinned the decisions made by the review panel.

The information used for each review and review panel recommendations are discussed below.

## Western Porous Rock SDL resource unit

The [Western Porous Rock SDL resource unit synthesis report](#) brought together the scientific knowledge underpinning the Western Porous Rock SDL review. The review panel considered the information from the synthesis report at its first meeting. In general the panel focused on two areas: the methods used by both the Authority and NSW to determine the sustainable level of take; and recharge processes in the area. The review panel's second meeting considered additional information from work in the Menindee area which was not available at its first meeting. The [Western Porous Rock SDL resource unit review panel report](#) includes the panel recommendations:

- the SDL is varied to take account of the agreed area for the WPR (Western Porous Rock) in line with the current Authority calculation and applied sustainability factors
- the Authority could consider varying the UWF (unassigned water factor) for a SDL resource unit to a value to be determined once assurances have been made by the relevant jurisdiction that they can demonstrate that the resource will be managed via State policies and plans in such a way that impacts are limited to acceptable levels. These assurances would need to be explicit and would include specification of the assets to be protected within Schedule 3 of the relevant NSW WSP, an agreement on the criteria that would be used to define acceptable impacts and monitoring, compliance and review processes.

## Eastern Porous Rock WRP area

The [Eastern Porous Rock WRP area synthesis report](#) brought together the scientific knowledge underpinning the Eastern Porous Rock WRP area review. The review panel deliberations focused on the methods used by Authority and NSW to determine the sustainable level of take and the difficulties of determining sustainable take in large deep groundwater basins. The [Eastern Porous Rock WRP area review panel report](#) includes the considerations of the panel and the recommendation:

- the Authority could consider varying the SDL resource unit to 146.6GL as suggested by NSW. This could be done once assurances were made by NSW that they can demonstrate that the resource will be managed via state policies and plans in such a way that impacts are limited to acceptable levels. These assurances would need to be explicit and would include a review of the assets listed in Schedule 3 of the NSW water sharing plan, an agreement on the criteria that would be used to define acceptable impacts and monitoring, compliance, review and decision making processes.

## Goulburn–Murray Sedimentary Plains SDL resource unit

The [Goulburn–Murray: Sedimentary Plain SDL resource unit synthesis report](#) brought together the scientific knowledge underpinning the review panel considerations of the SDL. In particular, this report considered the numerical model used to determine the Basin Plan SDL and a new numerical model developed by Victoria after the making of the Basin Plan.

A wider range of material and issues were considered in the review of the Goulburn–Murray Sedimentary Plains SDL resource unit. This reflects the greater level of extraction in this area and associated greater level of available information. The recommendations of the review panel are included in the [Goulburn–Murray: Sedimentary Plain SDL area review panel report](#) and are:

- the current agreed BDL for the Goulburn-Murray Sedimentary Plain of 203.5 GL/yr. be retained
- in relation to the SDL, the Authority could consider:
  - changing the SDL for the Goulburn–Murray Sedimentary Plain from 203.5GL/yr to 222.9 GL/yr as suggested by Victoria, once assurances were made that it can demonstrate that the resource will be managed via State policies and plans in such a way that impacts on groundwater users and salinity are limited to acceptable levels
  - improving the understanding of groundwater fluxes in the region (in particular the Katunga area) in the context of potential salinity impacts
- the revised definition proposed by Victoria for the sedimentary plains/highland boundary be adopted and the area changed accordingly
- the criteria used to assess groundwater model outputs be reviewed to more clearly align with the specified environmentally sustainable level of take (ESLT) assessment criteria
- the Authority investigates and addresses the issue of excess SDL credits
- the Authority conducts a rigorous, quantitative and comparative analysis of the SRP (Southern Riverine Plan) and Northern Victoria models to inform future potential management actions, including any actions under the second recommendation above
- the Authority actively fosters the work of the 'cross jurisdictional NSW/Vic groundwater working group' to use modelling and other information to obtain a more robust understanding of the interaction of groundwater take and management decisions across borders and the consequences to the long term sustainability of the connected groundwater systems.

## Appendix C: Outline of the socioeconomic analysis

*This appendix responds to subsection 47(2) of the Water Act 2007 (Cwlth), which requires the proposed Basin Plan groundwater amendment Plain English Summary to include an outline of the socioeconomic analysis carried out for the proposed amendments to the Basin Plan. The analysis of the proposed groundwater related changes was not linked to the socio-economic analysis undertaken as part of the Northern Basin review.*

*Note: Appendix B provides an outline of the scientific information used as the basis for the proposed amendments to the Basin Plan.*

### Overview

In developing the Basin Plan between 2009 and 2012, the Murray–Darling Basin Authority (MDBA) considered existing socio-economic analyses, and commissioned over 20 further studies to assess the potential impacts of meeting the environmental water requirements of the Murray–Darling Basin.

A separate socio-economic analysis (Socio-economic impacts of groundwater amendments to the Basin Plan) was undertaken to assess any potential socio-economic impacts from the proposed changes to groundwater SDLs for the four Water Resource Plan (WRP) areas, and a change to the methodology for ensuring compliance at the state level for groundwater extraction.

The analysis principally considers what the potential socio-economic impacts might be at the regional level, representing the four WRP areas, and what the wider impacts might be from a change to the compliance methodology. This analysis was undertaken separately to the socio-economic analysis undertaken as part of the Northern Basin Review as the groundwater reviews and this analysis were completed prior to the commencement of the main socio-economic studies conducted under the Northern Basin Review.

### Optimising environmental, economic and social outcomes

The Water Act 2007 (Cwlth) requires the Basin Plan to provide for management of basin water resources in a way that promotes the objects of the Act. In particular, the plan must establish sustainable diversion limits and environmental and water quality objectives; improving water security; and optimising economic, social and environmental outcomes.

The requirements relating to optimising environmental, economic and social outcomes are consistent with the aims of the Commonwealth's water reform agenda, and with other reforms such as the 2004 National Water Initiative and the 2008 Agreement on Murray–Darling Basin Reform.

The analyses and information about the benefits and costs of reallocating water resources in the Basin are imperfect. Consequently, in developing the proposed Basin Plan, the Authority has been required to exercise judgement in balancing and considering the outcomes of the socio-economic work, and other areas of work.



## Socio-economic analysis

The proposed groundwater SDL change socio-economic analysis was commissioned by the Authority with the intent of assessing only the costs and benefits of the proposed groundwater changes to the Basin Plan. The analysis has drawn upon the review panel reports, technical synthesis reports, State Water Registers and local resource and management plans to understand how proposed changes to SDLs might affect water use in these regions and therefore result in socio-economic costs or benefits.

### What the socioeconomic analysis found

Changes to SDLs may result in socio-economic impacts if the changes translate into changes to consumptive water use in the future. Of the four groundwater areas in this analysis, three areas relate to proposed increases to SDLs and one to a proposed decreased SDL. This potentially means that water use may increase or decrease respectively in the future.

In the case of the three groundwater review areas that are proposing increases, the socio-economic impacts (benefits) may only occur if actual water use (or water 'take') increases above the point of the current SDL stated in the Basin Plan (or the 'base case SDL'). The impacts then accrue for every ML used until this use reaches the proposed SDL (as this is the new cap). For the SA Murray, the reverse is true, socio-economic impacts (costs) may only occur if future water use hits the proposed SDL (as this is lower than the base case SDL).

Overall, the analysis found that there is likely to be negligible impact on communities in the four regions where changes to groundwater SDLs are proposed. In the three regions where it is proposed for SDLs to increase, at some point in the future the changes may result in a benefit to these communities (if water use reaches the current SDL) however there is limited evidence from which to suggest if and when those benefits could potentially occur. For the SA Murray WRP, the reduction in SDL is associated with a reallocation of the entitlement of a salt interception scheme. While it is not considered a productive use there are considerable socio-economic benefits from reducing salt loads to the Murray River and improving water quality. The main benefits are better quality water for irrigation and domestic water supply.

The proposed groundwater SDL change socio-economic assessment is limited to the socio-economic changes related to the change in the SDLs. As it is outside of the Authority's statutory responsibility the socio-economic analysis did not consider the broader socio-economic aspects of the potential changes in mining activities in the Eastern Porous Rock and Western Porous Rock areas.

The table below summarises the potential socio-economic impacts of SDL changes for the four groundwater areas.

**Table B.1: Socio-economic impacts of changes to SDLs**

Area	Change to SDL (GL/y)	Summary of potential socio-economic impact
<i>Western Porous Rock WRP Area (NSW) (GW6)</i>  Western Porous Rock SDL (GS50)	+109.4	Historical water use from aquifer licenses and salt interception schemes (of around 20 GL per year) is a fraction of the base case and proposed SDL. With poor water quality limiting potential uses, little substitution occurring between surface and groundwater resources and limited variability in historical use, any socio-economic impact from the increased SDL is largely dependent on key mining projects proceeding – in particular the Hawsons magnetite (iron ore) mine. In the event that the SDL is not increased, the Hawsons magnetite mine may need to source an alternative source which may be cost-prohibitive.
<i>Eastern Porous Rock WRP Area (NSW) (GW16)</i>  Gunnedah – Oxley Basin SDL (GS17)  Sydney Basin SDL (GS41)	+13.0  +1.9	Data on water use over the last two years from aquifer licences and town supplies (of around 5 GL per year) is well below the base case and proposed SDL. The limited time series of water use limits analysis of variability and we note the last two years were wet. However with relatively small demands projected from new mine projects it is unlikely that there will be any socio-economic impact from increasing the SDL in the foreseeable future.
<i>Goulburn-Murray WRP Area (Vic) (GW2)</i>  Goulburn-Murray: Sedimentary Plain SDL (GS8)  Goulburn-Murray Highland SDL (GS8)	+19.5  +18.2	Water use for every year over the last eight years in the area has been well below the base case and proposed SDL even during dry times when water use hit a peak. Furthermore, even in the region's hot spots (such as Katunga) water use was well below the allocation in this area. We also consider it unlikely that the 70% allocation in the Katunga area will increase in the foreseeable future. Therefore, any socio-economic impact from increasing the SDL limit is likely to be negligible in the foreseeable future.
<i>SA Murray WRP (GW4)</i>  GS3 Mallee (Murray Group Limestone) (GS3)	- 2.14	The 2.14 GL was associated with the operation a salt interception schemes along the Murray River and there are socio-economic benefits from reducing salt loads to the Murray River and improving water quality

### SDL change – Western Porous Rock SDL

Historical groundwater use in the Western Porous Rock area is a fraction of the base case and proposed SDL and very little variability is observed, demonstrating that groundwater is not widely used as an alternative (or buffer water) to surface water in times of drought. With irrigation, town supplies and stock and domestic use limited by poor water quality and high costs of drilling new bores, any socio-economic impacts are largely dependent on water demand from future mining

projects. Of particular importance is the prospective Hawsons Iron Ore project given it has an anticipated large demand (of around 100 GL per year) for its processing activities. Further details on the Hawsons Iron Ore project can be found at the [Geoscience Australia website](#). Without the Hawsons project, water use (of 21.5 GL) from the current and potential Mineral Sands projects in the Murray Geological Basin would not reach the base case SDL. More information on Mineral Sands in this area can be found at the [NSW Department of Industry](#) website. Therefore, on balance, unless the Hawsons project goes ahead, it is unlikely that any socio-economic impacts due to an increase in the SDL would occur in the foreseeable future.

### **SDL change – Eastern Porous Rock WRP**

The last four years of groundwater use in the area is well below the base case and proposed SDL. Without a longer time series, there are no observations on which to draw regarding the variability of groundwater use and the extent to which it acts as a buffer when surface water resources are scarce. Therefore any projections of future use, with respect to irrigation demand and stock and domestic, are highly uncertain. Also, for the deeper groundwater areas, development is limited as it is too costly to drill deep bores for irrigation uses.

In terms of new mining projects, the NSW Planning System has around 16 potential coal and coal seam gas projects, with relatively small anticipated demands on water resources (between 0.01 and 2 GL per year). We note however that these mines are only prospective and may not go ahead.

While data on historical water use associated with aquifer licences is limited we consider that, even under quite optimistic water use scenarios or high variability of demand and assuming all 16 mining projects went ahead, the base case SDL is still unlikely to be reached any time soon. Therefore, it is unlikely that any socio-economic impacts due to an increase in the SDL would occur in the foreseeable future.

### **SDL change – Goulburn–Murray WRP**

Historical average groundwater use over eight years (between 2007 and 2014) is well below the base case and the proposed SDL. Even when considering the highest peak in groundwater over this period (of 104 GL in 2006-07) it is still around 40% of the base case SDL.

In terms of potential future water use, groundwater demand may increase to some extent as a result of there being less surface water resources available from implementation of the Basin Plan. However, given all historical water use over the last eight years (even in peak times) is below half the base case and proposed SDLs, it is considered unlikely that groundwater use will develop to more than double its current use in the foreseeable future to reach the base case SDL.

Therefore, overall, we consider that there is negligible socio-economic impact of increasing the SDL limit in the foreseeable future (over the next 10-20 years), as water use is unlikely to reach the limit.

### **SDL change – SA Murray WRP**

The proposed SDL change to the SA Murray was the result of an incorrect assignment of 2.14 GL associated with the Murtho Salt Interception Scheme to the GS3 Mallee (Murray Group Limestone). The correct assignment of this amount is to the GS7 SA Murray Salt Interception Schemes. Given the 2.14 GL was associated with a salt interception scheme, there is no impact

of reducing the SDL amount for the GS3 Mallee as it does not relate to productive use. Because of this, no further analysis is required on historical or prospective future water use.

## Change to compliance methodology

The assessment of socio-economic impacts of the change to the state-level compliance methodology is similar to the change in SDLs in the sense that impacts only occur if the new compliance methodology changes water use. The changed methodology, in and of itself, would not directly result in any impact. Rather, it is only when actual water use increases or decreases compared to the base case methodology (i.e. the current compliance methodology) that socio-economic impacts occur. In addition, the compliance methodology relates to state government compliance with the Basin Plan and not the compliance of individual entitlement holders (individual compliance is undertaken by the states under various state and local management arrangements). Therefore, it is only through the actions or policies of state government in response to the change in compliance methodology that future water use could potentially be influenced.

Overall, it is considered that the proposed change to the compliance methodology would have negligible impact on water use, and therefore negligible socio-economic impacts. The reasons for this include:

- The register of take in the Basin Plan is designed to construct a baseline dataset where a Basin state may be assessed for non-compliance. It is not the intent of this register to be establishing a balance of available water for use.
- Groundwater use at the basin level is tracking well below SDL, which is the reason for the potential accumulation of credits in the first place. It is considered unlikely that the surplus water accumulated would be demanded in the areas where it accumulates most.
- In any event, any demand for accumulated credits does not mean water can automatically be used by individual users. Any 'release' of accumulated credits to water users is dependent on the actions of state governments rather than on individual water entitlement holders who operate under state-based and local management rules.