Transition to Basin Plan Sustainable Diversion Limits for the SA Murray Region Water Resource Plan Area

Current Water Resource Management Arrangements and Analysis of Sustainable Diversion Limit Compliance Requirements

Internal Report

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EXECUTIVE SUMMARY

The Murray-Darling Basin Plan was developed under the Water Act 2007 (Cth) (Water Act) and became a legislative instrument in November 2012. The Basin Plan sets new Sustainable Diversion Limits (SDLs) on the amount of water that can be used for consumptive purposes from the Basin’s water resources. Both the Basin Plan and Water Act also set out new accounting, monitoring and reporting obligations.

To achieve the Basin Plan and Water Act requirements, the South Australian Government is reviewing its existing water use planning, allocation, accounting and reporting policies, plans and processes to determine the changes required to effectively and efficiently manage and report on water use consistent with the Water Act and Basin Plan SDL requirements. An outline of this process is shown in Figure A below.

The first review of current management arrangements has been completed for the SDL resource units across the SA Murray Region as a compliant water resource plan is due by 2017. The SA Murray Region covers the Murray-Darling Basin within South Australia outside the Eastern Mount Lofty Ranges and the River Murray channel. It includes both surface water and groundwater, prescribed and non-prescribed areas and three Natural Resource Management (NRM) regions – the South Australian Murray-Darling Basin (SA MDB), South Australian Arid Lands (SAAL) and the South East (SE).

This is the first time that the water management information for this area has been consolidated and documented in one place. This report not only analyses the requirements for implementing SDL compliance, but also provides water resource managers with significant information on the management of water resources of the SA Murray Region under State legislation and in the context of the Basin Plan.

The information in this report has been drawn from a large number of sources including State legislation, Regional NRM Plans, Water Allocation Plans, Basin Plan technical documents and other Government policy documents. In addition, extensive discussions have occurred with central agency and regional staff to ensure the accuracy of the information and that the application of their policies is reflected appropriately.

The report includes an analysis of current management arrangements to determine the changes required to effectively manage and report on water use consistent with the SDL requirements. While the current level of water resource management across the SA Murray Region is based on the level of risk to the water resources, the Basin Plan now places limits on take in areas where no limits currently apply, as well as on forms of take that do not require a licence under State legislation.

Recommendations have been proposed and the likely tasks outlined in order to meet the requirements of the Basin Plan, including ‘fit for purpose’ options for managing take by limiting and monitoring development that affects water take such as farm dam and well construction as well as specific types of land use. These aim to ensure that SDL compliance is met while also minimising ongoing resourcing for reporting and compliance.

Key points and future tasks identified from the analysis are as follows:

1. A revised Baseline Diversion Limit (BDL) and associated SDL should be developed for the non-prescribed surface water SDL resource unit because existing State management arrangements were not included by the MDBA when the current values were determined. The current BDL is much lower than the level of take that could occur under the farm dam development limits defined within Regional NRM Plans. A method and rules for implementing the revised limit across the three NRM Regions will also need to be developed, which are proposed to be in the form of a limit on development activities that affect take (specifically farm
This process may include the re-apportionment of the BDL. The limit and associated rules will then need to be implemented through the regional NRM Plans.

2. A method for implementing the new Basin Plan limits for the non-prescribed groundwater SDL resources units should be developed and applied across the three NRM Regions by limiting and/or monitoring well construction and specific types of land use. This will require rules for take to be determined, with the rules then implemented through the regional NRM Plans and operating plans for salt interception schemes.

3. Permits for activities that affect water take will be a key mechanism for managing take across the water resource plan area, particularly in the non-prescribed areas and for forms of take that do not require a licence under State legislation. Explicitly managing relevant development activities is a key ‘fit for purpose’ option in order to avoid the cost and resource intensive process of monitoring all water take (including for stock and domestic purposes), while still fulfilling the SDL requirements. To do this, revised water affecting activity policies will need to be developed and implemented consistently through the three regional NRM plans.

4. There is not currently a central, searchable register of permits for activities that affect water take, nor a consistent approach to storing this information across the three NRM regions. This creates difficulties in keeping track of these activities and will create further issues in managing and reporting on the new limit on take. A central, searchable register for water affecting activities should be considered because it would not only support the Basin Plan requirements but could improve the management and monitoring of these activities across the State.

5. The current estimate of current take for stock and domestic purposes across a number of SDL resource units has a low level of confidence. Improving these estimates could be considered as this would allow current and future take to be accounted for appropriately and ensure that more robust estimates are used. It will also reduce the level of double accounting within annually reported figures for prescribed water resources.

6. A number of the Basin Plan BDLs and SDLs for SDL resource units in the SA Murray Region could be revised due to errors or omissions in their calculation. Additionally, a number of revisions to existing Water Allocation Plans could be undertaken for consistency with the Border Groundwater Agreement and the Basin Plan.

The next stage in this process will involve the development of an SDL work program to address the gaps and issues identified through this review, based around the recommendations and associated tasks outlined in this report. Some of these tasks will form part of the Development Program for the SA Murray Region WRP, other are internal systems and process improvements to support reporting and ongoing compliance.
Figure A: Transitioning to Sustainable Diversion Limits

**Water Act 2007 (Cth)**

**Basin Plan**

**Water Resource Plans**
- River Murray
- Eastern Mount Lofty Ranges
- SA Murray Region

**SDL Resource Units**
- Surface water
  - SA Non-Prescribed Areas (SS10)
  - SA Murray (SS11)
  - Marne Saunders (SS12)
  - Eastern Mt Lofty Ranges (SS13)
- Groundwater
  - Angas Bremer (GS1)
  - Eastern Mt Lofty Ranges (GS2)
  - Mallee (GS3)
  - Marne Saunders (GS4)
  - Peake-Roby-Sherlock (GS5)
  - SA Murray River (GS6)
  - SA Murray SIS (GS7)

**Sustainable Diversion Limits (SDLs) for consumptive purposes for each SDL resource unit**

**Water Resource Plan (SDL Compliant) Accreditation Package**

**SDL Requirements**
- Long term limits on take
- Rules for take
- Calculating take
- Reporting and Compliance
- Interception Activities
- Effects of connected water resources

**Review of State Water Management Arrangements**
- Legislation
- Policies
- Data collection / Monitoring
- Accounting
- Assessment
- Reporting

**Staged work program**
- Compliant policies and plans including allocation and accounting processes
- Compliant administration, data management accounting and reporting procedures, business systems, modelling frameworks and IT
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1 INTRODUCTION

The Murray-Darling Basin Plan was developed under the Water Act 2007 (Cth) (Water Act) and became a legislative instrument in November 2012. The Basin Plan sets new Sustainable Diversion Limits (SDLs) on the amount of water that can be used for consumptive purposes from the Basin’s water resources. Both the Basin Plan and Water Act also set out new accounting, monitoring and reporting obligations.

The SDLs apply to the State’s three Murray-Darling Basin water resource plan (WRP) areas: the Eastern Mount Lofty Ranges, South Australian River Murray and South Australian Murray Region. These areas include both prescribed and un-prescribed groundwater and surface water resources. Each WRP area is comprised of one or more SDL resource units, for each of which SDLs are defined in the Basin Plan.

While SDLs do not come into effect until 1 July 2019, accredited WRPs, which will implement the SDLs, will need to be in place across South Australia according to the following schedule:

- By 31 December 2017 for the South Australian Murray Region WRP area;
- By 1 July 2019 for the Eastern Mount Lofty Ranges WRP area; and
- By 1 July 2019 for the South Australian River Murray WRP area.

South Australia is also required to report on annual take limits and actual water use annually under section 71 of the Water Act.

To achieve the Basin Plan and Water Act requirements, the South Australian Government is reviewing its existing water use planning, allocation, accounting and reporting policies, plans and processes to determine the changes required to effectively manage and report on water use consistent with the Water Act and Basin Plan sustainable diversion limit requirements.

Across the SDL resource units in South Australia, there is a large variation in the management arrangements and availability of information to satisfy and / or fulfil the requirements of the Basin Plan. Water resource management at a State level is governed by the Natural Resources Management Act 2004 (SA) (NRM Act), with the level management commensurate with the level of risk. This means that for some areas there may be gaps when compared with the management requirements of the Basin Plan.

The Basin Plan requirements that relate to SDLs that have been considered in this report are listed in Table 1. These requirements are evaluated in relation to the current arrangements in place for SDL resource units in the South Australian Murray Region WRP area. Recommendations are then made for fit for purpose options to fulfil the requirements where there are identified gaps, and the likely tasks required to develop these options.
# Table 1  Basin Plan Requirements Related to SDLs.

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2 SA MURRAY REGION WATER RESOURCE PLAN AREA

2.1 Overview

The South Australian Murray Region WRP area covers the areas of the Murray-Darling Basin within South Australia excluding the Eastern Mount Lofty Ranges and the River Murray channel. It includes both surface water and groundwater SDL resource units, which represent both prescribed (under the NRM Act) and non-prescribed areas across one or more South Australian Natural Resource Management (NRM) regions – the South Australian Murray-Darling Basin (SA MDB), South Australian Arid Lands (SAAL) and the South East (SE).

Figure 1 shows the South Australian Murray Region WRP area, highlighting the NRM regional boundaries. The surface water SDL resource unit is then shown in Figure 2 and the groundwater SDL resource units in Figure 3. Each SDL resource unit has a unique identifier, with a ‘GS’ indicating a groundwater unit and ‘SS’ a surface water unit.

Table 2 lists the South Australian management plans applicable for each SDL resource unit in this WRP area. These include water allocation plans (WAPs) for prescribed resources and regional NRM plans. The extents of the Prescribed Wells Areas covered by the lists WAPs are shown in Figure 4. The *Groundwater (Border Agreement) Act 1985* (SA) also covers part of the SA Murray Region WRP area as shown in Figure 5. The *Development Act 1993* (SA) (Development Act) is applicable across the entire WRP area.

Table 2  Existing South Australian Management Plans and other Legislation covering SDL Resource Units.

<table>
<thead>
<tr>
<th>SDL Resource Unit (code)</th>
<th>South Australian Management Plans / Other Legislation</th>
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| Mallee (GS3)             | • Water Allocation Plan for the Mallee Prescribed Wells Area  
                           | • Water Allocation Plan for the Noora Prescribed Wells Area  
                           | • Regional NRM Plan for the South Australian Murray-Darling Basin  
                           | • *Groundwater (Border Agreement) Act 1985* (SA) |
| Peake, Roby and Sherlock (GS5) | • Water Allocation Plan for the Peake Roby and Sherlock Prescribed Wells Area  
                                      | • Regional NRM Plan for the South Australian Murray-Darling Basin |
| SA Murray (GS6)          | • Regional Natural Resources Management Plan for the South Australian Murray-Darling Basin  
                           | • Regional NRM Plan for the South Australian Arid Lands Region  
                           | • Regional Natural Resources Management Plan for the South East Region |
| SA Murray Salt Interception Schemes (GS7) | • Regional NRM Plan for the South Australian Murray-Darling Basin  
                                                  | • Water Allocation Plan for the Noora Prescribed Wells Area  
                                                  | • *Groundwater (Border Agreement) Act 1985* (SA)  
                                                  | • Operating plans for each salt interception scheme |
| South Australian Non-Prescribed Areas (SS10) | • Regional NRM Plan for the South Australian Murray-Darling Basin  
                                                      | • Regional NRM Plan for the South Australian Arid Lands Region  
                                                      | • Regional NRM Plan for the South East Region  
                                                      | • *South Eastern Water Conservation and Drainage Act 1992* (SA) |
Figure 1  South Australian Water Resource Plan areas with NRM region boundaries.
Figure 2  South Australian surface water SDL resource units.
Figure 3  South Australian groundwater SDL resource units.
Figure 4  South Australian Prescribed Areas in the SA Murray Region Water Resource Plan Area.
Figure 5  Border Groundwater Agreement Boundaries.
2.2 SDL Resource Unit Descriptions

The Basin Plan defines how each surface water and groundwater SDL resource unit is identified.

For surface water SDL resource units, section 6.02 states that:

(1) A **surface water SDL resource unit** referred to in column 1 of the table in Schedule 2 consists of all surface water resources within the area described by the polygon of the same name contained in the dataset that:

(a) is titled *Surface Water SDL Resource Units*; and

(b) has a dataset scale of 1:250,000; and

(c) is held by the Authority at the commencement of the Basin Plan.

For groundwater SDL resource units, section 6.03 states that:

(1) A **groundwater SDL resource unit** referred to in column 1 of the table in Schedule 4 consists of all groundwater resources described by column 2 of the table in Schedule 4 that lie beneath the area described by the polygon of the same name contained in the dataset that:

(a) is titled *Groundwater SDL Resource Units*; and

(b) has a dataset scale of 1:250,000; and

(c) is held by the Authority at the commencement of the Basin Plan.

2.2.1 Surface Water SDL Resource Units

**South Australian Non-Prescribed Areas (SS10)**

The boundaries of South Australian Non-Prescribed Areas SDL resource unit include all surface water resources within the Murray-Darling Basin that have not been prescribed under the NRM Act. Prescribed surface water resources that are covered by water allocation plans are covered by separate SDL resource units and are part of different water resource plan areas.

The SDL resource unit does not directly correspond to any of South Australia’s NRM or water resource planning boundaries. As such, information on the water resources of the SDL resource unit has been obtained from a number of sources. Unless referenced otherwise, the following information has been primarily taken from the SA MDB Region NRM Plan (SA MDB NRMB 2014a; SA MDB NRMB 2009), which covers the vast majority of the SDL resource unit. Additional information has been sourced from the SAAL and SE regional NRM plans (SAAL NRMB 2010; SE NRMB 2010).

The SDL resource unit includes all River Murray tributaries outside of the Eastern Mount Lofty Ranges water resource plan area. This includes those in the Ranges to River, Rangelands and Mallee NRM districts (refer Appendix 11.2), which are locally important to the ecology and economies of these areas. These streams are highly ephemeral and terminate as they fan out onto the Murray Plains.

Surface water run-off from the Murray Mallee region is practically non-existent due to the flat terrain, low rainfall and highly permeable soils. Inflows to the River Murray from the Mallee are from groundwater drainage, which follows a general north-westerly flow path. Similarly surface water run-off from the South Olary Plains only reaches the River Murray through groundwater drainage.
Burra Creek is the most significant tributary and is located in the north west of the SDL resource unit. It receives flows from a catchment of approximately 934 km², however, surface water flows from the catchment to the River Murray are rare as the lower reaches are flood plains that lack defined drainage (Deane, et al., 2008). The last known record of this occurrence in 1941, although it is believed to have occurred a number of times prior to this before European settlement (Deane, et al., 2008).

The landscape within the upper catchment of Burra Creek comprises generally flat to slightly undulating terrain. The central catchment is defined by a series of three north-south trending ridge lines comprising part of the northern Mount Lofty Ranges (Deane, et al., 2008). The course of Burra Creek itself is largely fault controlled through this area, following a major north-south trending fault line, to the east of the central range. These parallel ridges create a number of sub-catchments, many of which provide important contributing flows to Burra Creek (Deane, et al., 2008).

The lower Burra Creek catchment commences to the east of the Worlds End gauging station and in this area there is a well-defined channel with permanent flow (Deane, et al., 2008). Further to the east, flow becomes discontinuous, and permanent waterholes are irregularly located for approximately 20 km downstream of the gauging station. Although these become increasingly saline, they are of a significant volume and represent important habitat. With further distance to the east, Burra Creek becomes poorly defined and is essentially a floodout plain, with braided and discontinuous drainage lines (Deane, et al., 2008).

The Coorong is also part of the SA Non-Prescribed Areas SDL resource unit and is split between the SA MDB NRM region and the SE NRM region. The Coorong is an elongate coastal lagoon that extends from the mouth of the River Murray 100 kilometres south-east along the coast. The waterbody is confined by the coastal dune barrier of Young Husband and Sir Richard Peninsulas. There are three distinct habitats ranging from the seasonal fresh water near the barrages, to brackish Murray Mouth and northern lagoon area, to the hypersaline southern lagoon. It is a significant region for migratory birds, fish and unique vegetation communities. The Coorong, in conjunction with the Lower Lakes, is listed in the Ramsar register. In the past, groundwater naturally fed the wetlands of the South East and flowed into the Coorong until a series of drains were built for agriculture and pasturing purposes. Increased use of the River Murray’s water resources for consumptive purposes as well as the construction of locks and barrages has also significantly altered freshwater flows into the Coorong.

Major water courses in the part of the SDL resource unit that fall within the SAAL NRM region include Olary Creek, Wiawera Creek, Yunta Creek and Manunda Creek. There are also a number of natural waterholes and springs in the area. The Olary Ranges stream flows are generally irregular and subject to extreme flood, drought and siltation. Yunta Creek has a catchment area of approximately 680 km² and its topography is typically flat and undulating. Flows in the creek are irregular due to the rainfall being highly variable. Manunda Creek is approximately 123 km in length with the upper catchment located outside of the Murray-Darling Basin. The watercourse is ephemeral and reliant on surface water runoff. Olary Creek begins as Wiawera Creek. It has surface water reliant wetland features and is primarily reliant on surface water runoff and potentially some groundwater discharge.

2.2.2 Groundwater SDL Resource Units

Mallee (GS3)

The geographic boundary of the Mallee SDL resource unit covers the Mallee Prescribed Wells area (Mallee PWA) and the Noora Prescribed Wells area (Noora PWA) as shown in Figure 4. The Mallee PWA is approximately 11,850 km² and covers the underground water resources in a large portion of the Murraylands area of South
Australia. The Noora PWA covers an area of approximately 1,330 km², extending from the northern boundary of the Mallee PWA to the River Murray. Despite being managed as part of two separate prescribed wells areas, the underground resources are continuous across both areas. Part of the Mallee SDL resource unit is also contained within the Designated Area of the *Groundwater (Border Agreement) Act 1985* (SA) as shown in Figure 5.

It should be noted that the Mallee (GS3) SDL resource unit boundary shown in Figure 3 does not cover the entire Mallee PWA, as shown in Figure 4. During the development of the Basin Plan, the discrepancy between these boundaries was discussed with the MDBA. The MDBA advised that the boundaries needed to be consistent with the surface water boundaries rather than administrative boundaries (S Barnett pers. comm., 31 July 2014).

Underlying the Mallee PWA and the Noora PWA is the Murray Basin geological basin. The Murray Basin consists of layers of sand, clay and limestone up to 300 metres thick, which were deposited 30 million years ago during the Tertiary Period (SA MDB NRMB, 2012). The sediments are flat lying and relatively uniform in thickness. There are three main water-bearing layers, separated by clays and marls (RMCWMB, 2001), with the flow in all aquifers primarily from south-east to north-west. The underground water in these three aquifers is managed by the Mallee PWA and Noora PWA water allocation plans.

The Mallee SDL resource unit defines three SDL resource unit sub-components based on the vertical separation of the three water-bearing aquifers as follows:

1. Mallee - Pliocene Sands
2. Mallee - Murray Group Limestone
3. Mallee - Renmark Group

The hydrogeology of these three layers is as follows (RMCWMB 2001; SA MDB NRMB 2012):

1. Pliocene Sands:
   - Upper most aquifer consisting of fine to medium sand deposited as a former beach and shoreline.
   - In the Mallee PWA, the aquifer contains underground water only in the eastern part. In the western part the aquifer is higher than the water table and is therefore unsaturated. Salinity ranges from 1,500 mg/L to over 20,000 mg/L, increasing to the north and east.
   - In the Noora PWA, the salinity ranges from 30,000 EC to 56,000 EC from south to north, which would only allow limited industrial, mining use or brine production. Potential yield is estimated at 5 to 10 L/s.

2. Murray Group Limestone:
   - A marine fossil rich limestone aquifer that lies beneath the Pliocene Sands.
   - Main recharge source is rainfall in south-western Victoria. From here it moves slowly (due to the flat terrain) in a north-westerly direction.
   - In the Mallee PWA:
     - Aquifer averages over 100 metres in thickness, with a maximum of 140 metres in the north-west.
     - The salinity increases in a north-westerly direction from around 1,000 mg/L to up to 20,000 mg/L. There is a large area where the salinity is below 3,000 mg/L, which provides
water supplies suitable for irrigation. This was recharged through the deep sandy soils of the Big and Little Deserts about 20,000 years ago.

- Increased recharge that has resulted from nature vegetation clearance has not yet reached the water table of this aquifer. When it does, it is likely that the water table will rise and salt stored in the unsaturated zone will be flushed into the aquifer. This stored salt has concentrations of up to 30,000 mg/L and so will likely increase the salinity of the aquifer, although the rate and magnitude will vary. This is a long-term risk to water use in this area.

- Yields vary from 0.5 L/s from stock windmills (drilled to a few metres) to over 60 L/s for irrigation supplies (drilled to 200 metres).
  - In the Noora PWA the salinity varies from around 3,500 EC in the south to 56,000 EC in the north, with a variation in potential yield from 5 to 50 L/s.

3. Renmark Group:

- The lowest of the three aquifers, this is a sequence of gravels, sands and coaly clays.
- It is separated from the Murray Group Limestone aquifer by the Ettrick formation, which is a confining layer of low permeability carbonaceous clay. Although confined, tests have suggested that there may be some upward leakage.
- In the Mallee PWA, the salinity is generally similar to overlying Murray Group Limestone.
- In the Noora PWA, the salinity varies from around 11,000 EC in the south to 33,000 EC in the north, with a variation in potential yield from 5 to 50 L/s.

**Peake-Roby-Sherlock (GS5)**

The geographic boundary of the Peake-Roby-Sherlock SDL resource unit covers the Peake, Roby and Sherlock Prescribed Wells Area (PWA). The area is approximately 1,120 km², bordering the Tintinara Coonalpyn PWA in the south and the Mallee PWA in the east. The Peake, Roby and Sherlock PWA is underlain by two main water-bearing layers, namely a shallow Unconfined Aquifer and the underlying Confined Aquifer, which are separated by the Ettrick formation (SA MDB NRMB 2010a).

The Peake-Roby-Sherlock SDL resource unit defines two SDL resource unit sub-components based on the vertical separation of the two water-bearing aquifers as follows:

1. Peake-Roby-Sherlock - Unconfined
2. Peake-Roby-Sherlock - Confined

The hydrogeology of these two layers is as follows (SA MDB NRMB 2010a):

1. Unconfined Aquifer
   - A limestone aquifer that can be sub-divided into the Mallee Highland region in the east and the Coastal Plain region in the west.
     - Mallee Highland: Murray Group Limestone aquifer, which is contained with a calcareous sandstone and Tertiary limestone (approximately 30 million years old). The water table can be as deep as 50 metres. Salinity is generally around 2,000 to 3,000 mg/L.
Coastal Plain: the aquifer underlying this flat, low-lying region is contained within the Coomandook and Bridgewater Formations, which is composed of Quaternary limestone (less than one million years old). The water table is averages 5 metres below ground level. Salinity is high and generally in excess of 15,000 mg/L.

- Recharge is via local rainfall and lateral groundwater flow from the Mallee Highland.

2. Confined Aquifer

- Contains the Buccleuch Group (bryozoal limestone) and underlying sands of the Renmark Group (interbedded sands and clays).
- Main recharge source is south-western Victoria. From here it moves in an east-west direction between the Peake, Roby and Sherlock PWA.
- Salinity increases from 1,500 to 3,000 mg/L in the east to over 7,000 mg/L in the west.

SA Murray (GS6)

The SA Murray SDL resource unit includes all groundwater resources within the Murray-Darling Basin that have not been prescribed under the NRM Act. Prescribed groundwater resources that are covered by water allocation plans are covered by separate SDL resource units. The groundwater beneath the Lakes Alexandrina and Albert are also considered part of the SDL resource unit.

A 2010 report by CSIRO described the SA Murray region SDL resource unit as follows.

The SA Murray SDL resource unit incorporates the majority of the Murray-Darling Basin in South Australia, stretching from the border with Victoria in the east to the edge of the plains of the Mount Lofty Ranges and south-east to the coast. The area consists of two contrasting regions: the hills zone of the Olary Ranges and Mount Lofty Ranges along the north/north-eastern boundary of the area; and the more topographically homogenous plains region, which accounts for the majority of the area.

The upland reaches are formed from outcropping Cambrian basement rocks, forming Fractured Rock aquifers of varying yields. On the plains the upper most quaternary sediments of the SDL area mainly consist of the Aeolian Sands of the Woorinen Formation, underlain by Blanchetown Clay in some areas, which acts as a localized semi-confining layer to the underlying Tertiary sediments that contain the most significant aquifers in the system. The uppermost of these is the grained sands. In the central areas and east of the SDL area, the Pliocene Sands is separated from the underlying Murray Group Limestone aquifer, by the consolidated plastic silts and clays of the Bookpurnong Beds. The Murray Group Limestone is unconfined and contains the watertable across much of the plains, other than in the east where the watertable is within the Loxton-Parilla Sands.

Beneath the Murray Group Limestone, the Ettrick Formation acts as a confining layer to the underlying Renmark Group aquifer.

SA Murray Salt Interception Schemes (GS7)

The SA Murray Salt Interception Schemes SDL area incorporates the River Murray floodplain and adjacent areas, extending west from the South Australian - Victorian border to the east of Morgan. Parts of this SDL resource unit is contained within the Noora PWA and the Designated Area defined under the Groundwater (Border Agreement) Act 1985 (SA).
The hydrogeology is as follows (CSIRO 2010):

- Beneath the floodplain lies the Monoman Formation, which consists of predominantly re-worked fine to coarse-grained, fluvial sediments of the Loxton-Parilla Sands that the river has incised over time. The Monoman Formation is hydraulically connected to the regional groundwater flow system.

- In the eastern half of the area, the water table is located within the Loxton-Parilla Sands aquifer, which is separated from the underlying confined Murray Group Limestone aquifer by the Bookpurnong Beds (poorly consolidated plastic silts and shelly clays). The thickness of the Loxton-Parilla Sands aquifer varies from approximately 30 to 100 metres.

- Moving west, the Bookpurnong Beds disappear, leaving the lower Murray Group Limestone hydraulically connected to the overlying sand aquifers.

- In the west the water-table is mostly contained within the Murray Group Limestone.

- The majority of the groundwater in the area has a salinity greater than 14,000 mg/L.

- Recharge occurs via infiltration of rainfall and downward percolation of irrigation water.

The current salt interception schemes within this unit and year(s) of construction are as follows:

- Woolpunda - 1990, 1992
- Waikerie - 1992, 2010
- Sunlands-Qualco - 2001
- Bookpurnong - 2006
- Loxton - 2010
- Pike - 2011
- Murtho - 2014

While the Rufus River Scheme (1984) is operated by SA Water, it is located in New South Wales and hence forms part of another SDL resource unit.
3 LONG TERM SUSTAINABLE DIVERSION LIMITS

3.1 Calculation of the Basin Plan BDLs and SDLs

3.1.1 Baseline Diversion Limits

The Basin Plan establishes baseline diversion limits (BDLs) as an estimate of the baseline take or limit of take from a SDL resource unit. The BDLs provide the reference point from which SDLs are generated. For the SA Murray Region WRP area, the BDL includes all water pumped, diverted or intercepted for consumptive purposes as at 30 June 2009.

The methods used to determine the BDLs took into account a number of elements, including (MDBA 2010):

- Current limits on take defined by existing water resource plans or current water management arrangements;
- All existing water access rights including water access entitlements and stock, domestic and riparian domestic rights;
- The current use of existing water access rights;
- All known forms of take that may not be currently covered by water access rights; and
- Climate characteristics.

The basis for the calculation of BDLs for each SDL resource unit has varied, depending on the current level of management under State legislation. The general approach identified in MDBA (2010) was as follows:

- Where transitional or interim water resource plans were in place, the BDLs reflect the limits on take expressed in those plans.
- Where transitional or interim water resource plans are not in place, or the plans only apply to certain types of take, the baseline reflects the current level of take.
- Where a Basin state was developing a plan intended to become an interim water resource plan, the most up-to-date information available from the Basin state on the proposed limits to be established by the plan were used.

The following describes the general methods that the MDBA used to determine the BDLs for groundwater and surface water resources across all WRP areas. Not all methods were applied in the SA Murray Region WRP area.

**Groundwater BDLs**

MDBA (2012) described some of the changes in the calculation of the BDLs and SDLs since MDBA (2010). For the groundwater BDLs, the general approach has been enhanced as follows:

- Where a water management plan or proposed plan exists, the BDL is the plan limit unless the plan limit is greater than the level of entitlement, in which case the BDL is the entitlement;
- Where there is no plan, the BDL is the entitlement along with the effect of any rules managing extraction; and
- Where there is a cross-border agreement for groundwater management, the extraction limit under the agreement is the BDL.
In setting the groundwater BDLs, the MDBA principally used information provided by the States, which was considered the most up-to-date understanding of the current level of groundwater entitlements and stock and domestic extractions.

**Surface Water BDLs**

The Basin Plan separates the BDL for each surface water SDL resource unit into two components, namely watercourse diversions and interception. As such, the BDLs may be different from the long-term diversion Cap\(^1\), water allocation plan limit or other figures associated with a given area. Interception includes volumetric estimates for take under basic rights, take by runoff dams and net take by commercial plantations.

Hydrological modelling was the primary tool used to determine the BDL in each SDL resource unit (MDBA 2010). The hydrological models used represent the various water management, sharing and operating rules, the infrastructure and other relevant physical characteristics, and the existing spatial and temporal patterns of take. These models were generally used to establish limits under current water allocation plans and other instruments. Where forms of surface water take were not explicitly represented in a hydrologic model, the BDL was generally defined by the current level of take, which was quantified by the most appropriate method using the elements identified above.

Where possible, the 114-year period from July 1895 to June 2009 was used for climatic information (rainfall, evaporation) in the hydrologic models. The BDL was then the average modelled diversion based on this 114 year sequence.

Water recovered for the Living Murray and Water for Rivers programs was removed from BDLs (MDBA 2010). However, no environmental entitlements secured or made available to the Australian Government under the Water for the Future program have been included. This water is available to contribute to meeting the required reductions (where applicable) to meet the SDLs.

In a number of locations water is transferred into or out of the Basin\(^2\). These transfers were also taken into account in determining the BDLs and developing the SDLs (MDBA 2010). Water transferred into the Basin has been treated as part of Basin water resources that are available for meeting both environmental and consumptive water requirements. As the SDLs assume that these transfers are part of the available resource, WRP s will need to ensure that any variation of the transfer arrangements from those used in developing SDLs will not compromise environmental requirements.

In some areas, water taken from the Basin water resources may be subsequently returned to watercourses (for example from irrigation districts and urban centres) that may then contribute to meeting environmental values downstream. While it may be argued that any water taken and returned to a watercourse should not be included in the SDL, information about such return flows is generally poor. As such, any return flows that are currently accounted for in implementing the long-term diversion Cap have also been accounted for in developing the BDLs.

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\(^1\) A Cap on Diversions is defined under Schedule E of the Murray-Darling Basin Agreement for the area covered by the River Murray Prescribed Watercourse only. This comprises the South Australian Murray SDL resource unit (SS11) under the Basin Plan.

\(^2\) For example, the release of water from the Snowy Scheme (outside the Basin) into the Murrumbidgee and Murray systems (inside the Basin), and diversion of water from the South Australian River Murray (inside the Basin) to supply Adelaide (outside the Basin).
As the measurement of return flows improves over time it is anticipated that this would be reflected in future amendments of the Basin Plan.

### 3.1.2 Sustainable Diversion Limits

The Water Act [s 22(1)] defines the long-term SDL as the maximum long-term average quantity of water that can be taken, on a sustainable basis, from:

- a) the Basin water resources as a whole; and
- b) the water resources, or particular parts of the water resources, of each water resource plan area.

The SDLs are required to reflect an environmentally sustainable level of take [s 23(1) of the Water Act]. In their determinations of the environmentally sustainable level of take for a particular SDL resource unit, the MDBA took into account current environmental and hydrological science, socio-economic knowledge and any system constraints that limit flows along river channels.

Chapter 6 of the Basin Plan sets out long-term SDLs on the quantity of surface water and groundwater that may be taken from each SDL resource unit. The SDLs take effect on 1 July 2019 [s 6.04(1)].

SDLs will be implemented through accredited water resource plans. Chapter 10 of the Basin Plan defines the requirements for water resource plans, including those related to SDLs. This includes the incorporation, and application, of the long-term annual diversion limit for each SDL resource unit in the water resource plan area [s 10.01(2)(b)] and the sustainable use and management of water resources of the water resource plan area within the long-term annual diversion limits [s 10.01(2)(c)].

The SDLs must include all forms of take. Section 1.07 of the Basin Plan defines **form of take** to mean any of the following forms of take:

- Take from a watercourse;
- Take from a regulated river;
- Take by floodplain harvesting;
- Take by runoff dams;
- Net take by commercial plantations;
- Take from groundwater;
- Take under basic rights.

---

3 The long-term annual diversion limit is the sum of the long-term average SDL and the temporary diversion provision [s 22 of the Water Act]. Under the Basin Plan, the long-term annual diversion limit is equal to the long-term average SDL as the temporary diversion provision for each SDL resource unit is zero [s 6.07].

4 Runoff dam means a dam or reservoir that collects surface water flowing over the land.

5 Net take, in the context of a commercial plantation, means the difference between the take by a commercial plantation and the take by the vegetation existing at the site of the plantation before the plantation commenced.

6 Basic right includes a right under State water management law to take water for domestic or stock purposes and a native title right.
**Groundwater SDLs**

SDL resource unit boundaries for groundwater resources were determined to accommodate the level of connectivity of various groundwater resources and State planning boundaries (MDBA 2012a). As described in Section 2.2.2, a number of the groundwater SDL resource units have also been vertically separated into their specific aquifers to reflect that water is or could be extracted from different aquifers within the same area.

The SDLs for groundwater resources were determined based on an assessment of the risks of groundwater extraction on the environmentally sustainable level of take (ESLT) in relation to the following characteristics (MDBA 2012a):

- the ability of aquifers to continue to be productive over time;
- groundwater-dependent ecosystems;
- surface water resources that are fed from groundwater; and
- the water quality (salinity) of groundwater.

The groundwater SDLs were then informed either by numerical modelling (14 SDL resource units) or an analytical risk assessment (65 SDL resource units). For the South Australian Murray Region WRP area, all groundwater SDLs were set using the risk assessment method (MDBA 2012a).

The analytical risk assessment initially used the recharge risk assessment method (RRAM) to identify the potential volume of water available for consumptive use, that is, the preliminary extraction limit (PEL). This was done as follows (MDBA 2012a; MDBA 2012b):

- Recharge volume determined using the Water Vegetation Energy and Solute (WAVES) model or other numerical model (if available).
- Sustainability factor (SF) and adjust recharge volume determined. The SF is a factor that reduces the initial recharge volume based on risk and uncertainty. It is the product of the following three steps:
  1. Groundwater extraction risk to the ESLT characteristics (as listed above, except salinity). SF determined based on risk: high risk - 0.1, medium risk - 0.5, low risk - 0.7.
  2. Groundwater extraction risk to groundwater salinity. Each SDL resource unit was separated into four salinity classes (0 to 1,500 mg/L, 1,500 to 3,000 mg/L, 3,000 to 14,000 mg/L, >14,000 mg/L). If there was a risk of groundwater extraction compromising the salinity in class 1 or 2, then the SF from Step 1 was further reduced by the following: Class 1 - 0.8, Class 2 - 0.9.
  3. Uncertainty within the SDL resource unit assessed in terms of the amount information and data available as well as the level of understanding of the groundwater processes. If there was a high level of uncertainty, a reduction to the SF determined in step 2 was then applied based on the level of risk to the ESLT characteristics: high/medium risk - 0.5, low risk - 0.75. Otherwise an SF of 1.0 is applied.

Each SDL resource unit was then classified as one of seven categories, which was based on the type of groundwater resource, current or proposed management arrangements and the current level of take. The PEL was then evaluated against information specific to the category to determine whether this reflected an ecologically sustainable level of take or was subsequently adjusted.
The categories were as follows (MDBA 2012a):

1. Deep groundwater
   - Groundwater resources below those currently accessed for productive use and stock and domestic needs. Generally at least 200 metres below the land surface.
   - Not normally accessed due to depth and generally low water quality.
   - Proposed SDLs based on the available knowledge of these deep aquifers.
   - South Australian deep groundwater SDL resource unit: Mallee (Renmark Group) (GS3).

2. Non-renewable groundwater
   - Groundwater resource that received recharge during a different climatic period and is now a confined or semi-confined aquifer that receives negligible recharge.
   - Can have a very large storage that, to a certain point, can be extracted with minimal environmental consequences.
   - Current extraction regimes under existing water resource plans are based on an acceptable rate of decline of the resource.
   - South Australian non-renewable groundwater SDL resource unit: Mallee (Murray Group Limestone) (GS3).

3. Connected resources
   - Groundwater systems that are connected with surface water systems.
   - No South Australian SDL resource units are defined in this category.

4. Existing reduction program
   - SDL resource units in New South Wales only that are part of systems that had previously been identified as over-allocated and reductions in entitlement as part of the Achieving Sustainable Groundwater Entitlements program was put in place to move towards sustainable levels of entitlement and use.

5. SDL resource units with proposed reductions
   - SDL resource units where the BDL is higher than the proposed SDL.
   - No South Australian SDL resource units are defined in this category.

6. Existing planning arrangements / up to date science
   - SDL resource units where the MDBA considered the State extraction limits and the science underpinning those limits as the most up to date scientific knowledge.
   - This assessment acknowledges that the understanding and assessment of sustainability is more appropriate than the RRAM assessment.
   - South Australian SDL resource units where existing plan limits were applied:
     - Angas Bremer (Murray Group Limestone) (GS1)
7. Unassigned groundwater

- SDL resource units with low levels of current development but where there is potential to increase groundwater extraction without compromising ESLT characteristics.
- There is often low development due to access difficulties and/or poor water quality. However, there may be water suitable for stock and domestic purposes or mining activities. In some cases, the taking of saline groundwater may be beneficial in reducing salt inflow entering rivers.
- The PEL was adjusted based on an assessment of the risks associated with further development.
- South Australian SDL resource units with unassigned groundwater:
  - Angas Bremer (Quaternary) (GS1)
  - Mallee (Pliocene Sands) (GS3)
  - SA Murray (GS6)
  - SA Murray Salt Interception Schemes (GS7)
- The following formula was applied consistently to all groundwater resources with unassigned water (aside from SA Murray Salt Interception Schemes SDL resource unit where extraction is to reduce saline inflow to the River Murray) (MDBA 2012c):

  \[
  SDL = BDL + 25\% \text{ of the unassigned water}
  \]

  It should be noted that this formula is different to that used for SDL calculations in the Draft Basin Plan, which allowed for the SDL to be based on the BDL plus 50 / 100 percent of the unassigned water. The formula was revised due to concerns that there was insufficient information and science available to support the setting of groundwater SDLs at such levels.

**Surface water SDLs**

The general approach used to determine the SDLs in most SDL resource units across the MDB is described in MDBA (2011), and included the following steps:

1. Determine Basin wide objectives - including Water Act and Basin Plan objectives.
2. Identify key ecological values and ecosystem services across the Basin – including key environmental assets, key ecosystem functions, key environmental outcomes. Hydrological indicator sites were identified within rivers, floodplains and wetlands across the basin.
3. Determine environmental water requirements - set local environmental objectives and associated targets to determine site specific flow indicators. The environmental water requirements at the hydrological indicator sites were determined by assessing the needs of the local ecology, as well as the water needed to provide the many functions necessary for healthy ecosystems downstream.
4. Select ESLT options for assessment against water requirements - review all lines of evidence to select appropriate ESLT options for assessment.
5. Hydrological modelling of options - model ESLT options in an integrated river system modelling framework, simulating reductions in consumptive water use and using the available water to target achievement of environmental water requirements.

6. Assess environmental outcomes of options - compare flow outputs from models against environmental water requirements.

7. Select ESLT/SDLs - select the appropriate ESLT/SDLs, informed by the modelling and assessment of outcomes.

For those areas where the flow regimes under current arrangements were considered to already be sustainable, the objective of the SDL was to protect these flow regimes in order to preserve existing ecological values within the region and protect the contribution that these flows provide to downstream regions, either in terms of water for consumptive use or water for the environment (MDBA 2011).

Regions where current end of system flows are above 80% of without development flows were considered to have a flow regime which sustains water-dependent ecosystems. In these regions it was not considered necessary to assess environmental water requirements in any further detail and existing limits were adopted. While the MDBA recognised that there may be some flow stress issues in these regions, it was considered that they were not volumetric issues requiring a reduction in diversions, but require better river management and management of existing diversions (e.g. to avoid low flow stress). Such matters are considered in elements of the Basin Plan other than those related to SDLs.

3.1.3 Determination of BDLs and SDLs - SA Murray Region WRP Area

Schedules 2, 3 and 4 of the Basin Plan set out the BDLs and SDLs for each surface water and groundwater SDL resource unit. A summary of the BDLs and SDLs relevant to the South Australian Murray Region are provided in Attachment 1.

The application of the methods described above and the assumptions used by the MDBA to determine the BDLs and SDLs for each SDL resource unit in the South Australian Murray Region water resource plan area are described below.

South Australian Non-Prescribed Areas (SS10)

Schedule 3 of the Basin Plan describes the BDL for the South Australian Non-Prescribed Areas as the long-term annual average limit on the quantity of water that can be taken by runoff dams and from watercourses calculated by:

i) Summing the quantity of water that would have been taken by those forms of take for each year of the historical climate conditions under State water management law as at 30 June 2009; and

ii) Dividing that quantity by all of the years of the historical climate conditions.

In estimating the BDL for this SDL resource unit it appears that the MDBA did not base the estimate on the state water management laws that applied at the time. This may have been because the applicable state laws were not recognised as transitional or interim water resource plans at 30 June 2009 (refer to Section 3.1.1 for the method used by the MDBA to calculate the BDLs).

On 30 June 2009, the SA MDB NRM plan was in effect but was not considered a transitional plan under the Water Act 2007. A regulation was made on 21 November 2013 to recognize this plan as transitional. This plan requires
permits for certain water affecting activities and specifies limits for the total volumes of dams in a portion of the SA MDB region as outlined in Section 3.2.2 of this report.

The *South East Catchment Water Management Plan 2003 – 2008* (noting that it continued to have effect after 2008) and the *Catchment Water Management Plan for the South Australia Arid Lands Region* were also in place at 30 June 2009. Both of these documents required permits for certain water affecting activities, such as the construction of dams, however did not have any relevant policies that limited the volume of take from dams in the area of interest. These documents were not recognised as transitional or interim water resource plan at 30 June 2009.

Instead of using the limit in the SA MDB NRM plan referred to above as one part of the basis for setting the BDL, the MDBA estimated the BDL to be 3.5 GL. The MDBA recognised that areas contained in the SDL resource unit were not prescribed and had limited regulation in place. Given this, the MDBA determined that the SDL should be equal to the BDL.

In the absence of any other information on dam capacity and water use, estimates undertaken for the National Water Commission (*SKM et al.*, 2010) were considered the best available knowledge to determine the BDL. The surface water management areas (SWMAs) assessed in *SKM et al. (2010)* that were included by the MDBA in the SA Non-Prescribed Areas SDL resource unit are summarised in Table 3.

<table>
<thead>
<tr>
<th>Water Management Area</th>
<th>Farm Dam Impact (ML/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burra Creek</td>
<td>800</td>
</tr>
<tr>
<td>Coorong</td>
<td>19</td>
</tr>
<tr>
<td>Kakoonie</td>
<td>200</td>
</tr>
<tr>
<td>Murraylands</td>
<td>2500</td>
</tr>
<tr>
<td>Myppolonga Flat</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3519</strong></td>
</tr>
</tbody>
</table>

The method used by *SKM et al. (2010)* to estimate the volume and impacts of farm dams is described below.

1) Available farm dam data was collected.

2) For water management areas not covered by available farm dam data, the presence of farm dams was assessed in the first instance using Google Earth. Areas without any farm dams were removed from further analysis.

3) All other water management areas with unknown farm dam volumes were aligned with water management areas with farm dam data based on proximity to each other and similar land use types and distribution.

4) The dam density for each land use type for the water management areas with farm dam data was applied to the same land use type for the aligned water management areas in order to determine a total baseline dam volume for each of these water management areas.

5) The baseline dam impact for each water management area was determined using the following formula –

\[
\text{Impact of dams (ML/yr)} = 1.1 \times \text{Volume of dams (ML)}
\]
Mallee (GS3)

Mallee (Pliocene Sands)

The Basin Plan defines the following for the Mallee (Pliocene Sands) SDL resource unit:

- BDL = 0 GL/y
- SDL = 41.4 GL/y
- Limits apply to groundwater in the Pliocene sands

The Pliocene Sands aquifer in the Mallee SDL resource unit is included within the Unassigned Groundwater category. A summary of each step of the SDL calculation is provided in Table 4. This highlights a low risk to the ESLT characteristics and low uncertainty in the amount of information and groundwater processes. There is however, a risk of any extraction affecting the salinity in the class one and two zones.

Table 4 Development of the BDL and SDL for the Mallee (Pliocene Sands) SDL Resource Unit
(data from MDBA 2012b; MDBA 2012c)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recharge (WAVES recharge modelling)</td>
<td>267.5 GL/y</td>
</tr>
<tr>
<td>Risk to ESLT characteristics</td>
<td>Low (0.7)</td>
</tr>
<tr>
<td>Risk to salinity - risk to classes 1 and 2</td>
<td>Yes (0.8, 0.9)</td>
</tr>
<tr>
<td>Degree of uncertainty</td>
<td>Low (1.0)</td>
</tr>
<tr>
<td>PEL²</td>
<td>165.6 GL/y</td>
</tr>
<tr>
<td>BDL</td>
<td>0.0 GL/y</td>
</tr>
<tr>
<td>SDL (unassigned groundwater method: $SDL = BDL + 25%$ of the unassigned water)³</td>
<td>41.4 GL/y</td>
</tr>
<tr>
<td>Licensed entitlement⁴</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use⁴</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Estimated stock and domestic use⁴</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic</td>
<td>0 GL/y</td>
</tr>
</tbody>
</table>

1. Reduction in available recharge is applied to the area of the SDL resource unit with the relevant class of groundwater.
2. Sum of individual PELs for each salinity zone. It includes rainfall recharge only (i.e. does not include river and flood recharge of inflow from other aquifers) and does not account for water that is discharged from the system via baseflow to streams, outflow to other aquifers and/or evapotranspiration.
3. Change from draft Basin Plan SDL of 82.8 GL.
4. Provided by the South Australian Government.
The Basin Plan defines the following for the Mallee (Murray Group Limestone) SDL resource unit:

- **BDL** = 65.7 GL/y
- **SDL** = 65.7 GL/y
- Limits apply to groundwater in the Murray Group Limestone

The Murray-Group Limestone aquifer in the Mallee SDL resource unit is included within the non-renewable groundwater category. As a non-renewable resource, the SDL has been set using the current extraction regime under the existing water allocation plans, based on a rate of decline consistent with the existing Border Groundwater Agreement. A summary of each step of the SDL calculation is provided in Table 5.

**Table 5 Development of the BDL and SDL for the Mallee (Murray Group Limestone) SDL Resource Unit**

<table>
<thead>
<tr>
<th>Recharge (Barnett &amp; Osei-bonsu (2006) numerical model results)</th>
<th>3.8 GL/y(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL(^2)</td>
<td>N/A</td>
</tr>
<tr>
<td>BDL</td>
<td>65.7 GL/y</td>
</tr>
<tr>
<td>SDL (non-renewable groundwater policy)</td>
<td>65.7 GL/y</td>
</tr>
<tr>
<td>Licensed entitlement(^3)</td>
<td>63.4 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use(^3)</td>
<td>24.0 GL/y</td>
</tr>
<tr>
<td>Estimated stock and domestic use(^3)</td>
<td>2.33 GL/y</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic</td>
<td>65.73 GL/y</td>
</tr>
</tbody>
</table>

1. This value differs from the recharge value of 5.02 GL/y presented in MDBA (2012b). An area discrepancy was found in MDBA (2012b), which will be updated in a revised version of this report (Peter Hyde, pers. comm., 8 October 2014).
2. Does not receive rainfall recharge so PEL not applicable.
3. Provided by the South Australian Government.

There are a number of points to note with respect to the calculation of the BDL and SDL. These are explored further in Sections 3.2.2 and 3.3.3 but are introduced here as follows:

- The BDL and SDL were set based on the current extraction regime as follows:
  \[
  \text{BDL/SDL (65.7 GL)} = \text{Mallee WAP limit (61.3 GL)} + \text{Mallee WAP S&D (2.25 GL)} + \text{Noora existing allocation (2.144 GL)} + \text{Noora WAP S&D (0.028 GL)}
  \]
- The SDL uses the full limits from the Mallee WAP, despite a significant area of the Mallee PWA falling outside of the Mallee (GS3) SDL resource unit as defined by s 6.03 of the Basin Plan (refer Figure 4).
- The limit includes an existing allocation of 2.144 GL in the Noora PWA, which was made in January 2009. However, this allocation is for extraction from the Pliocene Sands aquifer, not the Murray Group Limestone. This allocation was granted for the purpose of extraction for the proposed Murtho SIS. This allocation should therefore be included within the SA Murray Salt Interception Schemes (GS7) SDL resource unit.
Mallee (Renmark Group)

The Basin Plan defines the following for the Mallee (Renmark Group) SDL resource unit:

- \( BDL = 0 \) GL/y
- \( SDL = 2.00 \) GL/y
- Limits apply to groundwater in the Renmark Group, and all other groundwater within this SDL resource unit (GS3) that is not included in the Pliocene Sands or Murray Group Limestone limits.

The Renmark Group aquifer in the Mallee SDL resource unit is included within the deep groundwater category. When setting this SDL, all available information was considered. The storage volume of Renmark Group was estimated to be in excess of 100,000 GL and the SDL represents 0.002% of this volume. A summary of each step of the SDL calculation is provided in Table 6. This component of the SDL resource unit does not have a recharge input that can be applied to an SF to derive the PEL. However, the risk assessment was used as one line of evidence to assess the proposed SDL. This highlights a low risk to the ESLT characteristics but a high level of uncertainty.

<table>
<thead>
<tr>
<th>Recharge(^1)</th>
<th>0 GL/y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk to ESLT characteristics(^2)</td>
<td>Low</td>
</tr>
<tr>
<td>Risk to salinity - risk to classes 1 and 2(^2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Degree of uncertainty(^2)</td>
<td>High</td>
</tr>
<tr>
<td>PEL(^1)</td>
<td>N/A</td>
</tr>
<tr>
<td>BDL</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>SDL (deep groundwater policy)</td>
<td>2 GL/y</td>
</tr>
<tr>
<td>Licensed entitlement(^3)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use(^3)</td>
<td>Not measured</td>
</tr>
<tr>
<td>Estimated stock and domestic use(^3)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic</td>
<td>0 GL/y</td>
</tr>
</tbody>
</table>

1. Does not receive rainfall recharge so PEL not applicable.
2. SDL resource unit does not have a recharge input that can be applied to the Sustainability Factor to derive the PEL. However, the risk assessment was used as one line of evidence to assess the proposed SDL.
3. Provided by the South Australian Government.
The Basin Plan defines the following for the Peake-Roby-Sherlock (unconfined) SDL resource unit:

- **BDL = 3.41 GL/y**
- **SDL = 3.41 GL/y**
- Limits apply to groundwater in:
  a) the unconfined Murray Group Limestone comprising the Coomandook and Bridgewater Formations; and
  b) the unconfined Quaternary limestone.

The unconfined aquifer in the Peake-Roby-Sherlock SDL resource unit was included in the existing planning arrangements category. A summary of each step of the SDL calculation is provided in Table 7. While this component of the SDL resource unit does not have a recharge input that can be applied to an SF to derive the PEL, the risk assessment was used as one line of evidence to assess the proposed SDL. This shows a medium risk to the ESLT characteristics but a low level of uncertainty.

**Table 7 Development of the BDL and SDL for the Peake-Roby-Sherlock (unconfined) SDL Resource Unit (data from MDBA 2012b)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recharge(^1) (Barnett and Yan (2008) assessment of resource capacity)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Risk to ESLT characteristics(^2)</td>
<td>Medium</td>
</tr>
<tr>
<td>Risk to salinity - risk to classes 1 and 2(^2)</td>
<td>Yes</td>
</tr>
<tr>
<td>Degree of uncertainty(^2)</td>
<td>Low</td>
</tr>
<tr>
<td>PEL(^3)</td>
<td>N/A</td>
</tr>
<tr>
<td>BDL</td>
<td>3.41 GL/y</td>
</tr>
<tr>
<td>SDL (existing plan limit)</td>
<td>3.41 GL/y</td>
</tr>
<tr>
<td>Licensed entitlement (2008-09)(^3)</td>
<td>3.22 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use (2008-09)(^3)</td>
<td>0.001 GL/yr</td>
</tr>
<tr>
<td>Estimated stock and domestic use (2008-09)(^3)</td>
<td>0.19 GL/y</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic (2008-09)</td>
<td>3.41 GL/y</td>
</tr>
</tbody>
</table>

1. The productive aquifers of the Peake-Roby-Sherlock SDL resource unit are not recharged via rainfall infiltration or via leakage from overlying/underlying aquifers.
2. SDL resource unit does not have a recharge input that can be applied to the Sustainability Factor to derive the PEL. However, the risk assessment was used as one line of evidence to assess the proposed SDL.
3. Provided by the South Australian Government.
Peake-Roby-Sherlock (confined)

The Basin Plan defines the following for the Peake-Roby-Sherlock (confined) SDL resource unit:

- **BDL = 2.58 GL/y**
- **SDL = 2.58 GL/y**
- **Limits apply to groundwater in:**
  - a) the confined Renmark Group; and
  - b) the confined Buccleuch Group;
  - c) all other groundwater that is not included in the confined aquifer limits.

The confined aquifer in the Peake-Roby-Sherlock SDL resource unit was included in the existing planning arrangements category. A summary of each step of the SDL calculation is provided in Table 8. While this component of the SDL resource unit does not have a recharge input that can be applied to an SF to derive the PEL, the risk assessment was used as one line of evidence to assess the proposed SDL. This shows a medium risk to the ESLT characteristics but a low level of uncertainty. This shows a medium risk to the ESLT characteristics but a low level of uncertainty.

**Table 8  Development of the BDL and SDL for the Peake-Roby-Sherlock (confined) SDL Resource Unit (data fromMDBA 2012b)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recharge(^1) (Barnett and Yan (2008) assessment of resource capacity)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Risk to ESLT characteristics(^2)</td>
<td>Medium</td>
</tr>
<tr>
<td>Risk to salinity - risk to classes 1 and 2(^2)</td>
<td>Yes</td>
</tr>
<tr>
<td>Degree of uncertainty(^2)</td>
<td>Low</td>
</tr>
<tr>
<td>PEL(^1)</td>
<td>N/A</td>
</tr>
<tr>
<td>BDL</td>
<td>2.58 GL/y</td>
</tr>
<tr>
<td>SDL (existing plan limit)</td>
<td>2.58 GL/y</td>
</tr>
<tr>
<td>Licensed entitlement (2008-09)(^3)</td>
<td>2.17 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use (2008-09)(^3)</td>
<td>1.97 GL/y</td>
</tr>
<tr>
<td>Estimated stock and domestic use (2008-09)(^3)</td>
<td>0.41 GL/y</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic (2008-09)</td>
<td>2.58 GL/y</td>
</tr>
</tbody>
</table>

1. The productive aquifers of the Peake-Roby-Sherlock SDL resource unit are not recharged via rainfall infiltration or via leakage from overlying/underlying aquifers.

2. SDL resource unit does not have a recharge input that can be applied to the Sustainability Factor to derive the PEL. However, the risk assessment was used as one line of evidence to assess the proposed SDL.

3. Provided by the South Australian Government.
SA Murray (GS6)

At 30 June 2009, there were no state laws that applied limits to take from the SA Murray SDL resource unit.

Given this, the MDBA used the following technical information to develop the BDL and SDL for the SA Murray SDL resource unit (MDBA 2012b).

**Table 9  Technical information used by MDBA in development of BDL and SDL for the SA Murray Resource Unit (data from MDBA 2012b)**

<table>
<thead>
<tr>
<th>Recharge (RRAM - WAVES recharge modelling)</th>
<th>483.3 GL/y</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (includes rainfall recharge only (i.e. does not include river and flood recharge of inflows from other aquifers) and does not account for water that is discharged from the system via baseflow to streams, outflow to other aquifer and/or evapotranspiration)</td>
<td>253.7 GL/y</td>
</tr>
<tr>
<td>BDL</td>
<td>1.8 GL/y</td>
</tr>
<tr>
<td>SDL (unassigned groundwater method: $SDL = BDL + 25%$ of the unassigned water)</td>
<td>64.8 GL/y$^1$</td>
</tr>
<tr>
<td>Licensed entitlement (based on 2007/08 reported information)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use</td>
<td>Not measured</td>
</tr>
<tr>
<td>Estimated stock and domestic use (based on 2007/08 reported information)</td>
<td>1.8 GL/y$^2$</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic</td>
<td>1.8 GL/y</td>
</tr>
</tbody>
</table>

1. The SDL in this table is what has been used for the final Basin Plan rather than what was listed in MDBA 2012b.
2. Stock and domestic use was estimated by the Department of Environment, Water and Natural Resources (formerly Department for Water) based on an approximate extrapolation from the methodology used in the Mallee WAP (S Barnett, 13 January 2010, pers. comm.). No formal details of these calculations are available.

It should be noted that the MDBA originally calculated the SDL for the Murray Region to be around double what was contained in the final Basin Plan. The South Australian Government did not express a concern regarding the higher SDL and noted that resources are mostly saline and/or deep confined aquifers that are not connected to surface water resources. However, the South Australian Government did suggest a precautionary approach be taken to groundwater SDLs in other parts of the Basin and therefore did not object to the reduced SDL that was applied in the final Basin Plan.
SA Murray Salt Interception Schemes (GS7)

The Basin Plan defines the following for the SA Murray Salt Interception Schemes SDL resource unit:

- **BDL = 11.1 GL/y**
- **SDL = 28.6 GL/y**
- Limits apply to all groundwater

The SA Murray Salt Interception Schemes SDL resource unit is included within the Unassigned Groundwater category. A summary of each step of the SDL calculation is provided in Table 10. The method for this salt interception scheme resource unit was modified slightly from application of 100% of unassigned groundwater. The SDL was set to correspond with the estimated projected growth of salt interception schemes, given that the PEL is only 0.3 GL/y less and the take represents beneficial use.

### Table 10  Development of the BDL and SDL for the SA Murray Salt Interception Schemes SDL Resource Unit (data from MDBA 2012b)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recharge (WAVES recharge modelling)</td>
<td>40.41 GL/y</td>
</tr>
<tr>
<td>Risk to ESLT characteristics</td>
<td>Low</td>
</tr>
<tr>
<td>Risk to salinity - risk to classes 1 and 2</td>
<td>No</td>
</tr>
<tr>
<td>Degree of uncertainty</td>
<td>Low</td>
</tr>
<tr>
<td>PEL</td>
<td>28.3 GL/y</td>
</tr>
<tr>
<td>BDL</td>
<td>11.1 GL/y</td>
</tr>
<tr>
<td>SDL (modified unassigned groundwater method for SIS SDL resource unit: $SDL = BDL + 25% \text{ of the unassigned water}$)</td>
<td>28.6 GL/y</td>
</tr>
<tr>
<td>Licensed entitlement (2007-08)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Measured groundwater use (2007-08)</td>
<td>11.1 GL/y</td>
</tr>
<tr>
<td>Estimated stock and domestic use (2007-08)</td>
<td>0 GL/y</td>
</tr>
<tr>
<td>Entitlement plus stock and domestic (2007-08)</td>
<td>0 GL/y</td>
</tr>
</tbody>
</table>

1. The salt interception schemes are designed to intercept saline groundwater that would discharge to the river and therefore the risk to the ESLT characteristics associated with the impacts of groundwater pumping is considered low.
2. Includes rainfall recharge only (i.e. does not include river and flood recharge of inflow from other aquifers) and does not account for water that is discharged from the system via baseflow to streams, outflow to other aquifers and/or evapotranspiration.
3. Provided by the South Australian Government.

The licensed entitlement in Table 10 is reflective of no entitlements having been issued within the area covered by this SDL resource unit up to and including 2007-08. However, as introduced under the BDL/SDL calculations for the Mallee (GS3) (Murray Group Limestone) SDL resource unit, an allocation of 2.144 GL was made in the Noora PWA in January 2009. This allocation is for extraction from the Pliocene Sands aquifer but as the purpose of this extraction is for the proposed Murtho SIS, it should be included within this SDL resource unit.
3.2 State Limits and Demands in the SA Murray Region WRP Area

3.2.1 Overview

The following provides an overview of the *Natural Resources Management Act 2004 (SA)* and the *Groundwater (Border Agreement) Act 1985 (SA)*, which govern the setting of State limits and under which limits are managed. This includes a more detailed description of those provisions relating to general rights and State authorisations.

*Natural Resources Management Act 2004 (SA)*

The NRM Act contains the provisions for the management and protection of water resources. Broadly, these relate to:

- General rights in relation to water including the right to take water [s 124];
- Declaration of prescribed water resources [s 125];
- Controls on water take in prescribed areas [s 127(1); s 128] and non-preserved areas [s 127(2)];
- Controls on specified activities [s 127(3)] – an authorisation or permit is required for activities such as well drilling and dam construction;
- Controls on activities in prescribed areas [s 127(5a)] – approvals required for specified works;
- Allows the taking of water for particular purposes to be authorised by the Minister [s 128]; and
- Activities not requiring a permit [s 129].

These provisions are generally managed and controlled through the regional NRM Plan and associated WAPs for the prescribed resources. As such, these documents provide the majority of controls on the water affecting activities and hence either defined limits on take or limits on construction activities that would allow take to occur. The requirements for water affecting activities under s 127 are presented in detail in Section 4.2.1.

**General Rights**

Section 124 of the NRM Act provides the right to take water subject to certain requirements. This includes:

- Subject to the NRM Act and any other Act or law to the contrary, a person who has lawful access to a watercourse, lake or well may take water from these for any purpose, and the occupier of land is entitled to take surface water from the land for any purpose [s124(1) to (2)];
- An authorisation under section 128 or a water allocation that relates to the relevant water resource, is required to take water from a prescribed watercourse, lake or well or to take water from a surface water prescribed area [s124(3)(a)];
- A person must not take water from a watercourse, lake or well that is not prescribed if to do so would detrimentally affect the ability of another person to exercise a right to take water from the watercourse or lake or from the same underground aquifer, or would detrimentally affect the enjoyment of the amenity of water in the watercourse or lake by the occupier of land that hat adjoins the watercourse or through which the watercourse runs; or that adjoins the lake or on which the lake is situated [s124(3)(b)];
- Water may be taken from a prescribed or non-prescribed watercourse, lake or well or from a surface water prescribed area if it is used by the occupier for domestic purposes or for watering stock (other than stock subject to intensive farming) [s 124(4)];
• An exception to the right to take for stock and domestic purposes exists for a prescribed watercourse, lake or well or a surface water prescribed area if the regulation declaring these prescribed areas excludes its operation [s 124(5)]; and

• Water must not be taken contrary to the provisions of an NRM plan that applies in relation to that water unless the water is taken pursuant to an authorisation under section 128 or a water allocation that relates to the relevant water resource [s 124(7)].

The above sections highlight the basics right to take water for those who have lawful access, subject to any authorisations or allocations in prescribed areas or without affecting the rights of others to take or enjoy the water resources in non-prescribed areas. These rights include those for the taking of water for stock and domestic purposes in either prescribed or non-prescribed areas, unless this provision expressly excluded from operation (for example, most stock and domestic use within the River Murray Prescribed Watercourse is licensed rather than a basic right).

**Authorised Take**

Section 124 also references authorisations by the Minister to take water for certain uses under section 128. In particular:

1. Subject to subsection (2), the Minister may, by notice published in the Gazette, authorise the taking of water from a prescribed watercourse, lake or well, or the taking of surface water from a surface water prescribed area, for a particular purpose specified in the notice.

2. A notice under subsection (1) cannot authorise the taking of water by stopping, impeding or diverting the flow of water for the purpose of collecting the water or diverting the flow of water from a watercourse unless the Minister is satisfied that it is reasonable to allow the water to be taken in this way after taking into account any criteria prescribed by the regulations for the purposes of this subsection.

3. A notice under subsection (1) may apply generally throughout the State or in relation to a particular watercourse or lake or to the wells, or the wells of a particular class, in a particular part of the State or to a particular surface water prescribed area (including as to particular stormwater infrastructure (or a part of stormwater infrastructure) or stormwater infrastructure of a particular class).

**Groundwater (Border Agreement) Act 1985 (SA)**

The *Groundwater (Border Agreement) Act 1985* (SA) (Border Groundwater Agreement) between South Australia and Victoria was signed in 1985 to cooperatively and equitably manage the groundwater resources along the State border. It establishes a Designated Area, which extends 20 kilometres either side of the border, and from the coast to the River Murray (BGARC 2010a). The Designated Area is divided into 22 management zones, with 11 zones in each State.

The provisions apply to all existing and future bores, with the exception of domestic and stock bores. Bore construction licences and permits or extraction licences may not be granted or renewed within the Designated Area by either State unless they conform to management prescriptions set by the agreement (BGARC 2006).

The Border Groundwater Agreement includes Permissible Annual Volumes (PAVs) that are able to be taken from the specified zones within the Designated Area. The limits apply to the entire zone and are although they are not aquifer specific, were developed with consideration of only the Tertiary Limestone Aquifer (BGARC 2006).
As the understanding of the groundwater resources along the border improved and the demand for water increased, the need for more targeted management approaches that could be applied to specific circumstances and aquifer types was recognised (BGARC 2006). As such, the Border Groundwater Agreement was formally amended in 2005 via the addition of Schedule 3. The amendments included the ability to distinguish between aquifers and enable sub-zones to be established for more effective local management. It allowed management prescriptions to be set for the different aquifers and sub-zones within a zone, including the division of PAVs into Allowable Annual Volumes (AAVs).

The Review Committee established by the Border Groundwater Agreement have the authority to review and alter the PAVs. Since its original enactment, a number of changes to the PAVs and AAVs has occurred, based on new information and revised management approaches.

### 3.2.2 Limits of Take

The following outlines the limits on take of water in the South Australian Murray WRP area under State legislation and water allocation plans.

**Statewide Authorisations**

Section 128 provides for the authorisation of certain uses of water from prescribed areas (refer Section 3.2.1), including the following purposes that have been issued as State wide authorisations:

- fire-fighting;
- road making;
- underground water in the course of any operation or activity reasonably necessary for, or incidental to the drilling, construction or testing of a hydrocarbon exploration well pursuant to section 11 of the Petroleum Act 2000 (SA);
- for the purpose of the application of chemicals to non-irrigated crops and non-irrigation pasture and for the control of pest plants and animals;
- up to or equal to 500 KL per annum of surface water from a connected roof area; and
- native title purposes.

In most cases, recording the act of taking water for these purposes is not required. The volumes of water used for these purposes are variable from year to year and extremely small, even when compared to the small volumes of take for stock and domestic use in most areas. As such, volumetric estimates are not generally made. While these authorisations apply for prescribed resources, in non-prescribed areas there are also no requirement to report take for these purposes, nor to measure the volume taken.

Weir (2005) attempted to provide, where possible, a quantified, documented and auditable estimate of total extractions of groundwater for non-licensed purposes from the Mallee PWA. This study provided a combined estimate of water use for firefighting, road making and crop spraying / pest control of between 4 and 8 ML per year. This compares to the estimate of stock and domestic take of between 1662 and 2204 ML per year.
South Australian Non-Prescribed Areas (SS10)

The area contained within the South Australian Non-Prescribed Areas SDL resource unit is currently not prescribed. As a result, there are no water allocation plans governing the water resources of this SDL resource unit and water use is unlicensed.

No single limit of take applies to this SDL resource unit.

The relevant NRM plans specify limits on the total volume of dams in the SE NRM region and a portion of the SA MDB region. There are no limits on the total volumes of dams in the SAAL NRM region and in the remaining portion of the SA MDB region. In relation to the SE region, the policy area for which a limit has been set is larger than the relevant portion of the SDL resource unit. However, as the policy is both area and allotment limited, it may be possible to apply the runoff coefficient used to ascribe a single limit for the relevant area of the SE region within the South Australian Non-Prescribed Areas SDL resource unit (Jennifer Schilling, pers. comm., 30 October 2014). These matters are discussed further below.

No other limits apply to take from surface water in this SDL resource unit. Other rules that affect take are outlined in Section 4.2.3 of this document.

SA MDB NRM region

The SA MDB NRM plan has a principle that the total volume of all dams within a surface water sub-catchment zone shall not exceed the specified limits (refer Appendix 11.2). When the limit for a surface water sub-catchment zone has been reached or exceeded, other methods of surface or watercourse water diversions or harvest will not be permitted, if it may result in a net increase in the volume of water to be collected or diverted.

The total volumetric limit of all dams within all applicable sub-catchment zones in the South Australian Non-Prescribed Areas SDL resource unit is approximately 31.57 GL. The individual limits for each sub-catchment zone are shown in Appendix 11.2.

The limit does not apply where the diversion is solely for the purpose of improving water quality and/or mitigating flooding, prior to returning the diverted water to the same watercourse or drainage path within three days, with loss of water volume only allowed via minimised evaporation and seepage from the water body. The limit also does not apply to authorised structure for the specific purpose of measuring streamflow. There are also a limited number of circumstances where the requirement to seek a permit for activities that would otherwise be subject to the surface water sub-catchment zone limit – these exemptions are outlined in Section 4.2.3 of this report.

To assess applications for permits against the applicable sub-catchment zone limit for the total volume of dam capacity, a visual analysis is undertaken of GIS information on dams in the sub-catchment (Scott Mitchell, pers. comm.). Where it looks like the total dam capacity could be approaching the sub-catchment limit, a more thorough investigation would be undertaken.

SE NRM region

The SE NRM Plan includes a principle that the total of all dams within a surface water policy area shall not exceed the limit specified in the Plan. When the limit for a surface water policy area has been reached or exceeded, no further authorisations shall be issued for the diversion, capture or extraction of surface water.

A portion of the SE water affecting activity permit policy area Regional Zone f (refer Appendix 11.3) is contained within the South Australian Non-Prescribed SDL resource unit. The limit for the entire Regional Zone f is 24.7 GL however the vast majority of Regional Zone f is not within the SDL resource unit.
Mallee (GS3)

The State limits on take in the Mallee (GS3) SDL resource unit area are defined under the current Mallee PWA WAP (SA MDB NRMB 2012) and the current Noora PWA WAP (RMCWMB 2001). These WAPs are developed under the NRM Act but are also required to be consistent with the Border Groundwater Agreement due to all of the Noora PWA and part of the Mallee PWA being contained within the 40km wide Designated Area along the border (20km on each side).

Water Allocation Plans

The limits specified in the Mallee and Noora WAPs apply to take for licensed purposes only. Within the Mallee PWA, this includes town water supply, recreational purposes (for example, public or school lawns, amenities and sporting facilities), environmental purposes, intensive farming (for example, piggeries, cattle, sheep and lambs, poultry, yabbies and marron, dogs and rabbits), irrigation (for example, lucerne, olives, carrots, potatoes and vines) and industrial (for example, vegetable packing sheds, processing plants and mining). The categories are similar for licensed use in the Noora PWA, although there is currently no licensed water use. Future water use was identified in the Noora WAP as most likely being for industrial (mining) purposes.

The Mallee WAP lists unlicensed purposes as stock and domestic use (includes all stock that are not intensively farmed), Aboriginal business and cultural needs, dryland crop spraying and firefighting, although the latter two are covered by State-wide authorisations. Water use for these purposes is also unlicensed under the Noora WAP.

Border Groundwater Agreement

The Mallee PWA includes Zone 9A North, all of Zone 10A and Zone 11A South under the Border Groundwater Agreement. Zone 11A North is covered by the Noora PWA. The Tertiary Limestone Aquifer refers to the Murray Group Limestone aquifer and the Tertiary Confined Sand Aquifer refers to the Renmark Group aquifer.

Changes to PAVs and AAVs by the Review Committee and other legislative changes in relation to Zones 9A, 10A and 11A are shown in Table 11. These have included:

- Revised management prescriptions for the Tertiary Limestone Aquifer in March 2001 (BGARC 2010b)
  - Division of a number of zones into sub-areas\(^7\) based on land ownership and areas of usable water quality (generally salinity to 3000 mg/L).
  - Zone 9A and Zone 11A were divided into sub-areas.
  - PAVs for Zones 9A, 10A and 11A were revised and AAVs established for sub-areas within Zones 9A and 11A.

- Revision of the Border Groundwater Agreement in 2005
  - Reflected March 2001 changes to the PAVs for Zones 9A, 10A and 11A.
  - Included PAVs for the Tertiary Confined Sand Aquifer.

- In 2007 a PAV for the Pliocene Sands Aquifer in Zone 11A was determined to enable extractions from the Murtho Salt Interception Scheme (BGARC 2008; BGARC 2010a). This was gazetted in May 2008.

\(^7\) In 2001 no areas were officially declared sub-zones (BGARC 2010b) but sub-areas refer to part of a zone for the purpose of reviewing the PAVs.
• Amendments to the PAVs and AAVs Zones 9A, 10A and 11A in July 2010 (BGARC 2010a).
  o Made in preparation for the proposed new Mallee WAP and in order to manage the conversion from area based allocations to volumetric entitlements.
  o Zone 9A was formally divided into two sub-zones to facilitate the management of this zone within the two separate Tatiara and Mallee PWAs by two separate NRM Boards.
  o Redistribution of the PAVs for Zones 9A North, 10A and 11A whilst maintaining the combined PAV.
  o Adjustment to Zone 11A was in part to protect this area from the risk of flow reversal from north of Peebinga (located at the southern end of Zone 11A South), where groundwater salinities are higher, and subsequently draw more saline water in to the pumping zone.

Table 11  Border Groundwater Agreement Limits for Selected Zones.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pliocene Sands Aquifer</td>
<td>Tertiary Limestone Aquifer</td>
<td>Tertiary Sand Aquifer</td>
</tr>
<tr>
<td>9A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>-</td>
<td>3.835</td>
<td>2.400</td>
</tr>
<tr>
<td>South</td>
<td>-</td>
<td>7.760</td>
<td>8.806</td>
</tr>
<tr>
<td>Total</td>
<td>6.000</td>
<td>11.595</td>
<td>11.206</td>
</tr>
<tr>
<td>10A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6.000</td>
<td>9.400</td>
<td>14.000</td>
</tr>
<tr>
<td>11A1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North</td>
<td>-</td>
<td>0.000</td>
<td>-</td>
</tr>
<tr>
<td>South</td>
<td>-</td>
<td>6.861</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>12.000</td>
<td>2.144</td>
<td>3.7002</td>
</tr>
</tbody>
</table>

1. The division of Zone 11A into two sub-areas in 2001 by the Review Committee is only referenced in the Management Review report prepared in 2010 (BGARC 2010b). The preceding and proceeding annual reports do not explicitly refer to limits in Zone 11A North and South but include only a PAV for Zone 11A.

2. Despite this being referenced as the total for Zone 11A only, this is the limit specified for the area represented by Zone 11A South in the Mallee WAP and as such the limit for Zone 11A North (Noora PWA) must be zero.

Mallee (Pliocene Sands)

Mallee PWA:

• The Mallee WAP (SA MDB NRMB 2012) does not define a PAV for the Pliocene Sands aquifer due to its low yield and limited area of good quality water and no water allocations are permitted from this aquifer.

• There were no stock or domestic use nor demands for Aboriginal business and cultural needs that had been identified at the time the WAP was adopted.

• Under the Border Groundwater Agreement the PAV is 0 GL for this aquifer within the Mallee PWA.
Noora PWA:

- The Noora WAP (RMCWMB 2001) does not define an allocation limit for the Pliocene Sands aquifer due to extremely high salinity and no current use. However, the water allocation provisions allow water to be allocated, subject to a number of criteria.
- Under the Border Groundwater Agreement there is a limit of 2.144 GL for extraction from the Pliocene Sands aquifer in Zone 11A. An allocation has been made for this purpose within the Noora PWA. However, given that this is for SIS purposes, this limit and extraction would be accounted for within the SA Murray Salt Interception Schemes SDL resource unit (GS7).

Mallee (Murray Group Limestone)

Mallee PWA:

- The Mallee WAP (SA MDB NRMB 2012) defines a Total PAV (licensed purposes) of 61.3 GL per year, with specific AAVs for defined management areas, as shown in Table 12.
- The PAV and the AAV for each Border Zone have been aligned, as required, with the PAVs in the Border Groundwater Agreement.

Table 12  Management Areas and Allowable Annual Volumes for the Mallee PWA (SA MDB NRMB 2012)

<table>
<thead>
<tr>
<th>Management Areas</th>
<th>Allowable Annual Volume (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Management Area (Outside of Designated Area)¹</td>
<td>25.7</td>
</tr>
<tr>
<td>Parilla Red Management Area</td>
<td>7.0</td>
</tr>
<tr>
<td>Yellow Management Area²</td>
<td>7.0</td>
</tr>
<tr>
<td>Out of Hundreds Management Area¹,²</td>
<td>1.5</td>
</tr>
<tr>
<td>Border Zone 11A (PAV = 3.7 GL)</td>
<td></td>
</tr>
<tr>
<td>(11A Red Management Area)</td>
<td>3.5</td>
</tr>
<tr>
<td>(11A Green Management Area)</td>
<td>0.2</td>
</tr>
<tr>
<td>Border Zone 10A (PAV = 14.0 GL)</td>
<td></td>
</tr>
<tr>
<td>(10A Red Management Area)</td>
<td>6.0</td>
</tr>
<tr>
<td>(10A Parilla Red Management Area)</td>
<td>3.0</td>
</tr>
<tr>
<td>(10A Green Management Area)</td>
<td>5.0</td>
</tr>
<tr>
<td>Border Sub-zone 9A¹ North (PAV = 2.4 GL)</td>
<td></td>
</tr>
<tr>
<td>(9A North Green Management Area)</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Total Permissible Annual Volume  61.3

1. Part or all of these Management Areas fall outside of the legislated boundary for the Mallee SDL resource unit.
2. These management areas are currently being administered as a combined unit with one PAV.

- Demands for stock and domestic purposes (unlicensed) were considered when determining the licensed extraction limits within the Mallee WAP as follows:
  - Current demand for domestic use is estimated to be 0.85 to 1.15 GL per year.
  - Current demand for stock water use is estimated to be 0.8 to 1.1 GL per year.
- No demand for Aboriginal business and cultural needs had been identified at the time the WAP adoption.
• WAP limit + stock and domestic demand = 63.55 GL (assuming the upper limit of the current demand for stock and domestic purposes).

• The Minister has authorised the taking of water for use in a sand mining development in the Green Management Area under section 128 of the NRM Act.
  
  o The authorisation allows a maximum of 42.92 GL to be taken over the 10 year period ending in 2016-17, with a maximum of 6 GL in any year.
  
  o The volume permitted under this authorisation is above the PAV but was taken into account when the PAV was determined.
  
  o At the time of the WAP development it was determined that the resource could tolerate a take of 42,920 GL above the PAV. Consideration was given to converting this mining authorisation into an allocation and including in the PAV but this did not eventuate. This was most likely due to equity issues with other existing users who would have liked a higher allocation (S Kuchel pers. comm., 1 July 2014).

Noora PWA:

• The Noora WAP (RMCWMB 2001) defines a water allocation limit of 5.138 GL per year, which is subject to a number of criteria to ensure no degradation in water quality, impact on water dependent ecosystems or impact on other water resources.

• The WAP provides an estimated upper demand for stock use of 0.028 GL per year.

• WAP limit + stock use = 5.166 GL per year.

• The Noora PWA covers the northern part of Zone 11A under the Border Groundwater Agreement.
  
  o In 2001 when the Noora WAP was developed, the limit for Zone 11A was 12 GL per year. As 6.862 GL per year was allocated to the Mallee PWA at that time, the remainder was made available under the Noora WAP (RMCWMB 2001).
  
  o The legislative and Review Committee amendments described above have reduced the PAV for Zone 11A to 3.7 GL, which is allocated in the Mallee PWA. Zone 11A within the Noora PWA therefore has a limit of 0 GL.
  
  o As yet, no change has been made to the Noora WAP to account for the reduction in the Zone 11A limit.

Mallee (Renmark Group)

Mallee PWA:

• The Mallee WAP (SA MDB NRMB 2012) does not define a Permissible Annual Volume for the Renmark Group aquifer.

• Under the WAP, no water allocations permitted from this aquifer except to SA Water for public water supply, subject to a no net allocation increase criteria. However, there are currently no water supply wells completed in this aquifer because of high drilling costs and the uncertainty of obtaining large supplies from the interbedded sands and clays.
• Currently no stock or domestic use nor demands for Aboriginal business and cultural needs that had been identified at the time the WAP was adopted.

• The limits for this aquifer under the Border Groundwater Agreement are shown in Table 11, with only Zones 9A and 10A having capacity to extract from this aquifer.

Noora PWA:

• The Noora WAP (RMCWMB 2001) does not define a water allocation limit for the Renmark Group aquifer due to extremely high salinity and no current use. However, the water allocation provisions allow water to be allocated, subject to a number of criteria.

• Under the Border Groundwater Agreement no extractions are possible from this aquifer with the PAV for Zone 11A in Table 11 equal to 0 GL per year.

Peake-Roby-Sherlock (GSS)

The State limits on take in the Peake-Roby-Sherlock (GSS) SDL resource unit area are defined under the current Peake, Roby and Sherlock PWA WAP (SA MDB NRMB 2010a).

The limits apply to take for licensed purposes. These purposes include irrigation for horticultural production, town water supply, commercial use, industrial use and recreational use. Stock and domestic use is not required to be licensed and the Peake, Roby and Sherlock WAP states that the current actual use for this purpose is unknown.

Access to, and use of water from prescribed water resources by Aboriginal people is exempt from licensing for the purpose of social, cultural or spiritual use, provided that the taking does not involve stopping, impeding or diverting the flow of water for the purpose of collecting the water or diverting the flow of water from water resources (SA MDB NRMB 2010a). The current and future Aboriginal needs for water were not identified or quantified at the time the WAP was adopted.

Peake-Roby-Sherlock (unconfined)

Peake, Roby and Sherlock PWA WAP (SA MDB NRMB 2010a):

• Total Annual Allocation Volume is 3.215 GL per year
  • 2.0 GL per year from the Coastal Plain High Salinity Management Zone, where the salinity is too high for agricultural production and is not currently being utilised; and
  • 1.215 GL per year from the Mallee Highland Management Zone.

• Stock and domestic use estimated at 0.19 GL per year, based on a rate of 0.002 GL per year for each active well.

• WAP limit + stock and domestic = 3.405 GL per year.

Peake-Roby-Sherlock (confined)

Peake, Roby and Sherlock PWA WAP (SA MDB NRMB 2010a):

• Total Annual Allocation Volume is 2.168 GL per year across four management zones as shown in Table 13.

• Stock and domestic use estimated at 0.41 GL per year, based on a rate of 0.002 GL per year for each active well.
- WAP limit + stock and domestic = 2.578 GL per year.

### Table 13  Management Zones and Annual Allocation Volumes for the Peake, Roby and Sherlock (Confined) SDL Resource Unit (SA MDB NRMB 2010a).

<table>
<thead>
<tr>
<th>Management Zone</th>
<th>Annual Allocation Volume (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Plan High Salinity Management Zone</td>
<td>0.10</td>
</tr>
<tr>
<td>Coastal Plan Medium Salinity Management Zone</td>
<td>0.25</td>
</tr>
<tr>
<td>Coastal Plain General Management Zone</td>
<td>0.10</td>
</tr>
<tr>
<td>Extraction Management Zone</td>
<td>1.718</td>
</tr>
<tr>
<td><strong>Total Annual Allocation Volume</strong></td>
<td><strong>2.168</strong></td>
</tr>
</tbody>
</table>

### SA Murray (GS6)

The water resources contained within the SA Murray SDL resource unit are currently not prescribed. As a result, there are no water allocation plans governing the water resources of this SDL resource unit and water use is unlicensed with no limits on take specified in the relevant NRM plans.

There are almost no exemptions for groundwater related water affecting activities under s 127(3)(a) to s 127(3)(c) or s 127(3)(f) of the NRM Act and therefore permits are required under the relevant NRM plans for these activities. These include constructing, backfilling or repairing wells and draining or discharging water directly or indirectly into a well.

A well is defined under the NRM Act as an opening in the ground excavated for the purpose of obtaining access to underground water. However, under Schedule 2 (para 1) of the NRM Act a permit is not required for a well that is 2.5 metres or less in depth. Groundwater access trenches (GATs), commonly referred to as wedgeholes, are essentially trenches cut into the ground that allow access to the unconfined aquifer. These are common in the SE NRM Region and are one example where a permit for a well is not required due to an exemption.

The permit requirements under s 127(3)(e) principally relate to activities involving surface water resources, however, they do include the surface expression of groundwater and some exemptions apply under the SAAL Regional NRM Plan (Melissa Horgan, pers. comm., 15 October 2014). Consideration needs to be given as to where such take should be accounted for, that is, under a surface water or groundwater SDL.

### SA Murray Salt Interception Schemes (GS7)

The SA Murray Salt Interception Schemes SDL resource unit contains part of the Noora PWA with the remainder being non-prescribed resources. The area within the Noora PWA is managed under the Noora WAP (RMCWMB 2001) as well as the Border Groundwater Agreement.

**Noora PWA:**

- The Noora WAP (RMCWMB 2001) does not define an allocation limit for the Pliocene Sands aquifer (from where extractions for SIS purposes would most likely occur) due to extremely high salinity and no current use. However, the water allocation provisions allow water to be allocated, subject to a number of criteria.

- Under the Border Groundwater Agreement there is a limit of 2.144 GL for extraction for the Murtho SIS from the Pliocene Sands aquifer in Zone 11A.

**Non-prescribed Area:**

- There are currently no restrictions on water permitted to be taken.
Schemes are generally operated (volume pumped) to achieve a target groundwater level.

### 3.2.3 Current take

The current take from within each SDL resource unit provides an indication of the potential risk to approaching and/or exceeding the defined SDL. The following presents information on the level of current take including the South Australian water access entitlements issued (prescribed areas only) and recorded annual take levels (where available).

**South Australian Non-Prescribed Areas (SS10)**

The current levels of take in the South Australian Non-Prescribed Areas are not well understood as there is no monitoring in place.

#### Take by Dams

The best understanding of current take by dams is the estimate of the BDL used by the MDBA as outlined in Section 3.1.3.

In developing the BDL for this SDL resource unit the Department advised that it had very little knowledge of farm dam locations and capacities for the South Australian Non-Prescribed Areas SDL resource unit. The only area the Department had farm dam statistics for was the catchment of Burra Creek. For the Burra Creek catchment, the Department estimated that there were approximately 760 farm dams with a dam capacity of 1.4 GL.

There have been a limited number of aerial surveys undertaken within the SA MDB NRM Region since the BDL was estimated. Surveys focused on the River Murray corridor and floodplain were undertaken in 2012, 2013 and 2014. An aerial survey of the southern portion of the SA MDB (with a predominant focus on the South East) was undertaken in 2013. These newer surveys only cover a portion of the SA MDB. There has also been some more recent work since 2010 to digitize farm dam coverage in the SDL resource unit however again, this work does not cover the whole SDL resource unit.

It is noted that any water affecting activity permits issued for dams after the impact assessment of dams was undertaken for the National Water Commission would be considered additional take to what was considered in calculating the BDL.

Further information on take covered by water affecting activity permits is provided below for the relevant water resources in each water resource plan area.

#### SA MDB NRM Region

Only one permit has been issued since the farm dam impact assessment was undertaken in 2010 (Scott Mitchell, pers. comm., 23 June 2014). This was for a stock and domestic dam of 540 kL in volume located within CT5479/850 (Sec118, Hd Dutton, Truro).

#### SE NRM Region

There have been no water affecting activity permits issued in the section of the SE that intersects with the South Australian Non Prescribed Areas SDL resource unit (David Williamson pers. comm., 10 July 2014). A number of dams can be seen in the area via aerial survey however, given there are no permits covering these dams, it is assumed that they are historical. Alternatively, they may be groundwater access trenches (GATs), which are commonly referred to as wedgeholes. These are essentially trenches cut into the ground that allow access to the
unconfined aquifer. A well is defined under the NRM Act as an opening in the ground excavated for the purpose of obtaining access to underground water. However, under Schedule 2 (para 1) of the NRM Act a permit is not required for a well that is 2.5 metres or less in depth. Consideration needs to be given as to whether the take from these GATs should be accounted for under the surface water or groundwater SDL.

There are also exemptions for activities where licences for private water management works and authorisations to take water under the South Eastern Water Conservation and Drainage Act 1992 (SA) are required.

**SAAL NRM Region**

There are a significant number of surface water dams in the area of the SAAL NRM Region that intersects with the South Australian Non-Prescribed Areas SDL resource unit. However these dams are either historical or below 10 ML in capacity and are therefore are not covered by water affecting activity permits (David Leek, pers. comm., 14 April 2014). It is also noted that water affecting activity permits are not required where approval under the Development Act has been granted and although unlikely, there may be dams in excess of 10 ML approved through this process (Melissa Horgan, pers. comm., 15 October 2014). In relation to the historical dams, it is understood that there are quite a few large dams in excess of 10 ML associated with watercourses in the area however very few dams that exceed 30 ML in capacity. There is no comprehensive data set available on dam numbers, locations or properties (for example, dam area and dam volume). However, there may be some information within the Pastoral Program Waterpoint layer on dams (for example, location and properties) that are located on land held under a pastoral leave (Melissa Horgan, pers. comm., 15 October 2014).

**Direct Extraction from a Watercourse**

It is unclear whether there is any direct extraction from watercourses other than via dams in this SDL resource unit as water affecting activity permits for this form of take do not provide an indication of volume of take other than for this type of activity. Given the ephemeral nature of most watercourses, the volumes extracted are thought to be very low.

**SE NRM Region**

Take from the SE drainage network may need to be considered further, although the quality of water is such that take is unlikely (Jennifer Schilling, pers. comm., 30 October 2014).

**SAAL NRM Region**

There may be some information within the Pastoral Program Waterpoint layer on watercourse extractions (for example, location where water is pumped to troughs or tanks when water is available) that are located on land held under a pastoral leave (Melissa Horgan, pers. comm., 15 October 2014).

**Take by Commercial Forestry**

The Department holds spatial information on land use coverage that indicates that there is approximately 711,408 m² of irrigated forestry (DEH, 2008) within the SDL resource unit. From spatial coverage information alone it is not possible to determine whether this irrigation is being undertaken from groundwater or surface water resources. It is therefore not currently possible to estimate the level of take that is derived from this SDL resource unit. As a percentage of the SDL resource unit, irrigated forestry coverage equates to 0.0001%.

The spatial information also indicates the presence of approximately 2,804,553m² of dryland forestry which would intercept run off within the SDL resource unit. This dryland forestry may also access water from the unconfined
aquifer where it is shallower than 10m in depth. As a percentage of the SDL resource unit, dryland forestry coverage equates to 0.0005%.

There are currently no requirements in the either the SAAL or SA MDB NRM plans to require a licence or permit specifically for forestry activities within this SDL resource unit. Recent amendments to the SE NRM Plan have activated commercial forestry provisions and a permit will now be required for new forests.

Take by Mines

The mineral tenements data GIS layer held by DEWNR shows that there are a number of small mineral operations in the SDL resource unit, although some of these tenements may have expired. Unless information is specifically required to be provided under a mining licence, it is difficult to know how much water (if any) these mines use or intercept, or the method by which this water is accessed (for example, via a well, interception, dam or direct extraction from a watercourse) or what type of water resource is being accessed (surface water or groundwater). However, for those tenements with a Program for Environmental Protection and Rehabilitation under the Mining Act 1971 (SA) there is a requirement to identify water supply and water use requirements (Melissa Horgan, pers. comm., 15 October 2014).

Mallee (GS3)

The current volume held on licence within the Mallee SDL resource unit for each of the Mallee and Noora PWAs, and use against those licences since prescription, were obtained from the DEWNR water licensing system (WILMA). Estimates of use for stock and domestic (non-licensed) use has been taken from the relevant WAPs for the Mallee PWA (SA MDB NRMB 2012) and the Noora PWA (RMCWMB 2001).

Mallee (Pliocene Sands)

Mallee PWA:

- No licences currently issued.
- No stock and domestic use.
- Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Noora PWA:

- No licences currently issued.
- No stock and domestic use.
- Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Mallee (Murray Group Limestone)

Mallee PWA:

- Total licensed volume\(^8\) = 60.098 GL (rounded). Table 14 shows the volumes that have been allocated in each management area.

\(^8\) Data extracted from WILMA on 17 June 2014
• Unallocated volume = 1.202 GL (rounded)
  o Any unallocated volume may be allocated as Temporary Auxiliary Allocations (TAAs) under principle 29 (section 5.2.4) of the Mallee WAP (SA MDB NRMB 2012). The exception is for the Yellow Management Area, which was an area of expansion of the Mallee PWA under the previous Mallee WAP (MWRPC 2000). A TAA is only granted where the Minister is satisfied that the licensee’s historical water use is greater than the licensee’s volumetrically converted water allocation. Existing users in the Yellow Management Area were issued with an allocation volume upon enactment of the Mallee WAP in 2012. Therefore, because no volumetric allocation conversions were required in this management area, no TAAs are available.
  o The TAAs expire progressively over the three water use years following adoption of the WAP, that is, by the end of 2014-15. As this occurs, the volumes become unallocated water that may be made available by the Minister, consistent with the South Australian Unallocated Water Policy Statement (2013).

• Average annual extraction for licensed purposes since 2004-05 has been 32.02 GL (25.4 GL to 38.3 GL). Table 14 shows the volume used within each management area in 2012-13.

<table>
<thead>
<tr>
<th>Management Areas</th>
<th>Allowable Annual Volume (GL)</th>
<th>Volume Allocated (GL)</th>
<th>Volume Used 2012-13 (GL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Management Area (Outside of Designated Area)¹</td>
<td>25.7</td>
<td>25.70</td>
<td>14.52</td>
</tr>
<tr>
<td>Parilla Red Management Area</td>
<td>7.0</td>
<td>6.05</td>
<td>7.34³</td>
</tr>
<tr>
<td>Yellow Management Area²</td>
<td>7.0</td>
<td>5.33</td>
<td>0.28</td>
</tr>
<tr>
<td>Out of Hundreds Management Area¹²</td>
<td>1.5</td>
<td>2.98</td>
<td>0.66</td>
</tr>
<tr>
<td>Border Zone 11A (PAV = 3.7 GL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11A Red Management Area)</td>
<td>3.5</td>
<td>3.50</td>
<td>2.94</td>
</tr>
<tr>
<td>(11A Green Management Area)</td>
<td>0.2</td>
<td>0.20</td>
<td>0.00</td>
</tr>
<tr>
<td>Border Zone 10A (PAV = 14.0 GL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10A Red Management Area)</td>
<td>6.0</td>
<td>6.00</td>
<td>4.69</td>
</tr>
<tr>
<td>(10A Parilla Red Management Area)</td>
<td>3.0</td>
<td>2.94</td>
<td>2.20</td>
</tr>
<tr>
<td>(10A Green Management Area)</td>
<td>5.0</td>
<td>5.00</td>
<td>3.08</td>
</tr>
<tr>
<td>Border Sub-zone 9A¹ North (PAV = 2.4 GL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9A North Green Management Area)</td>
<td>2.4</td>
<td>2.40</td>
<td>1.24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61.3</strong></td>
<td><strong>60.098</strong></td>
<td><strong>36.94</strong></td>
</tr>
</tbody>
</table>

1. Part or all of these Management Areas fall outside of the legislated boundary for the Mallee SDL resource unit.
2. These management areas are currently being administered as a combined unit with one PAV.
3. Data extracted from WILMA on 17 June 2014.
4. Recognised overuse. The conversion to volumetric allocations and use was only completed in 2013-14. As such, compliance is only required from 2014-15. Some overuse is likely due to the previous application of area based allocations.

• Authorisation for sand mining development in the Green Management Area under section 128 of the NRM Act for 42.92 GL to be taken over the 10 year period ending in 2016-17, with a maximum of 6 GL in
any year. Any volume taken under an authorisation is in addition to that taken for licensed purposes within the management area. Since 2009-10, a maximum of 0.57 GL per year has been taken.⁹

- Current demand for stock and domestic use (unlicensed purpose) has been estimated as being between 1.65 and 2.25 GL per year (SA MDB NRMB 2012).
- Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Noora PWA:

- Total licensed volume¹⁰ = 0 GL
- Unallocated volume = 5.138 GL
- Current stock use is limited to 14 registered bores (some no longer used). The upper level of demand is estimated at 0.028 GL per year, based on 2 ML per year per bore.
- Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Mallee (Renmark Group)

Mallee PWA:

- No licences currently issued.
- No stock and domestic use.
- Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Noora PWA:

- No licences currently issued.
- No stock and domestic use.
- Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Peake-Roby-Sherlock (GSS)

The current volume held on licence within the Peake, Roby and Sherlock PWA and use against those licences since prescription were obtained from the DEWNR water licensing system (WILMA). Estimates of use for stock and domestic (non-licensed) use has been taken from Peake, Roby and Sherlock WAP (SA MDB NRMB 2010a).

Peake-Roby-Sherlock (unconfined)

- Total licensed volume¹¹ = 0.292 GL (rounded) within the Mallee Highland Management Zone.
- Unallocated volume = 2.923 GL (rounded)
- Under water allocation principle 12 (s 5.3.5 of the Peake, Roby and Sherlock WAP), if there is water available within the Annual Allocation Volume of the respective management zones, payment will be required for new allocations in accordance with s 147(2) of the NRM Act.

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⁹ Data from Customer Services Unit, DEWNR on 30 June 2014
¹⁰ Data extracted from WILMA on 17 June 2014
¹¹ Data extracted from WILMA on 17 June 2014
• Very limited extraction occurs from this aquifer. In 2010-11 there was only 0.5 ML extracted for licensed purposes, with no extraction in 2011-12 or 2012-13.

• Current demand for stock and domestic use (unlicensed purpose) has been estimated as being 0.19 GL per year, based on a rate of 0.002 GL per year for each active well.

• Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

**Peake-Roby-Sherlock (confined)**

• Total licensed volume\(^{12}\) = 1.920 GL (rounded). Table 15 shows the volumes that have been allocated within each management zone.

**Table 15** Peake, Roby and Sherlock (Confined) SDL Resource Unit - Allocations and Use within PWA Management Zones.

<table>
<thead>
<tr>
<th>Management Zone</th>
<th>Annual Allocation Volume (GL)</th>
<th>Volume Allocated (GL)</th>
<th>Volume Used 2012-13 (GL)(^{1})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Plan High Salinity Management Zone</td>
<td>0.100</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Coastal Plan Medium Salinity Management Zone</td>
<td>0.250</td>
<td>0.202</td>
<td>0.096</td>
</tr>
<tr>
<td>Coastal Plain General Management Zone</td>
<td>0.100</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Extraction Management Zone</td>
<td>1.718</td>
<td>1.718</td>
<td>1.297</td>
</tr>
<tr>
<td><strong>Total Annual Allocation Volume</strong></td>
<td><strong>2.168</strong></td>
<td><strong>1.920</strong></td>
<td><strong>1.393</strong></td>
</tr>
</tbody>
</table>

1. Data extracted from WILMA on 17 June 2014.

• Unallocated volume = 0.248 GL (rounded)

• As above, under water allocation principle 12 (s 5.3.5 of the Peake, Roby and Sherlock WAP), if there is water available within the Annual Allocation Volume of the respective management zones, payment will be required for new allocations in accordance with s 147(2) of the NRM Act.

• Average annual extraction for licensed purposes since 2010-11 has been 1.285 GL per year (range from 1.22 to 1.39 GL). Table 15 shows the volume used within each management zone in 2012-13.

• Current demand for stock and domestic use (unlicensed purpose) has been estimated as being 0.41 GL per year, based on a rate of 0.002 GL per year for each active well.

• Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

**SA Murray (GS6)**

The current level of take in the SA Murray SDL resource unit is not well understood as there is no monitoring in place. Extraction from this SDL resource unit is estimated to be relatively minor, mainly due to the high salinity of the groundwater in the region.

\(^{12}\) Data extracted from WILMA on 17 June 2014.
Stock and Domestic Take

The best understanding of stock and domestic use is the estimate undertaken by the Department for the Basin Plan in 2010, noting that there is a low level of confidence in this figure. It should be noted that there may be seasonal variation in actual levels of take.

A more up to date, accurate estimation could potentially be undertaken in the future with appropriate resourcing, similar to those undertaken for the Eyre Peninsula and Mallee WAPs (Steve Barnett, pers. comm.).

Take by Commercial Forestry

The Department holds spatial information on land use coverage which indicates that there is approximately 107,048 m$^2$ of irrigated forestry (DEH, 2008) within the SDL resource unit. However, as indicated above, from spatial coverage information alone it is not possible to determine whether the irrigation is being undertaken from groundwater or surface water resources. It is therefore not possible to estimate the level of take that is derived from forestry within this SDL resource unit. As a percentage of the SDL resource unit, irrigated forestry coverage equates to 0.00002%.

The spatial information also indicates the presence of approximately 878,289 m$^2$ of dryland forestry that could access groundwater from unconfined aquifers that are shallower than 10m within the SDL resource unit. This dryland forestry would also access water from surface water runoff. As a percentage of the SDL resource unit, dryland forestry coverage equates to 0.0002%.

There are currently no requirements in the either the SAAL or SA MDB NRM plans to require a licence or permit specifically for forestry activities within this SDL resource unit. Recent amendments to the SE NRM Plan have activated commercial forestry provisions and a permit will now be required for new forests.

Take by Mines

The mineral tenements data GIS layer held by DEWNR shows that there are a number of small mineral operations in the SDL resource unit, although some of these tenements may have expired. Unless information is specifically required to be provided under a mining licence, it is difficult to know how much water (if any) these mines use or intercept, or the method by which this water is accessed (for example, via a well, interception, dam or direct extraction from a watercourse) or what type of water resource is being accessed (surface water or groundwater). However, for those tenements with a Program for Environmental Protection and Rehabilitation under the Mining Act 1971 (SA) there is a requirement to identify water supply and water use requirements (Melissa Horgan, pers. comm., 15 October 2014).

SA Murray Salt Interception Schemes (GS7)

The SA Murray Salt Interception Schemes SDL resource unit contains part of the Noora PWA with the remainder being non-prescribed resources.

Within the Noora PWA and under the Border Groundwater Agreement there is a limit of 2.144 GL for extraction for the Murtho SIS from the Pliocene Sands aquifer in Zone 11A. This licence is held by the Minister for the River Murray. No use has been recorded to the end of 2013-14 as the scheme has only just been completed.

Within the non-prescribed areas the volumes extracted through the Salt Interception Schemes are not licensed. Schemes are generally operated (volume pumped) to achieve a target groundwater level.
Figure 6 shows the historical take from the six salt interceptions schemes within the SDL resource unit that were operational to the end of 2013-14, together with the Basin Plan SDL. The Woolpunda and Waikerie schemes pump the largest volumes annually. As the first commissioned schemes, they pumped all of the annual total from 1990-91 to 2000-01. Since this time, they have still pumped the majority of the annual total, with between 71 and 82% over the last three years (to 2013-14).

![Graph showing historical take from salt interception schemes](image)

**Figure 6  Current Take from Salt Interception Schemes in SDL Resource Unit GS7**

**Stock and Domestic Take**

The risk assessment undertaken for SA Murray Region WRP (DEWNR 2015) noted four bore holes that are identified as being for stock and domestic purposes. There is no town supply sourced within the SDL resource unit.

**Take by Commercial Forestry**

Spatial land use information (DEH 2008) analysed by DEWNR (2015) indicates that there is approximately 0.334 km² of dryland forestry within this SDL resource unit. Analysis of this information by DEWNR (2015) indicated that it may access groundwater. As a percentage of the total SDL resource unit area, the dryland forestry parcels equate to 0.008%.

There are currently no requirements in the relevant NRM plans to require a licence or permit for plantation forestry activities within this SDL resource unit.
3.2.4 Potential Future Demand

Information on the potential future demand for water in each SDL resource unit is presented below, where available.

Under section 76(4)(c) of the NRM Act, water allocation plans must, in providing for the allocation of water, take into account the present and future needs of the occupiers of land in relation to the existing requirements and future capacity of the land. This means that requirements for current and future non-licensed purposes are considered in the development of a WAP when setting limits on take. This information provides guidance on potential increases in this form of take, which is generally not monitored as there are no compliance requirements under the NRM Act.

South Australian Non-Prescribed Areas (SS10)

The potential future demand for water in the South Australian Non-Prescribed Areas SDL resource unit is unknown.

Given that the SDL is equal to the BDL and any increases in use will need to be restricted to comply with the Basin Plan, further analysis on future demand may only be necessary in the context of apportioning the final BDL across the SDL resource unit.

Mallee (GS3)

Estimates of future demand have generally been taken from the relevant WAPs for the Mallee PWA (SA MDB NRMB 2012) and the Noora PWA (RMCWMB 2001).

Mallee (Pliocene Sands)

Mallee PWA:

- No Permissible Annual Volume has been determined for licensed use from this aquifer due to the low yield and limited areas of good quality water (SA MDB NRMB 2012). As such, future demand for licensed purposes is unlikely.
- Given no current use from this aquifer for stock and domestic purposes, future use would be unlikely (Steve Barnett, pers. comm., 26 June 2014).

Noora PWA:

- No current demand for water from this aquifer due to extremely high salinity (RMCWMB 2001).
- Future demand considered unlikely at this time due to limited commercial potential from the highly saline water (greater than 30,000 EC). New opportunities would need to become available for industries such as salt harvesting for chemical industries, mineral sand mining, saline aquaculture and saline agricultural production systems (RMCWMB 2001).
Mallee (Murray Group Limestone)

Mallee PWA:

- The current annual take for all licensed purposes is relatively stable at around 50 to 60% of the total allowable annual take. Potential future use for individual licensed purposes has been evaluated as follows (SA MDB NRMB 2012):
  - Irrigation – Irrigation from this aquifer has been established for some time and extractions are relatively stable. It is expected that this purpose will continue to require the majority of water allocations. Based on the current types of irrigated crops, some areas have limited horticultural crop potential due to water quality and soil type. Depending on crop types, irrigation development may expand into areas that were previously considered less suitable.
  - Industrial (Manufacturing) – There are no known demand for the expansion of manufacturing in the Mallee PWA that requires water.
  - Industrial (Mining) – The current s 128 authorisation for sand mining in the Green Management Area demonstrates a demand in the area until 2017. Future demand has been indicated for this operation in the Yellow Management Area, however, demand may be met through existing allocations.
  - Intensive Farming – Previous potential expansions have not eventuated. It is considered that any potential increase would be able to be met from existing allocations.
  - Recreation / Environment – Future water use for recreational purposes is estimated to remain the same or slightly decline due to local recycling schemes. There are no known future requirements for environmental purposes due to the lack of water dependent ecosystems in the Mallee PWA.
  - Town Water Supplies – water usage for town water supplies has declined, despite town populations remaining static. It is expected that currently allocated volumes should be sufficient to meet future demands.

- The permissible annual volume for the Mallee PWA meets current demands, however, the allowable annual volumes (AAVs) (refer Table 12) in the Red Management Areas may be less than the current and future demand. These areas usually correspond with areas of low salinity groundwater and where developed businesses with the ability to expand are located (SA MDB NRMB 2012).

- The establishment of management areas with individual AAVs aim to prevent any further concentrations of pumping in the Mallee PWA. This includes any increased demand on water in the Mallee PWA as a result of drought conditions, water restrictions or water quality deterioration in neighbouring prescribed areas. As a result of this, the overall volume of licensed extractions is not expected to increase markedly in the future (SA MDB NRMB 2012).

- Potential future use for non-licensed purposes were evaluated as follows (SA MDB NRMB 2012):
  - Domestic – this is expected to stay the same or slightly decline, in line with population trends in the Mallee PWA.
  - Stock – future stock demands are expected to be similar to current demands. However, this may change if increasingly favourable conditions occurred, therefore improving the availability of fodder and leading to increased stocking numbers.
o Aboriginal Business and Cultural Needs – current and future Aboriginal needs for water have not been identified or quantified.

Noora PWA:
- Take is currently limited to small volumes for stock purposes in a small area where salinity is in the order of 3,500 EC (RMCWMB 2001).
- Given no use for licensed purposes currently occurs, future use is unlikely.

Mallee (Renmark Group)
Mallee PWA:
- No current take from this aquifer (SA MDB NRMB 2012).
- There are currently no water supply wells completed in this aquifer due to costs and uncertainty of supply (SA MDB NRMB 2012). As such, it is reasonable to assume that future demand from this aquifer is unlikely.

Noora PWA:
- No current take from this aquifer due to high salinity (RMCWMB 2001).
- Future use would be limited to stock watering in a small area where salinity is around 11,000 EC (RMCWMB 2001). However, given no use to date, this is considered unlikely. In other areas, future demand considered unlikely due to limited commercial potential from the highly saline water (greater than 22,400 EC). New opportunities would need to become available for industries such as salt harvesting for chemical industries, mineral sand mining, saline aquaculture and saline agricultural production systems (RMCWMB 2001).

Peake-Roby-Sherlock (GS5)
The estimates of future demand for both the unconfined and confined aquifers within the WAP for the Peake, Roby and Sherlock PWA (SA MDB NRMB 2010a) are limited and not generally aquifer specific.

Peake-Roby-Sherlock (unconfined)
Potential future demands have been considered as follows:
- The estimated stock and domestic demand of 0.19 GL is likely to remain stable (SA MDB NRMB 2010a).
- There combination of limited areas of low salinity water (SA MDB NRMB 2010a) and low level of current allocation and use (refer Section 3.2.3), an increase in future demand is unlikely (Steve Barnett, pers. comm., 15 August 2014).

Peake-Roby-Sherlock (confined)
Potential future demands have been considered as follows:
- The estimated stock and domestic demand of 0.41 GL is likely to remain stable (SA MDB NRMB 2010a).
- The Peake town water supply demand is anticipated to increase from 10 ML to 12 ML per year in the future (SA MDB NRMB 2010a).
• Imported water from the River Murray through Tailem Bend – Keith Pipeline is used for stock and domestic purposes. Future demand is expected to remain stable (SA MDB NRMB 2010a).

• Irrigation for horticulture will continue to place the greatest demands (SA MDB NRMB 2010a). Currently the annual take for licensed purposes is around 65% of the total water allocated each year. This may increase over time (Steve Barnett, pers. comm., 15 August 2014).

SA Murray (GS6)

The water resources of the SA Murray SDL resource unit are highly saline, which limits the types of uses for this water. The aquifers are often confined, lie deep below the ground and are not connected to surface water resources. Where the aquifers are close to the surface, they may contribute saline groundwater to the River Murray floodplain. As such, further extraction in these areas may have some benefits.

Growth in stock water use would be expected to closely follow seasonal climate variability.

It is understood that there has been some mining exploration in the area. A notable portion of the region (predominantly the north) is covered by exploration licences or exploration licence applications.

A better understanding of potential future demand could be established by undertaking an assessment of the mining explorations that have occurred to date. The Eyre Peninsula WAP also has a method for assessing future demand that could be applied to this SDL resource unit. However, considering there is significant capacity for additional take between the BDL and SDL, further investigation into potential future take may not be necessary.

SA Murray Salt Interception Schemes (GS7)

The Murtho salt interception scheme is currently under construction. An allocation of 2.144 GL has been made for this purpose. However, other future demands are currently unknown.

Due to the SIS operational costs, there is currently a review of all SIS pumping. In light of this, future reductions in the volumes pumped may occur.

Given the high salinity of the groundwater in most areas of the SDL resource unit, there is unlikely to be any further demand for stock and domestic take.

3.3 Alignment between State Arrangements and Basin Plan Requirements - with Recommendations

While the Basin Plan does not require the long term SDL to be specifically outlined in a water resource plan, it does require certain rules for take and the annual determination of water permitted to be taken (discussed further in Section 4). By default, these rules are likely to result in reference to the long term SDL. It is also considered that there are benefits in specifying the long term SDL within relevant planning instruments for transparency and greater ease of management.

3.3.1 All SDL Resource Units

As outlined in Section 3.2.2, there are a number of uses of water that are authorised under s 128 of the NRM Act but for which details on occurrence and volume taken are not recorded. Estimates of this take do not appear to have been included for any of the BDLs and SDLs across the SA Murray Region.
While the Basin Plan requires that all forms of take be accounted for, given the nature of these authorised activities and the small volumes of take that they represent, it is recommended that the State negotiate with the MDBA to reach an agreement that take for these purposes is not required to be accounted for under the BDL or SDL. If this is not agreed, then an investigation would be required to estimate these forms of take for the purposes of revising the BDL and SDL for each SDL resource unit.

**Recommendation 1**

It is recommended that the State negotiate with the MDBA that take for those purposes covered by State-wide 128 authorisations is small and is not required to be accounted for under the BDL or SDL for any SDL resource unit. If this is not possible, it may be necessary to adjust the BDLs for all SDL resource units with an estimate of take for these purposes as at 30 June 2009.

### 3.3.2 South Australian Non-Prescribed Areas (SS10)

**Alignment between BDL and limits of take as of 30 June 2009**

As outlined in Section 3.1.3, in estimating the BDL for this SDL resource unit it appears that the MDBA did not base the estimate on the state water management laws that applied at the time. Instead of using the limits in the surface water sub-catchment zones in the SA MDB NRM plan as a part of the basis for setting the BDL, the MDBA estimated the BDL based on information on a farm dams impact assessment undertaken for the National Water Commission (SKM et al., 2010).

The BDL in the Basin Plan is a description, meaning that estimates can be updated without amending the Basin Plan. It therefore may be possible to negotiate with the MDBA to revise the estimate of the BDL using:

- limits on the total volume of farm dams for a portion of the SA MDB region to calculate a limit of take for this area (SA MDB NRM Plan); and
- the data on farm dams for all other areas (dam impact assessment undertaken for the National Water Commission).

A baseline limit of take could be derived from the relevant limits in the SA MDB NRM plan by applying either the method used by SKM et al. (2010) to farm dam data for the purposes of estimating the BDL for this SDL resource unit or by applying a hydrological modelling method such as that used as part of the development of limits in the Marne-Saunders WAP (SA MDB NRMB 2010b).

It is currently unknown whether this work would result in a higher long term limit of take for the SDL resource unit than what has been estimated for the Basin Plan, therefore it is recommended that the Department undertake an investigation into the issue prior to approaching the MDBA about revising the estimate.

To revise the estimate of the BDL it will be necessary to extract the area covered by the surface water sub-catchment zones in the SA MDB NRM plan referred to in Section 3.1.3 from the data on farm dams for the SA Non-Prescribed SDL resource unit compiled for the National Water Commission (SKM et al., 2010). If this it is not possible to extract the area covered by the surface water sub-catchment zones, the estimate of the BDL will most likely need to be accepted as it currently stands.

It is also unclear whether take from forestry, mining and potentially direct extraction from watercourses should have been accounted for under the BDL. If the MDBA require accounting for these forms of take under the SDL, the State will need to have the BDL updated to account for these forms of take as of 30 June 2009 as well.
**Recommendation 2**

It is recommended that:

- An investigation is undertaken to determine a long term average baseline limit of take for the relevant portions of the SA MDB region that had limits applied to them as of 30 June 2009;
- Should this investigation indicate that a higher BDL could be justified, the State should negotiate with the MDBA to revise the estimate of the BDL and SDL. This revised BDL and SDL would be based on the long term average limit of take determined in the investigation above for the relevant portion of the SA MDB region plus the data on farm dams compiled for the National Water Commission for all other areas; and
- If the MDBA requires accounting for take via forestry, mining and direct extraction (if any) under the SDL [link to recommendation on the forms of take required to be accounted for under theSDL below], then the State will need to undertake an analysis of the impacts of these forms of take as of 30 June 2009 and request that the BDL is updated to account for these.

**Alignment between SDL and current limits of take**

The Basin Plan requires water resource plans to implement SDLs through the incorporation and application of a long-term annual diversion limit for each SDL resource unit in the water resource plan area.

There is currently no single, overarching limit of take that applies to the South Australian Non-Prescribed Areas SDL resource unit. Under the NRM Act, the main option for applying a limit on take for surface water that is not prescribed is to limit the development activities that affect take, principally the construction of dams or other structures that will collect and/or divert water following in a watercourse or over land under s 125(a).

Limits on the total volumes of dams permitted have been set for the SE NRM region and a portion of the SA MDB region. In relation to the SE region, the policy area for which a limit has been set is larger than the relevant portion of the SDL resource unit. However, as the policy is both area and allotment limited, it may be possible to apply the runoff coefficient used to ascribe a single limit for the relevant area of the SE region within the South Australian Non-Prescribed Areas SDL resource unit (Jennifer Schilling, pers. comm., 30 October 2014).

It should be noted that the total volume of dams permitted does not directly correspond to a limit of take for these areas. A limit of take could be derived from the limits on total volume of dams by applying either the method used by SKM et al. (2010) that was applied to farm dam data for the purposes of estimating the BDL for this SDL resource unit or by applying a hydrological modelling method such as the one applied for the Marne Saunders WAP (SA MDB NRMB 2010b), which was used as the basis for the BDL and SDL in the Marne-Saunders SDL resource unit.

No limits of take have been specified for the relevant area of the SAAL NRM region.

To comply with the Basin Plan, a single overarching limit of take will need to be applied to the area, however there is no reason why this limit could not be managed and administered under multiple NRM plans. The following matters will need to be considered in considering options for applying, managing and enforcing a single limit of take to the SDL resource unit.

- The limit will need to apply to all forms of take – consideration will need to be given as to whether it is possible to apply and enforce a limit on take via direct extraction from watercourses (apart from via farm
dams and drains within the SE NRM Region) and take by commercial forestry plantations. The section below recommends seeking approval to exempt accounting for these forms of take due to their insignificance.

- Clear links between limits on total volumes of dams and a limit of take for the area – the State would need to determine and demonstrate a clear method for how the limits on total volumes of dams correlate to the SDL for the SDL resource unit.
- Exemptions to the requirement to obtain a permit for relevant water affecting activities – any exemptions would present a risk to being able to demonstrate compliance with the SDL due to an inability to monitor and manage these activities.
- Apportionment of the limit – the SDL will need to be apportioned across the three NRM plan areas.
- Alignment and creation of water affecting activity permit policy boundaries – to effectively apply and manage the SDL to the water resources in this SDL resource unit, limits will need to be applied in three different NRM plans. This will likely involve the creation of a water affecting activity policy boundary for the relevant portion of the SAAL region and the alignment or creation of a new boundary for the relevant section of the SE region.
- Introduction of limits to areas that previously had no restrictions on levels of take.

It is recommended that the State ask the MDBA to reconsider the SDL that is applied to this SDL resource unit as part of the review of the Basin Plan in 2022, given there seems to be very little scientific justification for restricting future take.

**Recommendation 3**

It is recommended that:

- The Murray-Darling Basin Policy and Strategy team work with the relevant NRM regions to develop a paper that outlines and assesses options for applying a single limit of take to the SDL resource unit, after it has been determined whether the BDL and SDL estimate will be revised [link to recommendation in Section 4.3.1]. This may include the re-apportionment of the revised BDL across the SDL resource unit;
- The relevant NRM regions implement the preferred option for applying a single limit of take [link to recommendation in Section 4.3.1]; and
- The State formally request that the MDBA reconsider the SDL for the South Australian Non-Prescribed Areas SDL resource unit as part of the review of the Basin Plan in 2022.

**Alignment between SDL and current take**

Given that the BDL is equal to the SDL and was set using the information on a farm dams impact assessment undertaken for the National Water Commission (SKM et al., 2010), any new development that results in increased extraction after this survey was undertaken will be considered additional take to the BDL. This additional take will subsequently create risks for the State in being able to comply with the SDL in the future.

As indicated in Section 3.2.2 only one dam permit has been issued since the survey was undertaken. This was for a dam 540 kL in volume in the SA MDB NRM Region. In the SAAL NRM Region, water affecting activity permits are
only required for dams over 10 ML in capacity but those over 5 ML in capacity and a wall height of 3 metres require approval under the Development Act. Given this, there could have been new dam development in this area that there is no data for.

As indicated in Section 3.2.3 there appears to be evidence of forestry and mining activity within the SDL resource unit that could impact on levels of take. There could also be some direct extraction from watercourses that is readily identifiable or actively managed. These forms of take were not accounted for under the BDL. It is unclear whether take from forestry, mining and potentially direct extraction from watercourses would be considered significant enough to be accounted for under the SDL. Given that these forms of take are likely to be very minor it is suggested that the State negotiate with the MDBA that these should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) may assist the State in these negotiations. Alternatively, further evidence may need to be gathered as to the level of significance of these forms of take to support the negotiations.

There is currently no way to limit further development that would result in additional take prior to the introduction of Basin Plan consistent management arrangements.

If the State is successful in negotiating a revised estimate of the BDL with the MDBA, it is assumed that this revised estimate will allow further development to occur before the State would breach the SDL (although this will need to be confirmed via the work recommended in the previous section above).

If the MDBA does not agree to revise the estimate, it is recommended that the State argue that the estimates of current take undertaken for the purposes of estimating the BDL were rough and that additional take since these estimates were done is very small and unlikely to result in a breach of the SDL.

**Recommendation 4**

It is recommended that:

- If the MDBA does not agree to revise the estimate of the BDL, the Department argue that the estimates of current take undertaken for the purposes of estimating the BDL were rough and that additional take since these estimates were done is very small and unlikely to result in a breach of the SDL.
- The State negotiate with the MDBA that take via forestry, mining and direct extraction from watercourses is minor and should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue.

**3.3.3 Mallee (GS3)**

**Mallee (Pliocene Sands)**

**Alignment between BDL and limits of take as of 30 June 2009**

The BDL for the Mallee Pliocene Sands aquifer was set based on the current plan limit approach, where the BDL is equal to the lesser of the plan limit and the level of entitlement (Section 3.1.1). As there were no entitlements issued for extraction from this aquifer at the time, the BDL was determined to be 0 GL per year.\(^{13}\)

\(^{13}\) There is a limit of 2.144 GL per year from the Pliocene Sands Aquifer within the Noora PWA but this falls within the SA Murray Salt Interception Schemes SDL resource unit (GS7).
There are no forms of non-licensed take or interception activities (forestry or mining) that have been identified within either the Mallee PWA or the Noora PWA that would require a change to the BDL.

Given the above, no change to the BDL is required.

Alignment between SDL and current limits of take / current take

The Mallee Pliocene Sands aquifer was included in the unassigned groundwater category (refer Section 3.1.2) with the SDL determined to be 41.4 GL per year.

There are a number of inconsistencies with respect to the SDL, the current limits of take under the Mallee and Noora WAPs and the current limits under the Border Groundwater Agreement.

- The Border Groundwater Agreement has a limit of 0 GL per year with respect to the Pliocene Sands aquifer within this SDL resource unit.
- The Mallee WAP does not define a limit on take but does not permit water allocations from the Pliocene Sands aquifer. Therefore, the limit is effectively 0 GL per year, consistent with the Border Groundwater Agreement.
- The Noora WAP does not define a limit on take but does permit water allocations from the Pliocene Sands aquifer, subject to a number of criteria. This WAP has not been updated to reflect changes to the Border Groundwater Agreement, which does not currently permit extractions from this aquifer (other than for the Murtho SIS, which is within the SA Murray SIS SDL resource unit).
- The SDL for the Mallee Pliocene Sands is much higher than the current limits of take.

There is currently no take from the Pliocene Sands aquifer. Future take is unlikely due to the high salinity of the resource. Any future take for licensed purposes would require changes to the Border Groundwater Agreement and the Mallee WAP, which is also unlikely.

There are no forms of non-licensed take or interception activities (forestry or mining) that have been identified within either the Mallee PWA or the Noora PWA that would require a change to the SDL. Future use for these purposes is unlikely.

Recommendation 5

It is recommended that the limits within the Noora WAP for the Mallee Pliocene Sands aquifer be updated to reflect the Border Groundwater Agreement.

Mallee (Murray Group Limestone)

Alignment between SDL Resource Unit area and the area used for determination of the BDL and SDL

- The BDL and SDL for the Mallee Murray Group Limestone aquifer unit included the full take limits under the Mallee WAP, despite a significant area of the Mallee PWA falling outside of the SDL resource unit area as defined by s 6.03 of the Basin Plan.
- There are a number of options for addressing and/or managing this inconsistency:
  1. Despite the misalignment of boundaries, continue to manage this SDL resource unit through inclusion of the full Mallee PWA under the SDL. The accounting for take against the SDL would
therefore be from across the full Mallee PWA, which is consistent with the approach used for reporting under section 71 of the Water Act for 2012-13; or

2. Include only the area of the Mallee PWA that is within the s 6.03 defined boundary as part of the management of the SDL resource under the WRP plan and request realignment of the BDL and SDL with this boundary. The BDL and SDL would therefore need to consider only the Mallee WAP limits that apply and entitlements that are located (for partially included management zones) within the s 6.03 defined boundary. The process for section 71 reporting would need to be updated to be consistent with this approach; or

3. Include only the area of the Mallee PWA that is within the s 6.03 defined boundary as part of the management of the SDL resource under the WRP plan but do not request realignment of the BDL or SDL with this boundary. If the area outside of the s 6.03 defined boundary was excluded from compliance, there would then potentially be an additional buffer between the current State limits and the SDL. This would potentially allow an increase in the State take limits (subject to any Border Groundwater Agreement limits) within this SDL resource unit. However, this would create new inconsistencies:

   • The Basin Plan defined BDL would be inconsistent with the limits of take for the reduced area at 30 June 2019.
   • There would be an inconsistency between the value of the Basin Plan defined SDL and the method used to calculate it, as the method should have been applied to a smaller area.

Option 1 requires no change to current practice, the least ongoing effort and does not result in additional inconsistencies.

### Recommendation 6

It is recommended that:

- For ease of reporting and administration, continue to manage take within the SDL resource unit and reporting by including the full Mallee PWA within the Mallee (GS3) SDL resource unit boundary, despite the area inconsistency; and
- Inform the MDBA of the identified inconsistency and the approach to be applied for managing it.

### Alignment between BDL and limits of take as of 30 June 2009

The BDL for the Mallee Murray Group Limestone aquifer was set based on the current plan limit approach, where the BDL is equal to the lesser of the plan limit and the level of entitlement (Section 3.1.1), as follows:

$$BDL (65.7 \text{ GL}) = \text{Mallee WAP limit (61.3 GL)} + \text{Mallee WAP S&D (2.25 GL)} + \text{Noora PWA existing entitlement (2.144 GL)} + \text{Noora WAP S&D (0.028 GL)}$$

There are a number of inconsistencies between the BDL and the limits of take as of 30 June 2009 as follows:

- The existing allocation of 2.144 GL within the Noora PWA is for extraction from the Pliocene Sands aquifer, not the Murray Group Limestone aquifer. As its purpose is for extraction for the proposed Murtho SIS, it should be accounted for within the SA Murray SIS (GS7) SDL resource unit.
An authorisation for a sand mining development under s 128 of the NRM Act made prior to 30 June 2009 was not included in the BDL. This authorisation was for a maximum of 42.92 GL over a 10 year period ending in 2016-17, with a maximum of 6 GL in any year.

The level of stock and domestic use included in the BDL is the estimate of current take specified in the relevant WAPs. This represents the best estimates of use for these purposes as of 30 June 2009.

There are no other forms of non-licensed take or interception activities (forestry or other mining operations) that have been identified within either the Mallee PWA or the Noora PWA, which would require an increase to the BDL.

**Recommendation 7**

It is recommended that the BDL be revised to:

- remove the Noora PWA entitlement of 2.144 GL; and
- include the authorised use of 4.292 GL per year (average) for sand mining.

**Alignment between SDL and current limits of take**

The Mallee Murray Group Limestone aquifer was included within the non-renewable groundwater category and the SDL set using the current extraction regime under the existing water allocation plans (refer Section 3.1.2).

As for the BDL above, the SDL was determined as follows:

\[
\text{SDL (65.7 GL) = Mallee WAP limit (61.3 GL) + Mallee WAP S&D (2.25 GL)} \\
+ \text{ Noora PWA existing entitlement (2.144 GL) + Noora WAP S&D (0.028 GL)}
\]

As for the BDL above, inconsistencies exist between the SDL and the current limits of take in relation to inclusion of the Noora PWA existing entitlement and not including the current s 128 authorisation.

With respect to the Noora PWA entitlement, this should be removed from this SDL as it should be accounted for within the SA Murray SIS (GS7) SDL resource unit.

The s 128 authorisation for the sand mining development expires in 2016-17. While this take forms part of the BDL, it is not an ongoing management arrangement or entitlement. If this was to be the case, it would or should have been incorporated into the Mallee WAP in 2012 (refer Section 3.2.2) and an entitlement issued.

The level of stock and domestic use included in the SDL is the estimate of current take specified in the relevant WAPs.

**Recommendation 8**

It is recommended that:

- The limits within the Noora WAP for the Murray Group Limestone aquifer be updated to reflect the Border Groundwater Agreement.
- The SDL for the Mallee Murray Group Limestone aquifer be revised to remove the Noora PWA entitlement of 2.144 GL.
Alignment between SDL and current take

The SDL (once revised to remove the Noora PWA entitlement of 2.144 GL) includes 61.3 GL that reflects the limit for licensed purposes under the Mallee WAP. Current take is well below the SDL and likely to remain so for the immediate future:

- 60.098 GL has been allocated from the Murray Group Limestone aquifer across the Mallee PWA.
- 1.202 GL remains unallocated. Following the expiration of Temporary Auxiliary Allocations that allow the unallocated volume to be used for up to three years after the adoption of the WAP (until end of 2014-15), the South Australian Unallocated Water Policy Statement would manage any allocation of this volume. Consideration would be given to a number of factors including the demand for additional water, which may include consideration of the current utilisation of existing allocations (refer Appendix 11.4).
- Average annual use for licensed purposes since 2004-05 has been 32.02 GL with an upper limit of 38.3 GL (refer Section 3.2.3), which indicates a large volume of unused allocations.
- The Mallee WAP indicates that the overall volume of licensed extractions from this aquifer is not expected to increase markedly in the future (refer Section 3.2.4).

With respect to stock and domestic take:

- The SDL includes 2.278 GL based on the estimates in the Mallee and Noora WAPs.
- As this form of take is unlicensed it is unknown how the current level of take relates to this estimate.
- Both WAPs indicate that future demands are likely to remain stable or decline slightly in line with population trends (refer Section 3.2.4).
- There are also a number of limiting factors that have likely contributed to the relatively low level of current development, and make it unlikely that the current estimate would increase significantly over time. These include limited stocking capacities given the prevailing climate conditions and land available. Population trends in most regional areas of South Australia are not increasing and are unlikely to do so in either the immediate or medium term future.
- Current use is unlikely to have exceeded the WAP estimates but consideration of options for a more accurate estimate of current take, and options for meeting reporting obligations under section 71 of the Water Act and for SDL compliance assessment, are outlined in Sections 5.3.2 and 6.2.3.

Based on the available information, no reduction in current take should be required to meet the SDL.

Mallee (Renmark Group)

Alignment between BDL and limits of take as of 30 June 2009

The BDL for the Mallee Renmark Group was set based on the current plan limit approach, where the BDL is equal to the lesser of the plan limit and the level of entitlement (Section 3.1.1). As there were no entitlements issued for extraction from this aquifer at the time, the BDL was determined to be 0 GL per year.

There are no forms of non-licensed take or interception activities (forestry or mining) have been identified within either the Mallee PWA or the Noora PWA that would require a change to the BDL.

Given the above, no change to the BDL is required.
Alignment between SDL and current limits of take / current take

The Mallee Renmark Group aquifer was included in the deep groundwater category (refer Section 3.1.2) with the SDL determined to be 2 GL per year.

There are a number of inconsistencies with respect to the SDL, the current limits of take under the Mallee and Noora WAPs and the current limits under the Border Groundwater Agreement.

- The Border Groundwater Agreement has a limit of 0.89 GL per year from this aquifer within the Mallee PWA and 0 GL per year within the Noora PWA, compared with the SDL of 2 GL per year.
- The Mallee WAP does not define a limit on take but does not permit water allocations from the Renmark Group aquifer with the exception of SA Water for public water supply only (with a no net allocation increase criteria).
- The Noora WAP does not define a limit on take but does permit water allocations from the Renmark Group aquifer, subject to a number of criteria. This WAP has not been updated to reflect changes to the Border Groundwater Agreement, which does not currently permit extractions from this aquifer within this PWA.

There is currently no take from the Renmark Group aquifer. Future take is unlikely due to the high salinity of the resource and the cost of drilling.

There are no forms of non-licensed take or interception activities (forestry or mining) that have been identified within either the Mallee PWA or the Noora PWA that would require a change to the SDL. Future use for these purposes is unlikely.

Recommendation 9

It is recommended that:

- The limits within the Mallee WAP for the Renmark Group aquifer be updated to reflect the Border Groundwater Agreement; and
- The allocation criteria and limits in the Noora WAP be updated to reflect the Border Groundwater Agreement.

3.3.4 Peake-Roby-Sherlock (GS5)

Peake-Roby-Sherlock (unconfined)

Alignment between BDL and limits of take as of 30 June 2009

The BDL for the Peake-Roby-Sherlock Unconfined aquifer was set based on the current plan limit approach, where the BDL is equal to the lesser of the plan limit and the level of entitlement (Section 3.1.1), as follows:

\[
\text{BDL (3.41 GL)} = \text{PRS WAP limit (3.215 GL)} + \text{PRS WAP S&D (0.19 GL)}
\]

The level of stock and domestic use included in the BDL is the estimate of current take specified in the WAP. This represents the best estimate of use for these purposes as of 30 June 2009.

There are no other forms of non-licensed take or interception activities (forestry or mining) that have been identified within the Peake, Roby and Sherlock PWA that would require an increase to the BDL.
Given the above, no change to the BDL is required.

Alignment between SDL and current limits of take

The Peake-Roby-Sherlock Unconfined aquifer was included in the existing planning arrangements category and the SDL set to the existing plan limits (refer Section 3.1.2).

As for the BDL above, the SDL was determined as follows:

\[
\text{SDL (3.41 GL) = PRS WAP limit (3.215 GL) + PRS WAP S&D (0.19 GL)}
\]

The level of stock and domestic use included in the SDL is the estimate of current take specified in the WAP.

No change to the SDL is required.

Alignment between SDL and current take

The SDL includes 3.22 GL (rounded) that reflects the limit for licensed purposes under the Peake, Roby and Sherlock WAP. Current take is well below the SDL and likely to remain so in the future:

- 0.292 GL has been allocated from the Unconfined aquifer across the Peake, Roby and Sherlock PWA.
- 2.923 GL remains unallocated. The WAP specifies that payment will be required for new allocations with respect to water available within the current limits.
- The annual use for licensed purposes is much less than the allocated volume.
- An increase in demand is unlikely.

With respect to stock and domestic take:

- The SDL includes 0.19 GL for stock and domestic purposes based on the estimate in the Peake, Roby and Sherlock WAP (0.002 GL per year for each active well).
- The WAP indicates that demand for this purpose is likely to remain stable (refer Section 3.2.4).
- There are also a number of limiting factors that have likely contributed to the current low level of development in this area, and make it unlikely that the current estimate would increase significantly over time. Salinity of groundwater within the Unconfined Aquifer is higher than desirable for domestic purposes over the majority for the SDL resource unit, and not suitable for stock over a large area. There are also limited stocking capacities given the prevailing climate conditions and land available for this purpose. Population trends in most regional areas of South Australia are not increasing and are unlikely to do so in either the immediate or medium term future.
- Current use is unlikely to have exceeded the WAP estimates but consideration of options for a more accurate estimate of current take, and options for meeting reporting obligations under section 71 of the Water Act and for SDL compliance assessment, are outlined in Sections 5.3.3 and 6.2.4.

Based on the available information, no reduction in current take should be required to meet the SDL.
**Peake-Roby-Sherlock (confined)**

**Alignment between BDL and limits of take as of 30 June 2009**

The BDL for the Peake-Roby-Sherlock Confined aquifer was set based on the current plan limit approach, where the BDL is equal to the lesser of the plan limit and the level of entitlement (Section 3.1.1), as follows:

\[
\text{BDL (2.58 GL)} = \text{PRS WAP limit (2.168 GL)} + \text{PRS WAP S&D (0.41 GL)}
\]

The level of stock and domestic use included in the BDL is the estimate of current take specified in the WAP. This represents the best estimate of use for these purposes as of 30 June 2009.

There are no other forms of non-licensed take or interception activities (forestry or mining) that have been identified within the Peake, Roby and Sherlock PWA that would require an increase to the BDL.

Given the above, no change to the BDL is required.

**Alignment between SDL and current limits of take**

The Peake-Roby-Sherlock Confined aquifer was included in the existing planning arrangements category and the SDL set to the existing plan limits (refer Section 3.1.2).

As for the BDL above, the SDL was determined as follows:

\[
\text{SDL (2.58 GL)} = \text{PRS WAP limit (2.168 GL)} + \text{PRS WAP S&D (0.41 GL)}
\]

The level of stock and domestic use included in the SDL is the estimate of current take specified in the WAP.

No change to the SDL is required.

**Alignment between SDL and current take**

The SDL includes 2.17 GL (rounded) that reflects the limit for licensed purposes under the Peake, Roby and Sherlock WAP. Current take is below the SDL and is likely to remain so for the immediate future:

- 1.92 GL has been allocated from the Confined aquifer across the Peake, Roby and Sherlock PWA.
- 0.248 GL remains unallocated. The WAP specifies that payment will be required for new allocations with respect to water available within the current limits.
- The average annual use for licensed purposes is around 65% of the allocated volume
- Future demand may increase over time.

With respect to stock and domestic take:

- The SDL includes 0.41 GL for stock and domestic purposes based on the estimate in the Peake, Roby and Sherlock WAP (0.002 GL per year for each active well).
- The WAP indicates that demand for this purpose is likely to remain stable (refer Section 3.2.4).
- There are also a number of limiting factors that have likely contributed to the current low level of development in this area, and make it unlikely that the current estimate would increase significantly over time. There are also limited stocking capacities given the prevailing climate conditions and land available for this purpose. Population trends in most regional areas of South Australia are not increasing and are unlikely to do so in either the immediate or medium term future.
• Current use is unlikely to have exceeded the WAP estimates but consideration of options for a more accurate estimate of current take, and options for meeting reporting obligations under section 71 of the Water Act and for SDL compliance assessment, are outlined in Sections 5.3.3 and 6.2.4.

Based on the available information, no reduction in current take should be required to meet the SDL.

### 3.3.5 SA Murray (GS6)

**Alignment between SDL and current take**

While the current levels of take are not well understood, based on the estimate of take that was undertaken for the Basin Plan it is expected that take is significantly lower than the SDL for the SDL resource unit. While a more accurate estimate of current take is not required at this stage, an estimate of annual take will need to be undertaken for the purposes of reporting under section 71 of the Water Act and SDL compliance assessment. Recommendations to meet these requirements are outlined in Sections 5.3.4 and 6.2.5.

As indicated in Section 3.2.3 there appears to be evidence of minor levels of forestry and mining activity within the SDL resource unit. These forms of take were not accounted for under the BDL. These forms of take are likely to be very minor it is suggested that the State negotiate with the MDBA that these should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) may assist the State in these negotiations.

**Recommendation 10**

It is recommended that the State negotiate with the MDBA that take via forestry and mining is minor and should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue.

**Alignment between SDL and current limits of take**

The relevant NRM plans do not currently specify long term limits of take for the SA Murray SDL resource unit. Under the NRM Act, the main option for applying a limit on take for groundwater that is not prescribed is to limit development activities that affect take, principally the construction of new wells or the modification of existing wells under s 127(3)(a) to s 127(3)(c).

There is a large difference between the BDL and SDL for this non-prescribed groundwater SDL resource unit, with a low risk of a significant increase in use (DEWNR 2015). As such, it is proposed that limiting and/or monitoring well construction and specific types of land use should be sufficient to implement the limit on take defined under the Basin Plan.

To comply with the Basin Plan, any limits on construction or on specific types of land use would need to be applied to the area of the full SDL resource unit, however there is no reason why these could not be managed and administered under multiple NRM plans. The following matters would need to be considered when applying, managing and enforcing such a limit to the SDL resource unit:

- The limit needs to apply to all significant forms of take. It is recommended that approval is sought to exclude accounting for insignificant forms of take such as commercial forestry plantations.

- The identification of any new take could be done using the following approach:
Use the water affecting activity permit system to monitor and identify any new development. An updated central permit system would help improve this process (refer Section 4.4.2).

Monitor any change in land use to commercial forestry via regular updates to the spatial land use information of DEH (2008).

- Exemptions the permit requirements for relevant water affecting activities should be removed as any exemptions present an inability to monitor and manage these activities. Although exemptions do not apply for the main groundwater related activities under s 127(3)(a) to s 127(3)(c) or s 127(3)(f) of the NRM Act (refer Section 3.2.2), exemptions do apply under Schedule 2 (para 1) for wells that are 2.5 metres or less in depth (Refer Section 3.2.3). Such “wells” could include groundwater access trenches that allow access to the unconfined aquifer, if take from these is regarded as take from groundwater as opposed to take from surface water.

- Apportionment of the limit – how any limit on development activities that allow for the taking of groundwater would to be apportioned across the three NRM plan areas.

**Recommendation 11**

It is recommended that:

- Murray-Darling Basin Policy and Strategy work with the relevant NRM regions to develop a paper that outlines options for applying a limit of take to the SDL resource unit by limiting and/or monitoring well construction and specific types of land use [link to recommendation in Section 4.3.4]; and

- The relevant NRM regions implement the preferred option for applying a limit of take [link to recommendation in Section 4.3.4].

### 3.3.6 SA Murray Salt Interception Schemes (GS7)

**Alignment between BDL and limits of take as of 30 June 2009**

The BDL for the SA Murray SIS SDL resource unit was set based on the measured groundwater use in 2007-08 (refer Section 3.1.1). It does not include the allocation of 2.144 GL made within the Noora PWA in January 2009, which is an entitlement existing at 30 June 2009 and should have been included.

Four bores have been identified as being for stock and domestic purposes (DEWNR 2015). No information on use is available as they are located within a non-prescribed area, however, the use is likely to be very low. Given the high salinity of the groundwater across most areas of the SDL resource unit, there is unlikely to be any further demand for stock and domestic take. The prevailing conditions are likely to be a major factor as to why there has been such limited development to date.

While there are small areas of dryland forestry that may use groundwater within this SDL resource unit, the combined area is very small (less than 0.008% of the total SDL resource unit area). This form of take was not accounted for in the BDL and information is not available to allow estimation of the potential take at 30 June 2009.

It is unclear whether this level of stock, domestic and forestry use would be considered by the MDBA to be significant enough to require accounting under the SDL. Given that any take is likely to be very minor it is suggested that the State negotiate with the MDBA that current take for these purposes is not required to be accounted for under the BDL or SDL. Data and information from the risk assessment (DEWNR 2015) may assist in these negotiations with further evidence gathered as to the level of significance of these forms of take, if needed.
Assuming that current take by stock, domestic and forestry purposes is not accounted under the SDL, then the following could be used to reassess the levels of these forms of take prior to revisions of the water resource plan:

- Use the water affecting activity permit system to monitor and identify any new stock and domestic development. An updated central permit would improve this process (refer Section 4.4.2)
- Monitor any change in land use to commercial forestry via regular updates to the spatial land use information of DEH (2008).

The above would also provide additional support to the fit for purpose negotiations that the occurrence of any new development for these forms of take will be identified for each revision of the water resource plan.

**Recommendation 12**

It is recommended that:

- The BDL be revised to include the Noora PWA entitlement of 2.144 GL for SIS purposes;
- The State negotiate with the MDBA that current take via stock, domestic or forestry purposes is minor and should not be accounted for under the BDL or SDL. Additionally, that the water activity permit system and spatial land use information could be used to identify any new take by these purposes. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue; and
- A paper to be developed to document the process for updating and analysing the spatial land use information to allow any changes in land use to commercial forestry.

**Alignment between SDL and current limits of take / current take**

The SA Murray SIS SDL resource unit was included in the unassigned groundwater category (refer Section 3.1.2) with the SDL determined to be 28.6 GL per year, based on projected growth of salt interception schemes.

Aside from the area within the Noora PWA, there is no long term limit on take defined either within the MDB Regional NRM Plan or with respect to the operation of the salt interception schemes.

The current take by the existing salt interception schemes, combined with the entitlement for the Murtho SIS is significantly less than the SDL. Given the SDL is set to allow for projected growth, this difference is appropriate and no change to the SDL is required.
4 RULES FOR TAKE

4.1 Basin Plan Rules for Take

4.1.1 Annual Determinations of Water Permitted to be Taken

Section 10.10 of the Basin Plan sets out the WRP requirements for the annual determination of water that is permitted to be taken, including:

(1) For each SDL resource unit and for each form of take, the water resource plan must set out the method for determining the maximum quantity of water that the plan permits to be taken for consumptive use during a water accounting period.

(2) This method may include modelling and must be designed to be applied after the end of the relevant water accounting period, having regard to the water resources available during the period.

(3) The plan must
   (a) Account for the matters in subsection 10.12(1); and
   (b) Be consistent with the other provisions of the water resource plan.

(4) The plan must set out a demonstration of each method in such a way that, if applied over a repeat of historical climate conditions, it would result in meeting the SDL for the resource unit, including as amended under s 23A of the Water Act.

(5) The method must also be able to incorporate and apply any adjustments to the SDLs under s 23B of the Water Act that may arise during the life of a water resource plan. If, as a result of any adjustments, the SDL for a surface water resource unit is expressed as a formula that changes over time, the SDL for subsection 10.10(4) is taken to be:
   (a) For a water accounting period beginning on or after 1 July 2019 – the SDL as it stood on 30 June 2019; and
   (b) For a water accounting period beginning on or after 1 July 2022 – the SDL as it stood on 30 June 2022; and
   (c) For a water accounting period beginning on or after 1 July 2024 – the SDL as it stood on 30 June 2024.

In relation to the above, MDBA (2013) includes the following:

- The method for determining the quantity of water permitted to be taken must cover all forms of take, but may be composed of various independent parts in relation to the management of different forms of take.
- A key element of the method is the demonstration that there is no double-counting of the various forms of take.

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14 As defined under s 1.07 of the Basin Plan (refer Section 3.1.2)
15 Section 23A of the Basin Plan allows the Authority to long-term average SDL for the water resources of a particular water resource plan area (or a particular part of those water resources).
The method will be used at the end of every water accounting period to determine the quantity of water permitted to be taken during that water year under the rules in the water resource plan.

The MDBA will maintain a register of the various measures that are expected to result in adjustment to the SDL by 2024. This will aid in the application of s 10.10(5).

Adjustments may also be made to groundwater SDLs if better information becomes available. In relation to such adjustments, it may be possible to represent the SDL as a formula or alternatively provide for a review of the water resource plan if the SDL is adjusted during the life of the plan. The method used will depend on a number of factors including the nature of the resource, the likelihood of any adjustment being required and existing State planning arrangements.

Section 10.12(1) of the Basin Plan specifies the matters that must be specifically accounted for under s 10.10(3)(a) as follows:

a) All forms of take from the SDL resource unit and all classes of water access right;

b) Water allocations that are determined in one water accounting period and used in another, including water allocations that are carried over from one water accounting period to the next;

c) For a surface water SDL resource unit – return flows, in a way that is consistent with arrangements under the Murray-Darling Basin Agreement immediately before commencement of the Basin Plan;

d) Trade of water access rights;

e) Water resources which have a significant hydrological connection to the water resources of the SDL resource unit;

f) Circumstances in which there is a change in the way water is taken or held under a water access right;

g) Changes over time in the extent to which water allocations in the unit are utilised;

h) Water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water (if applicable); and

i) Water resources which are used for the purpose of managed aquifer recharge.

In relation to the above, MDBA (2013) includes the following:

- Where the method determines a permitted take using less than full utilisation of allocated water, it needs to be demonstrated that the method will work to limit take where such utilisation increases. The method for determining annual permitted take would need to make this assumption of less than full utilisation clear, and be closely coupled to the water allocation rules in s 10.11 of the Basin Plan (described further below), so that when the level of utilisation changes the annual permitted take will also change to ensure that the SDL is not exceeded.

- The water resource plan must account for the disposal and acquisition of held environmental water separately and in a way that does not affect the method. Depending on how the method is constructed, it may also include or refer to the register of held environmental water required under s 10.09 of the Basin Plan.

- The MDBA's hydrological model standard for water resource plan accreditation is eWater Source for water resource planning and operations, having regard to the modelling practices of Basin States and the nature
of water resource plan areas and operational readiness of the model as it relates to a water resource plan area.

4.1.2 Rules for take, including water allocation rules

Section 10.11 of the Basin Plan sets out the WRP requirements for the rules for take, including:

(1) The setting of rules (including, if applicable rules for water allocations) that ensure, as far as practicable, that the quantity of water actually taken from each SDL resource unit for consumptive use in a water accounting period does not (after making any adjustments for the disposal or acquisition of held environmental water) exceed the unit’s annual permitted take for the period.

Note 1: Water resource plans are not required to give effect to the long-term average SDLs until 1 July 2019. Compliance with the long-term SDL will then be measured using the annual permitted take.

Note 2: Water allocations can be made during or before a water accounting period however the annual permitted take will generally be calculated after the end of the water accounting period.

(2) To avoid doubt, the rules may be designed to ensure that the quantity of water that is actually taken for consumptive use from an SDL resource unit in a water accounting period is less than the annual permitted take.

In relation to the above, MDBA (2013) includes the following:

- The rules may be or include water allocation rules or flow access rules.
- Rules may be designed so as to encourage a greater percentage of the volume of water permitted to be taken to actually be taken, particularly in areas where water users historically use less than the volumes allocated to them.
- In many highly regulated surface water systems these rules often include detailed water allocation policies and procedures, but all rules used to manage the temporal access to water during a water accounting period to ensure the SDL is not exceeded are relevant to s 10.11.
- Groundwater resources may have a significant storage component, so the amount of water available for use may be less directly related to year to year variations in climate. For most groundwater resources, it is likely to be sufficient to specify that the limit for take in the SDL resource unit is the one that is specified in the Basin Plan (or one that is lower if desired). However, in some cases climatic conditions may result in the restriction of groundwater resources.
- The rules must provide sufficient confidence that so long as water users operate in accordance with the water resource plan, actual take should not exceed annual permitted take for that period. Therefore where permitted take varies according to climatic and other factors, these rules may be designed to balance a desire to see as much of the volume permitted to be taken to actually be taken, and providing sufficient confidence that actual take will not exceed permitted take.
- The rules may also need to allow for a margin of error allowing for such matters as uncertainties in estimation methods, unknown future climate and inflows, and take that is illegal, unauthorised or unaccounted for. Where this is the case, water allocation rules must be set out in such a way that when the level of utilisation changes the annual permitted take, the annual permitted take will also change to ensure that the SDL is not exceeded.
• The rules must be able to clearly account for any acquisition or disposal of held environmental water, whether the disposal and acquisition occurs within an SDL area, or the held environmental water is bought into or sold out of an SDL area. The method for determining annual permitted take must not be affected by these activities (as required under s 10.12(3)).

• Trade in held environmental water must be accounted for in a manner that does not inappropriately impact on consumptive use more generally for the relevant SDL resource units. For example, if an owner of held environmental water sells water into consumptive use in a water resource plan area, the state will not need to reduce allocations to consumptive users so that actual take stays within permitted take. Rather the volume of traded held environmental water is accounted for after the annual permitted take for that SDL resource unit is compared to the actual take through an adjustment to the cumulative balance of the SDL resource unit.

4.1.3 Limits on Certain Forms of Take

Section 10.13 of the Basin Plan relates to limits of specified forms of take including:

1. a water resource plan must require that the long-term annual average quantity of water that can be taken from a surface water SDL resource unit for consumptive use by:
   (a) take under basic rights; or
   (b) take by runoff dams; or
   (c) net take by commercial plantations;

   does not exceed the level specified under the description of the BDL for that form of take (Schedule 3).

2. The quantity specified in subsection (1) for a form of take may only be increased above this level if:
   (a) The long-term annual average quantity of water that can be taken by another form of take from the same SDL resource unit is changed at the same time so that there is no overall change in the long term annual average quantity of water that can be taken; and
   (b) Take by the forms of take affected by the changes are capable of:
      (i) Being accurately measured (for example, through the use of a meter); or
      (ii) In the case of a form of take that is not capable of being accurately measured at the time the water resource plan is submitted for accreditation or adoption – being reasonably estimated using the best available method immediately before the water resource plan is submitted; and
   (c) The changes are not expected to result in the take from the SDL resource unit ceasing to be an environmentally sustainable level of take.

This means that if there is any increase in one or more of the forms of take above that there is a commensurate adjustment to another form of take within the SDL resource unit. The intent of this approach is to avoid growth in interception activities that would lead to an increase in take above the specified SDL (MDBA 2013).

In demonstrating that changes are not expected to result in take from the SDL resource unit ceasing to be an environmentally sustainable level of take under s 10.13(2)(c), factors such as location of the interception activity
within the water resource plan area and timing of take will likely need to be considered (MDBA 2013). As such, any adjustment may not be linear.

Generally, these forms of interception have not been managed within diversion limits. This is also true for South Australia, where take by interception activities under most State Water Allocation Plans has been unlicensed.

### 4.1.4 Extreme Events

Section 10.51 of the Basin Plan relates to measures in response to extreme events, including

1. A water resource plan must describe how the water resources of the water resource plan area will be managed during the following types of events:
   - An extreme dry period;
   - A water quality event of an intensity, magnitude and duration that is sufficient to render water acutely toxic or unusable for established local uses and values; and
   - Any type of event that has resulted in the suspension of a statutory regional water plan in the past 50 years.

2. In the event that a type of event above would compromise a Basin State’s ability to meet critical human water needs in the water resource plan area, the water resource plan must set out measures to meet critical human water needs during such an event.

3. The water resource plan must provide that, if new scientific information suggests a change in the likelihood of an event of a type listed above occurring (for example, due to climate change), consideration must be given to whether, as a result of this new information, the water resources should be managed differently. One such way in which this could be done is to lead to a review of the existing water resource plan and amendments to manage water differently.

In relation to the above, MDBA (2013) indicates that information that could be used to satisfy this requirement includes:

- Roles and responsibilities relating to the management of water resources during the identified extreme events (e.g. the powers of the Minister to declare and extreme event)
- The water management actions that will be implemented to respond to extreme events (e.g. restrictions on take, the policies for determining the level and timing of those restrictions, and how water will be provided to the point of use)
- A demonstration of how the water resource plan will perform under extreme circumstances
- Alternative water management rules to manage water resources during extreme events (e.g. changes in the way that water allocation rules are applied)
- Estimates of the volume of water required to meet critical human water needs
- The indicators that will be used to assess whether an event (i.e. dry period or water quality event) is classified as ‘extreme’ and determine the type or level of action to be taken (e.g. specifying the duration or severity of an extreme event)
- Circumstances in which a water resource plan can be suspended and the extent of temporary rules that could be put in place while the plan is suspended.
4.2 State Rules for Take in the SA Murray Region WRP Area

4.2.1 Overview of State Legislative Provisions

The NRM Act contains the provisions for the management and protection of water resources. The broad provisions in relation to water affecting activities were detailed in Section 3.2.1. With respect to determining annual permitted take and the rules for the taking of water to ensure that an SDL is not exceeded, inclusions within the NRM Act and its associated regulations are described below.

Annual Permitted Take under State Management Arrangements

Prescribed Areas – Licensed Take

- The annual permitted take is only determined for licensed purposes and s 128 authorisations in prescribed areas.
- Under all the WAPs that cover PWAs in the SA Murray Region WRP area the quantity of water permitted to be taken each year by licensed purposes is in the form of a sustainable limits under the WAPs, that is, the total volume allocated annually is the cumulative volume issued on licence.
- Section 47 of the NRM (General) Regulations 2005 (SA) provides the following for prescribed areas:
  - a water licence granted in respect of the water resource need not make express provision for a water access entitlement [s 47(1)(a)].
  - a water licence granted in respect of the water resource may include a quantity of water determined under the provisions of the relevant WAP or existing user allocation process and this may be taken to be a water access entitlement [s 47(1)(b)].
  - the holder of a water licence granted in respect of the water resource is entitled to obtain a water allocation equal to the relevant amount provided on the licence [s 47(1)(c)].

Rules for Take under State Management Arrangements

Prescribed Areas – Licensed Take

Licence holders must only take water in accordance with the conditions on the licence issued to them by the Minister under s 146 of the NRM Act.

Section 115 of the NRM Act relates to the declaration of penalty in relation to unauthorised or unlawful taking of water including:

(1) The Minister may, by notice in the Gazette, declare a penalty payable by –

(a) a person who is the holder of a water allocation who takes water in excess of the amount available under the allocation; or

(b) a person who is the holder of a water resource works approval who takes water contrary to the provisions that apply in relation to that water resource works approval; or

(c) a person who is the holder of a site use approval who uses water contrary to the provisions that apply in relation to the site use approval; or

(ca) a person who is the holder of a delivery capacity entitlement who takes water contrary to the provisions that apply in relation to that delivery capacity entitlement; or
(cb) a person who takes water and is not authorised under section 128 or as part of a water allocation to take that water, and so acts in contravention of this Act; or

(d) a person who has acted in contravention of a notice under section 132.

Section 132 of the NRM Act relates to restrictions in case of inadequate supply or overuse of water.

Under s 164P of the NRM Act, the Minister may cancel, suspend or vary a water management authorisation\(^\text{16}\) if:

(1) If the holder of a water management authorisation, or a person acting on behalf of the holder of a water management authorisation—

(a) takes water in excess of any entitlement under the water management authorisation, or contrary to a provision of the water management authorisation; or

(b) contravenes or fails to comply with a condition of the water management authorisation; or

(c) uses water taken pursuant to the water management authorisation for an illegal purpose.

Stock and Domestic Take

The taking of water for stock and domestic purposes has limited controls under the NRM Act [s 124(4)] within both prescribed areas and non-prescribed areas.

Water Affecting Activities

Section 127 of the NRM Act defines the requirements for water affecting activities, which are generally implemented through the relevant WAP or NRM Plan. Sections that relate to activities that affect take include:

(1) A person must not take water from a prescribed watercourse, lake or well or take surface water from a surface water prescribed area—

(a) Unless the person is –

   (i) —

     (A) authorised to do so under section 128; or

     (B) taking the water as part of a water allocation that relates to the relevant water resource; or

   (ii) entitled to take the water for domestic purposes or for watering stock under Part 1\(^\text{17}\); and

(b) if the taking of water consists of the erection, construction or enlargement of a dam, wall or other structure that collects or diverts water flowing in a watercourse or flowing over any other land—unless the person is authorised to erect, construct or enlarge the dam by a water management authorisation or a permit referred to in subsection (3).

(2) A person must not take water from a watercourse, lake or well that is not prescribed or take surface water from land that is not in a surface water prescribed area in contravention of an NRM plan that applies in relation to that water.

\(^{16}\) A water management authorisation includes a water licence, water allocation, a site use approval, a water resource works approval and a delivery capacity entitlement.

\(^{17}\) Part 1 includes s 124 and s 125, which defines the general rights in relation to water.
(3) Subject to this Act, a person must not undertake any of the following activities unless authorised to do so by a water management authorisation or permit granted by the relevant authority:

(a) drilling, plugging, backfilling or sealing of a well;
(b) repairing, replacing or altering the casing, lining or screen of a well;
(c) draining or discharging water directly or indirectly into a well;
(d) the erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts—
   (i) water flowing in a prescribed watercourse;
(e) an activity of a kind referred to in subsection (5) that is identified in an NRM plan that applies in the region in which the activity is to be undertaken as being an activity for which a permit is required under this subsection;
(f) an activity prescribed by the regulations made on the recommendation of the Minister.

(5) Subject to this Act, a person must not undertake any of the following activities contrary to an NRM plan applying in the region in which the activity is undertaken:

(a) the erection, construction, modification, enlargement or removal of a dam, wall or other structure that will collect or divert, or collects or diverts, water flowing in a watercourse that is not in the Mount Lofty Ranges Watershed and that is not prescribed or flowing over any other land that is not in a surface water prescribed area or in the Mount Lofty Ranges Watershed;
(b) the erection, construction or placement of any building or structure in a watercourse or lake or on the floodplain of a watercourse;
(d) depositing or placing an object or solid material in a watercourse or lake;
(e) obstructing a watercourse or lake in any other manner;
(f) depositing or placing an object or solid material on the floodplain of a watercourse or near the bank or shore of a lake to control flooding from the watercourse or lake;
(h) excavating or removing rock, sand or soil from—
   (i) a watercourse or lake or the floodplain of a watercourse; or
   (ii) an area near to the banks of a lake so as to damage, or create the likelihood of damage to, the banks of the lake;

(5a) Without limiting a preceding subsection, in the case of a prescribed watercourse, lake or well or a surface water prescribed area—

(a) a person must not construct, maintain or operate any works for the purposes of taking water or surface water (as the case may be) from the relevant water resource unless authorised to do so by a water resource works approval; and
(b) a person must not use water or surface water (as the case may be) taken from the relevant water resource unless authorised to do so by a site use approval; and
(c) if the relevant water allocation plan so requires – a person must not take water or surface water (as the case may be) unless authorised to do so by a delivery capacity entitlement.

4.2.2 Methods for Annual Determination of Permitted Take

The Basin Plan requires that a water resource plan must set out a method for determining the maximum quantity of water permitted to be taken during a water accounting period. The method must be able to incorporate and apply any SDL adjustments that arise during the life of a water resource plan as well as account for the disposal and acquisition of held environmental water.

South Australian Non-Prescribed Areas (SS10)

Annual determinations of take are not made for the South Australian Non-Prescribed Areas SDL resource unit.

Long term limits (where applicable) on the total volume of dams allowable in the SDL resource unit is outlined in Section 3.2.2.

Mallee (GS3)

Mallee (Pliocene Sands)

No annual determination of permitted take is made as there is no licensed or non-licensed take from the Pliocene Sands aquifer.

Mallee (Murray Group Limestone)

The annual determination of permitted take from the Murray Group Limestone aquifer is currently only made for licensed purposes under the Mallee and Noora WAPs and any s 128 authorisations. As described in Section 4.2.1, the annual permitted take is equal to the cumulative volume issued on licence, plus any s 128 authorisations. As such, the annual permitted take for licensed purposes does not vary according to climatic or other factors.

Mallee (Renmark Group)

No annual determination of permitted take is made as there is currently no licensed or non-licensed take from the Renmark Group aquifer.

Peake-Roby-Sherlock (GS5)

A determination of the annual permitted take from each of the Unconfined and Confined Aquifers within the Peake-Roby-Sherlock SDL resource unit is currently only made for licensed purposes under the Peake, Roby and Sherlock WAP plus and s 128 authorisations. As described in Section 4.2.1, the annual permitted take is equal to the cumulative volume issued on licence, plus any s 128 authorisations. As such, the annual permitted take for licensed purposes does not vary according to climatic or other factors.

SA Murray (GS6)

Annual determinations of take are not made for the SA Murray SDL resource unit. As outlined in Section 3.2.2, long term limits of take have also not been set for this SDL resource unit.
SA Murray Salt Interception Schemes (GS7)

A determination of the annual permitted take from the SA Murray Salt Interception Schemes is currently only made for those Salt Interception Schemes that are located within the Noora PWA and hence require a licence.

4.2.3 Rules for Take

Permits are required for water affecting activities outlined in s 127(3) of the NRM Act, and may be required for activities listed in s 127(5), as described in Section 4.2.1. The regional NRM plans set out the matters the NRM Boards will consider when exercising its powers to grant or refuse permits, as well as policies for control of water affecting activities.

A number of activities are excluded from requiring a permit under s 127(7) and s 129 of the NRM Act, including activities that are approved under other legislation such as the Environment Protection Act 1993 (SA) or the Development Act. These exclusions are in addition to any specific exclusions listed in the relevant NRM plans. Any water affecting activities that were granted before these provisions took effect do not require a permit.

The rules for take outlined below are in addition to any limits on take outlined in Section 3.2.2.

South Australian Non-Prescribed Areas (SS10)

As outlined in Section 3.2.2, the relevant NRM plans specify limits on the total volumes of dams in the SE NRM region and a portion of the SA MDB region. There are no limits on the total volumes of dams in the SAAL NRM region or for a portion of the area covered by the SA MDB region. In relation to the SE region, the policy area for which a limit has been set is larger than the relevant portion of the SDL resource unit. However, as the policy is both area and allotment limited, it may be possible to apply the runoff coefficient used to ascribe a single limit for the relevant area of the SE region within the South Australian Non-Prescribed Areas SDL resource unit (Jennifer Schilling, pers. comm., 30 October 2014).

Other specific rules that effect take are outlined below.

SA MDB region

The SA MDB NRM plan requires a permit for the water affecting activities that affect take from surface water as shown in Table 16.

In addition to the rules relating to sub-catchment limits outlined in Section 3.2.2 of this document, the SA MDB NRM plan contains the following additional provisions which specifically affect level of take:

- **Principle 29** - A dam must not be constructed or enlarged if that activity would cause the total volume of dam capacity on a property to exceed (or further exceed) the property dam capacity limit for that property. The property dam capacity limit is calculated as follows:
  - 0.3 x the area of the property (km²) x long term average rainfall between the months of May and November (mm) for the locality x 0.1 (10% run-off coefficient).

- **Principle 31** - A dam, wall or other structure that collects or diverts surface water flowing over land or water from a watercourse must include a device that ensures any water present at or below the threshold flow rate will:
  - Not be collected or diverted; or
- Be bypassed around the dam, wall or other structure, or otherwise returned to the same watercourse or surface water drainage path immediately downstream of the dam, wall or other structure as soon as reasonably practical and the water will be of an equivalent or better quality.

- **Principle 32** - For the purposes of the NRM Plan the threshold flow rate (in litres/second) is calculated by multiplying:
  
  o The unit threshold flow rate for the surface water sub catchment zone that the dam, wall or other structure lies within (in litres/second/km² outlined in table 11, column 8 of the NRM Plan), by the area of the catchment (km²) that contributes to the watercourse or drainage path, that is above the point where the water is diverted from the watercourse or drainage path.

- **Principles 41 and 49** - Structures, objects, solid materials or other obstructions that impede the flow of water must be designed to bypass or otherwise return water present at or below the threshold flow rate.

- **Principle 55** - Alteration to the alignment of a watercourse, or destruction of vegetation within a watercourse, lake or floodplain shall only occur where it is for the protection of existing infrastructure or rehabilitation of a watercourse, lake or floodplain, and the activity does not result in alteration of the natural flow regime of a watercourse (amongst other things).
### Table 16  Permits Required and Exclusions for Water Affecting Activities in the SA MDB NRM Region – Surface Water (from SA MDB NRM Plan 2014)

<table>
<thead>
<tr>
<th>Water Affecting Activity</th>
<th>General Exclusions</th>
<th>Specific Exclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRM Act - s 127(5)(a)</td>
<td>The erection, construction, modification, enlargement or removal of a dam, wall or other structure that (i) does or will collect or divert water flowing in a watercourse that is not in the Mount Lofty Ranges Watershed and that is not prescribed, or flowing over other land that is not a surface water prescribed area or in the Mount Lofty Ranges Watershed.</td>
<td>None – all applications assessed on merit</td>
</tr>
<tr>
<td>NRM Act - s 127(5)(b)</td>
<td>The erection, construction or placement of any building or structure in a watercourse or lake, or on the floodplain of a watercourse.</td>
<td>Activity where the proponent has written authorisation to carry out the activity in accordance with Board endorsed Best Practice Operating Procedures addressing the activity.</td>
</tr>
<tr>
<td>NRM Act - s 127(5)(d)</td>
<td>Depositing or placing an object or solid material in a watercourse or lake</td>
<td>Activity that is undertaken has a Board endorsed Current Recommended Practice addressing the activity and notification has been received by the Board prior to commencement.</td>
</tr>
<tr>
<td>NRM Act - s 127(5)(e)</td>
<td>Obstructing a watercourse or lake in any other manner</td>
<td>Activity that is undertaken as part of the Board endorsed work plan that specifies that there is an exclusion from requiring a water affecting activity permit for that activity.</td>
</tr>
<tr>
<td>NRM Act - s 127(5)(f)</td>
<td>Depositing or placing an object or solid material on the floodplain of, a watercourse, or near the bank or shore of a lake, to control flooding from the watercourse or lake</td>
<td>Desilting of a dam, providing it is carried out consistently with principle 38(^\text{18}) of the NRM plan, and does not involve a water affecting activity pursuant to s 127(5)(d) of the NRM Act.</td>
</tr>
<tr>
<td>NRM Act - s 127(5)(h)</td>
<td>Excavating or removing rock, sand or soil from a watercourse or lake or the floodplain of a watercourse; or an area near the banks of a lake, so as to damage, or create the likelihood of damage to, the banks of the lake.</td>
<td></td>
</tr>
</tbody>
</table>

\(^{18}\) Written as Principle 39 in the current SA MDB NRM Plan but will be corrected (Scott Mitchell, pers. comm., 29 October 2014).
The SE NRM Plan requires a permit for the water affecting activities that affect take from surface water as shown in Table 17.

### Table 17 Permits Required and Exemptions for Water Affecting Activities in the SE NRM Region – Surface Water (from SE NRM Plan)

<table>
<thead>
<tr>
<th>Water affecting activity</th>
<th>Exemptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRM Act - s 127(5)(a)</td>
<td>Any activity in relation to which the Board has provided financial or any other form of assistance pursuant to section 42 of the NRM Act.</td>
</tr>
<tr>
<td>The erection, construction, or enlargement of a dam, wall or other structure that will collect or divert water flowing in a watercourse that is not in the Mount Lofty Ranges watershed and that is not prescribed, or flowing over any other land that is not in a surface water prescribed area or in the Mount Lofty Ranges watershed</td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(b)</td>
<td>In accordance with Best Practice Operating Procedures. An activity in relation to which the Board has provided financial or any other form of assistance pursuant to section 42 of the NRM Act.</td>
</tr>
<tr>
<td>The erection, construction or placement of any building or other structure in a watercourse or lake or on the floodplain of a watercourse</td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(d)</td>
<td>In accordance with Best Practice Operating Procedures. An activity in relation to which the Board has provided financial or any other form of assistance pursuant to section 42 of the NRM Act.</td>
</tr>
<tr>
<td>Depositing or placing an object or solid material in watercourse or lake</td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(e)</td>
<td>In accordance with Best Practice Operating Procedures. An activity in relation to which the Board has provided financial or any other form of assistance pursuant to section 42 of the NRM Act.</td>
</tr>
<tr>
<td>Obstructing a watercourse or lake in any other manner</td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(f)</td>
<td>In accordance with Best Practice Operating Procedures.</td>
</tr>
<tr>
<td>Depositing or placing an object or solid material on the floodplain of a watercourse or near the bank or shore of a lake to control flooding from the watercourse or lake</td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(h)</td>
<td>Clay pits unless subject to another provision in the NRM plan. An activity in relation to which the Board has provided financial or any other form of assistance pursuant to section 42 of the NRM Act.</td>
</tr>
<tr>
<td>Excavating or removing rock, sand or soil from a watercourse or lake or the floodplain of a watercourse; or an area near the banks of a lake so as to damage, or create the likelihood of damage to, the banks of the lake</td>
<td></td>
</tr>
</tbody>
</table>
In addition to the rules relating to surface water policy area limits outlined in Section 3.2.2 of this document, the SE NRM plan contains the following additional provisions which specifically affect level of take:

- **Principle 4.4.4.4 (1)** - any on-stream dam must be sited or constructed to enable low flows to by-pass the dam;
- **Principle 4.4.4.4 (2)** - any overflow from a dam or flows that by-pass a dam must not be recaptured or diverted; and
- **Principle 4.4.4.4 (4)** - structures designed to capture and water to fill an of stream dam must be designed, installed and operated to facilitate the capture of water to commence when 75% of the median annual flow record is reached at the specified gauging station. In relation to Regional Zone f, 75% of the median annual flow is 10,875 ML.
- **Principle 4.4.7 (3)** - Objects or solid materials that impede the flow of water may be required to be designed and installed to provide for a low flow by-pass mechanism.
- **Principle 4.4.9 (1)** – Alteration to the alignment of a watercourse may only occur where it is for the protection of existing development and infrastructure, the rehabilitation of a watercourse, or for wetland management purposes, and the realignment / alteration does not result in alteration to the natural flow regime of a watercourse (amongst other things).

**SAAL region**

The SAAL NRM Plan (SAAL NRMB 2010) requires a permit for the water affecting activities that affect take from surface water as shown in Table 18.

Permits for any of the types of activities listed in Table 18 are not required where the NRM Board has endorsed a relevant Best Practice Operating Procedure, the person proposing to undertake the activity has obtained written approval from the Board to undertake the activity or activities in accordance with the Procedures and the activity is undertaken in accordance with these Procedures. Additionally, activities that are funded by the SAAL Board do not require a permit (Melissa Horgan, pers. comm., 15 October 2014).

The SAAL NRM Plan (SAAL NRMB 2010) also contains a provision (4.6(2)) that states that dams must allow low flow bypass, whether constructed on or off-stream.
<table>
<thead>
<tr>
<th>Water Affecting Activity</th>
<th>Location in Region</th>
<th>Permit Required If:</th>
<th>Exclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRM Act - s 127(5)(a)</td>
<td>Everywhere</td>
<td>Dam capacity exceeds 10 ML</td>
<td>None</td>
</tr>
<tr>
<td>The erection, construction or enlargement of a dam, wall or other structure that will collect or divert, or collects and diverts, water flowing in a watercourse that is not prescribed or flowing over any other land that is not in a surface water prescribed area.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(b)</td>
<td>a) In a watercourse</td>
<td>a) Activity prevents the passage of low flow</td>
<td>Levees of channels will not require a permit if water is to be diverted directly from rock faces and there is no significant downstream catchment, water use or users that would otherwise be affected by the diversion.</td>
</tr>
<tr>
<td>The erection, construction or placement of any buildings or structures.</td>
<td>b) In a lake</td>
<td>b) In all situations except for a floodplain of a watercourse (see (c) below)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) In the floodplain of a watercourse</td>
<td>c) Activity could lead to diversion of greater than 10 megalitres during one flow event</td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(d)</td>
<td>On the floodplain of a watercourse or near the bank or shore of a lake</td>
<td>If it will divert greater than 10 ML of water from its natural course during one flow event. This includes construction of roads or tracks or levee banks</td>
<td>None</td>
</tr>
<tr>
<td>Depositing an object or solid material to control flooding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRM Act - s 127(5)(h)</td>
<td>a) From the floodplain of a watercourse</td>
<td>a) if it diverts or impedes greater than 10 ML of water from its natural course in one flow event</td>
<td>None</td>
</tr>
<tr>
<td>Excavating or removing rock sand or soil</td>
<td>b) From a watercourse or lake</td>
<td>b) if the volume excavated significantly alters the geomorphology of the area from which the material is taken</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) From a waterhole or rock hole</td>
<td>c) all situations except for cleaning of rock holes in accordance with Aboriginal practice</td>
<td></td>
</tr>
</tbody>
</table>
Mallee (GS3)

The Mallee WAP (SA MDB NRMB 2012) restricts allocations for licensed purposes to the Murray-Group Limestone aquifer only\(^{19}\). For licensed purposes:

- There are no allocation rules that are applied each year as the entitlement volume held on licence is equal to the annual allocation (refer Section 4.2.1). This is the main control on take.

- Licensed water users may only take water in accordance with the conditions on the licence issued to them by the Minister under s 146 of the NRM Act. Failure to comply (refer Section 4.2.1) may result in penalties under s 115, or cancellation or suspension of the licence under s 164P.

The current Noora WAP (RMCWMB 2001) requires revision to ensure it is consistent with the Border Groundwater Agreement (refer Section 3.3.3). Under both the Border Groundwater Agreement and the Basin Plan, no licensed take is permitted within the Noora PWA.

Non-licensed take may occur from any of the Pliocene Sands, Murray Group Limestone or Renmark Group aquifers. For non-licensed purposes:

- There are no limits and few controls on non-licensed take under State management arrangements.

- The NRM Act and SA MDB NRM plan require permits water affecting activities (refer Section 4.2.1). Those that are likely to affect take from groundwater in this SDL resource unit:
  - Drilling, plugging, backfilling or sealing of a well [s 127(3)(a) of the NRM Act]; and
  - Repairing, replacing or altering the casing, lining or screen of a well [s 127(3)(b) of the NRM Act].

- The Mallee WAP has an additional requirement with respect to replacement wells under principle 51 (Section 7.1.3 of the WAP) as follows:
  51. If a well for a licensed or unlicensed purpose requires replacement, then a replace well may be drilled provided that:
  
  51.1 the original well is backfilled in accordance with a permit issued pursuant to section 127(3)(a) of the Act.

Peake-Roby-Sherlock (GS5)

The rules for take from the Unconfined and Confined aquifers are the same under the Peake, Roby and Sherlock WAP (SA MDB NRMB 2010a):

- There are no allocation rules that are applied each year as the entitlement volume held on licence is equal to the annual allocation (refer Section 4.2.1). This is the main control on take.

- Licensed water users may only take water in accordance with the conditions on the licence issued to them by the Minister under s 146 of the NRM Act. Failure to comply (refer Section 4.2.1) may result in penalties under s 115, or cancellation or suspension of the licence under s 164P.

\(^{19}\) With one exception where allocations can be made from the Renmark Group for public water supply so long as there is no net increase in allocation. No allocations have been made to date from the Renmark Group.
For non-licensed purposes:

- There are no limits and few controls on non-licensed take under State management arrangements.
- The NRM Act and SA MDB NRM plan require permits for water affecting activities (refer Section 4.2.1). Those that are likely to affect take from groundwater in this SDL resource unit:
  - Drilling, plugging, backfilling or sealing of a well [s 127(3)(a) of the NRM Act]; and
  - Repairing, replacing or altering the casing, lining or screen of a well [s 127(3)(b) of the NRM Act].

SA Murray (GS6)

The regional NRM plans require a permit for certain water affecting activities, including:

- Drilling, plugging, backfilling or sealing of a well; and
- Repairing, replacing or altering the casing, lining or screen of a well.

As outlined in Section 3.2.2, no limits of take have been specified in the relevant NRM plans for the water resources of this SDL resource unit.

There are no other rules which specifically affect level of take in this SDL resource unit in any of the NRM plans.

SA Murray Salt Interception Schemes (GS7)

There are no limits on take specified under the SA MDB NRM plan for the water resources of this SDL resource unit that are not prescribed (refer Section 3.2.2).

Within the Noora PWA, take by a Salt Interception Scheme is a licensed use and the following applies:

- There are no allocation rules that are applied each year as the entitlement volume held on licence is equal to the annual allocation (refer Section 4.2.1). This is the main control on take.
- Licensed water users may only take water in accordance with the conditions on the licence issued to them by the Minister under s 146 of the NRM Act. Failure to comply (refer Section 4.2.1) may result in cancellation or suspension of the licence under s 164P.

For non-licensed purposes:

- There are no limits and few controls on non-licensed take under State management arrangements.
- The NRM Act and SA MDB NRM plan require permits for water affecting activities (refer Section 4.2.1). Those that are likely to affect take from groundwater in this SDL resource unit:
  - Drilling, plugging, backfilling or sealing of a well [s 127(3)(a) of the NRM Act]; and
  - Repairing, replacing or altering the casing, lining or screen of a well [s 127(3)(b) of the NRM Act].

4.2.4 Management of extreme events

The information available indicates that water supplies for critical human water needs purposes within the SA Murray WRP area are principally supplied by SA Water and local councils. Some may possibly be supplied by a limited number of other small water industry entities, as defined by the Water Industry Act 2012 (SA) (Water Industry Act), with the remainder via private or community maintained dams, bores and rainwater tanks.
A list of country drinking water supply systems and towns supplied by SA Water can be accessed in the most recent SA Water Drinking Water Quality Report.

Under the Water Industry Act, a water industry entity that is providing a retail service for provision of water (for example, SA Water and local councils) must hold a licence. They must also comply with any applicable water retail codes that have been prepared by the Essential Services Commission of South Australia. Both the Water Retail Code – Major Retailers (applies to SA Water) and Water Retail Code – Minor and Intermediate Retailers (applies to all other water industry entities) state that retailers must use their best endeavors to provide a reliable supply of retail services to customers, in line with any applicable service standards. SA Water is also regulated by the Water Service Standards Schedule – Major Retailers, which requires them to restore water services within prescribed timeframes depending upon the criticality of the effected supply.

Section 38(1)(b) of the Water Industry Act also provides that the Essential Services Commission can take over some or all of the operations of water industry entity under certain circumstances to ensure adequate supply of water to its customers.

Where there are no retail services in place, there is little regulation and does not appear to be a State policy position or process, or a specific agency accountable for assessing and providing water supplies to remote communities in emergency situations.

Under the NRM Act, section 132 provides the option to restrict or prohibit use in situations of inadequate supply. Restricting or prohibiting certain types of demand can ensure critical human water needs continue to be met.

Water for Good includes a proposal for developing a longer term strategy for water supplies in remote communities. There is also a proposal to develop a strategy and criteria for Government involvement in short term emergency water supply situations. While development of these strategies is yet to commence, the Goyder Institute for Water Research is currently undertaking a project which considers governance and policy options for supplying remote community water supplies. This work is due to be completed by the end of March 2015.

**Recommendation 13**

Noting the management arrangements currently in place, the development of the water resource plan will need to consider whether these are adequate for managing extreme events in relation to water supplies for remote communities and Government involvement in short term emergency water supply situations.
4.3 Alignment between State Arrangements and Basin Plan Requirements – with Recommendations

4.3.1 South Australian Non-Prescribed Areas (SS10)

Annual determination of water permitted to be taken

For the SA Non-Prescribed Areas, the relevant NRM plans do not set out a methods for determining the maximum quantity of water that is permitted to be taken for consumptive use during a water accounting period.

As outlined in Section 3.3.2, further work will be required to set and implement a single, overarching limit of take that is consistent with the SDL for the resource unit. It is expected that once this overarching limit of take and appropriate rules to demonstrate how the limit would be enforced are applied, the MDBA would accept that this limit applies on an annual basis and as such constitutes a simple method for determining annual permitted take.

Given that the resources in this SDL resource unit are not prescribed and no licensing arrangements are in place, SDL adjustments and the disposal and acquisition of environmental water do not apply. It is therefore not considered practical for the relevant NRM plans to include provisions for their accounting.

The method is required to consider water resources that have a significant hydrological connection. The risk assessment for the SA Murray Region (DEWNR 2015) indicates that there are no significant connections with resources in other SDL resource units that would influence the water available to be taken and hence be required to be accounted for in terms of annual permitted take.

Rules for take, including water allocation rules

The Basin Plan requires a water resource plan to set out rules to ensure water use remains within the annual permitted take of the SDL resource unit. Given that limits of take and associated enforcement rules do not currently apply to this SDL resource unit, the existing rules are not considered sufficient to demonstrate that water use will remain within the SDL and annual permitted take.

Further work will be required to develop rules for take. This should be done in conjunction with work recommended in Section 3.3.2 to develop options for applying a single limit of take to the SDL resource unit.

Recommendation 14

It is recommended that:

- As part of the paper to be developed for applying a single limit of take recommended in Section 3.3.2, the Murray-Darling Basin Policy and Strategy team work with the relevant NRM regions to develop rules for enforcing a single limit of take;
- The relevant NRM regions implement the preferred option for rules for take via their NRM plans;
- The Department negotiate with the MDBA to accept the single limit of take and associated rules for take for the SDL resource unit as the method for determining the annual permitted take; and
- The Department advise the MDBA that as the water resources in the SDL resource unit are not prescribed and no licensing arrangements are in place, SDL adjustments and the disposal and acquisition of environmental water do not apply and therefore the relevant NRM plans do not require provisions for their accounting.
4.3.2 Mallee (GS3)

Mallee (Pliocene Sands)

Annual determination of water permitted to be taken

Under current State management arrangements, the Mallee and Noora WAPs set out methods that essentially define the annual permitted take for licensed use only. As such, a method is needed to determine the annual permitted take for all consumptive use.

The Mallee Pliocene Sands Aquifer was included within the Unassigned Groundwater category (refer Section 3.1.3) as there is currently no licensed or non-licensed use. This is primarily due to low yield and poor water quality (refer Section 3.2.2). As such, future demand is also unlikely (refer Section 3.2.4).

The Border Groundwater Agreement does not permit take for licensed purposes from this aquifer (within the Mallee SDL resource unit), which would also include any take under an NRM Act s 128 authorisation. Note that the Noora WAP requires updating for consistency with the Border Groundwater Agreement (refer Section 3.3.3).

There is no limit on stock and domestic use. If any future stock and domestic use did occur, it would be unlikely to vary significantly between years.

Given the above, the annual permitted take could be specified in the form of a single limit. This would also be consistent with MDBA (2013), which states that for most groundwater resources, it is likely to be sufficient to specify that the limit for take in the SDL resource unit is the one that is specified in the Basin Plan, or one that is lower if desired (refer Section 4.2.3).

The matters listed in s 10.12 are required be accounted for under s 10.10(3) when determining the annual permitted take under s 10.10(1). These are considered explicitly as follows:

- s 10.12(1)(a) – Forms of take – The forms of take that must be accounted for are:
  - Take via licensed purposes;
  - Take by basic rights (stock and domestic); and
  - Take for authorised uses under s 128 of the NRM Act.

None of the above forms of take currently occur and take via licensed purposes and other authorised uses are not permitted under the Border Groundwater Agreement. Should any take by basic rights (stock and domestic) occur in the future, then this would be accounted for under the specified single limit.

- s 10.12(1)(b) – Carryover allocations – The Mallee and Noora WAPs do not provide for allocations made in one water year to be used in another water year (no roll over or carryover). Carryover allocations are not applicable for unlicensed take.

- s 10.12(1)(c) – Return flows – Not applicable. Applies to surface water SDL resource units only.

- s 10.12(1)(d) – Trade – There is no licensed use, nor Held Environmental Water that must be accounted for in accordance with s 10.12(3). Trade is not applicable for unlicensed take.

- s 10.12(1)(e) – Hydrological connection – There is no licensed or non-licensed use. Given the small potential volumes, take for stock and domestic purposes is unlikely to affect take in neighboring areas. Conversely, the taking of water from the same aquifer in other SDL resource units is unlikely to affect take
from the Pliocene Sands Aquifer in the Mallee SDL resource unit (Steve Barnett pers. comm., 17 September 2014). This is supported by the risk assessment for the SA Murray Region (DEWNR 2015).

- **s 10.12(1)(f)** – Change in way water held or taken – The proposed single limit on take would not change if there was a change in the way water was held or taken. Instead, any changes would need to consider the limit.
- **s 10.12(1)(g)** – Change in utilisation – There is no licensed or non-licensed use. The effect of any future utilisation for non-licensed purposes is addressed with respect to the rules for take below.
- **s 10.12(1)(h)** – Great Artesian Basin – No water is sourced from the Great Artesian Basin.
- **s 10.12(1)(i)** – Aquifer recharge – There is currently no managed aquifer recharge. Aquifer recharge requires a permit under the NRM Act and would be identified through the permit system. Given the nature of the water resources across the SDL resource unit, aquifer recharge is highly unlikely.

Based on the above:

- No additional matters must be accounted for in determining the annual permitted take;
- No additional provisions should be required in the relevant WAPs or NRM Plans to account for the matters under s 10.12; and
- Applying a single limit for the annual permitted take should be acceptable.

Two options for setting the value for the single limit for annual permitted take are as follows:

1. **Set the annual permitted take equal to the SDL of 41.4 GL per year.** This would be consistent with the approach to be used in other groundwater SDL resource units and as suggested in MDBA (2013). It would also allow any non-licensed take to occur without having to adjust the limit in the future.

2. **Set the annual permitted take as 0 GL.** This would be reflective of the current level of development and would be consistent with current State management arrangements.

For flexibility for any future non-licensed development and consistency with the setting of the annual permitted take in other groundwater SDL resource units, it is recommended that Option 1 be selected.

Section 10.10(4) requires that the WRP demonstrate that if the method for determining the annual permitted take was applied over a repeat of the historical climate that the SDL would be met, including as a result of any amendments under s 23B of the Water Act. With the SDL being applied as a maximum limit on the quantity of water permitted to be taken in conjunction with the rule for take below, actual take should always be below this level. Section 89(2)(c) of the NRM Act allows plans to be reviewed without formal procedures to include great consistency with the provisions of the Basin Plan (refer Appendix 11.5). This provision in the NRM Act should be able to be used in relation to the Mallee and Noora WAPs to incorporate and apply any adjustments to the SDL that may arise during the life of the WRP.

**Rules for take, including water allocation rules**

The rules for take required under s 10.11 of the Basin Plan are to ensure that the water actually taken will not exceed the annual permitted take. They should provide sufficient confidence that as long as water users operate within the rules, the annual permitted take will not be exceeded (refer Section 4.1.2).
Given the level of current development and use, limits on take and potential demand for non-licensed purposes:

- No rules are required to manage licensed take.
- While there are no controls on non-licensed take, a permit is required for any new bores such that any future development could be tracked via this process (refer Section 4.4.2).

The existing arrangements should be sufficient to demonstrate that overall take would remain within the SDL.

**Recommendation 15**

It is recommended that:

- The annual permitted take for the Mallee Pliocene Sands SDL resource unit is specified as a single value limit that is equal to the SDL. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements;
- No additional allocation rules or rules for take are required for licensed purposes as there is currently no licensed take and none is permitted under current State management arrangements;
- No rules for take are required for stock and domestic purposes as there is currently no take and future demand is unlikely. Permits under the NRM Act should be used to track any new development. Additionally, given the SDL is equal to 41.4 GL, it is very unlikely that this form of take would ever reach the SDL; and
- The above be put forward to the MDBA during fit for purpose negotiations.

**Mallee (Murray Group Limestone)**

*Annual determination of water permitted to be taken*

Under current State management arrangements, the Mallee and Noora WAPs set out methods that essentially define the annual permitted take for licensed use only. As such, a method is needed that determines the annual permitted take for all consumptive use.

The Mallee Murray Group Limestone Aquifer was included as within the non-renewable groundwater category (refer Section 3.1.3) and as such is not dependent on year to year changes in climate. The limits on take for licensed purposes within the Mallee and Noora WAPs were defined as a maximum level of annual take, which does not change over the life of the individual WAPs. These limits were combined with an annual estimate for stock and domestic purposes to determine the SDL for this resource unit. The nature of stock and domestic use means that it does not generally vary significantly between years.

Given the above, the annual permitted take could be specified in the form of a single limit that is equal to the SDL (as updated per recommendation in Section 3.3.3). This would also be consistent with MDBA (2013), which states that for groundwater the SDL may be used as the limit on take (refer Section 4.2.3).

The matters listed in s 10.12 are required be accounted for under s 10.10(3) when determining the annual permitted take under s 10.10(1). These are considered explicitly as follows:

- s 10.12(1)(a) – Forms of take – The forms of take that must be accounted for are:
  - Take via licensed purposes;
  - Take by basic rights (stock and domestic); and
Take for authorised uses under s 128 of the NRM Act.

Take via licensed and basic rights are accounted for in an annual permitted take in the form of a single limit equal to the SDL. Provisions to adjust the annual permitted take by s 128 authorised use are not required in the relevant WAPs or NRM Plan. Rather, any future authorisations under s 128 would need be made with consideration of the SDL to ensure compliance.

- s 10.12(1)(b) – Carryover allocations – The Mallee and Noora WAPs do not provide for allocations made in one water year to be used in another water year (no roll over or carryover). Should the ability to carryover allocations from one year to the next be permitted as part of a revised Mallee WAP put forward as part of the SA Murray Region WRP accreditation, then annual adjustments would need to be applied to the annual permitted take. Carryover allocations would not be applicable within the Noora PWA as there is no licensed take permitted. Carryover allocations are not applicable for unlicensed take.

- s 10.12(1)(c) – Return flows – Not applicable. Applies to surface water SDL resource units only.

- s 10.12(1)(d) – Trade – Any trade in or out of an SDL resource unit would normally increase or decrease the annual permitted take by an equivalent amount. Any trade (temporary or permanent) of licensed entitlements can only occur within this SDL resource unit under the Mallee and Noora WAPs. There is no Held Environmental Water that must be accounted for in accordance with s 10.12(3). Trade is not applicable for unlicensed take.

- s 10.12(1)(e) – Hydrological connection – Determination of the limits on take within the Mallee and Noora WAPs have already considered any significant hydrological connection to other areas (refer Section 8.2.2). No further consideration should be required, which is supported by the risk assessment for the SA Murray Region (DEWNR 2015).

- s 10.12(1)(f) – Change in way water held or taken – The proposed single limit on take would not change if there was a change in the way water was held or taken. Instead, any changes would need to consider the limit.

- s 10.12(1)(g) – Change in utilisation – The single limit proposed for the annual permitted take assumes full utilisation of both licensed and non-licensed take. Any increase from the level of current utilisation of licensed entitlements does not affect this limit and there are no lower security products that would be affected by any change. The effect of any increase in utilisation of non-licensed take on compliance is addressed with respect to the rules for take below.

- s 10.12(1)(h) – Great Artesian Basin – No water is sourced from the Great Artesian Basin.

- s 10.12(1)(i) – Aquifer recharge – There is currently no managed aquifer recharge. Aquifer recharge requires a permit under the NRM Act and would be identified through the permit system. Given the nature of the water resources across the SDL resource unit, aquifer recharge is highly unlikely.

Based on the above:

- No additional matters must be accounted for in determining the annual permitted take at this time.

- No additional provisions should be required in the relevant WAPs or NRM Plans to account for the matters under s 10.12, unless changes (principally to the carryover of allocations) are made to the current arrangements in the respective WAPs.

- Applying the SDL as a single limit for the annual permitted take should be acceptable.
• Should the ability to carryover allocations be permitted in the future, then the annual permitted take would need to be adjusted each year to account for this.

• This adjustment could be a simple equation that is incorporated into a revised WAP as follows:

\[
\text{Annual permitted take (yr } t) = \text{SDL} - (\text{volume carried over to yr } t+1) + (\text{volume carried over from yr } t-1)
\]

Section 10.12(1) requires that the annual permitted take be determined for each form of take. MDBA (2013) states that the method may be composed of various independent parts in relation to the management of different forms of take. The main issue is to avoid double accounting. As the SDL has been determined based on the limit on licensed take and an estimate of non-licensed take, there is no double accounting of either form of take. As such, it is not considered necessary to separate the single limit into sub-limits.

The setting of any sub-limits would subsequently require active management in terms of accounting for take and compliance. This would present an issue with respect to non-licensed stock and domestic take as it is not actively managed, monitored or accounted for. It is also not likely to be cost effective to do so. While this issue can be avoided in terms of setting the annual permitted take, the lack of active management presents a separate issue with respect to rules for take and is considered further below.

Section 10.10(4) requires that the WRP demonstrate that if the method for determining the annual permitted take was applied over a repeat of the historical climate that the SDL would be met, including as a result of any amendments under s 23B of the Water Act. With the SDL being applied as a maximum limit on the quantity of water permitted to be taken in conjunction with the rule for take below, actual take should always be below this level. Section 89(2)(c) of the NRM Act allows plans to be reviewed without formal procedures to include great consistency with the provisions of the Basin Plan (refer Appendix 11.5). This provision in the NRM Act should be able to be used in relation to the Mallee and Noora WAPs to incorporate and apply any adjustments to the SDL that may arise during the life of the WRP.

Rules for take, including water allocation rules

The rules for take required under s 10.11 of the Basin Plan are to ensure that the water actually taken will not exceed the annual permitted take. They should provide sufficient confidence that as long as water users operate within the rules, the annual permitted take will not be exceeded (refer Section 4.1.2).

For licensed purposes:

• The volume held on licence is equal to the annual limit on take for licensed purposes (refer Section 4.2.2) and water can only be taken in accordance with the conditions on that licence (refer Section 4.2.3).

• There is no held environmental water for which adjustments due to any disposal or acquisition would be required.

• The volume allocated is lower than the SDL (refer Section 3.2.2) and current use is consistently much lower (refer Section 3.2.3). Any increase in actual utilisation of water allocations would not affect compliance with the SDL when considering the licensed component in isolation.

• As such, no additional allocation rules or rules for take are required for licensed purposes.

For stock and domestic (non-licensed) purposes:

• The component of the SDL that reflects stock and domestic use is based on an estimate of use at 30 June 2009 and does not allow for growth.
No limits and few controls on take for non-licensed purposes means that any increase above that estimate may put pressure on compliance with the SDL should the take for licensed purposes reach full utilisation.

The limiting factors for stock and domestic development identified in Section 4.2.3 suggest that it is unlikely that overall use would increase significantly.

The existing arrangements may not be considered sufficient to demonstrate that overall take would remain within the SDL. Therefore, options for managing this form of take in the absence of any limits or rules for take need to be considered and confirmed by the MDBA as being fit for purpose.

Rule for take will also be needed for Peake-Roby-Sherlock (Confined and Unconfined) SDL resource unit under similar circumstances to those within the Mallee Murray Group Limestone SDL resource unit. As such, the following describes options that could be used in both areas:

1. **License and monitor all take, including for stock and domestic purposes** – This would provide a method to control and monitor all take. It would allow rules to be put in place to manage and/or restrict stock and domestic use or put other controls on licensed use, if and when use approached the SDL. It would also fulfill all monitoring requirements under s 10.15 of the Basin Plan (refer Section 5.1.1). It would likely require legislative changes to the NRM Act and/or associated Regulations. As stock and domestic use is relatively small, it is unlikely to be cost effective to license or monitor.

2. **Undertake a comprehensive survey and assessment of stock and domestic use, then use water affecting activity permits to monitor any changes in development as a surrogate for use** –
   a) There is some uncertainty around the current calculation of stock and domestic use used for determining the SDL (Steve Barnett pers. comm., 21 August 2014). Consideration could be given to a comprehensive survey and assessment to update the location and volume of current use. This could include the calculation and/or confirmation of an average annual volume for current stock and domestic use that could be applied to estimate annual take for these purposes (links to recommendation in Section 5.3.2).
   b) The requirements for permits (particularly around exemptions) are likely to need revisiting in order to manage take within the non-prescribed SDL resource units. An improved management system and process for storing all permit information is suggested for this purpose (refer to recommendation in Section 4.4.2). If this occurs, then processes could also be put in place to track all permits, including those for stock and domestic purposes. This would indicate any potential increase or decrease in active bores (for example, including a requirement to report bores that are backfilled and no longer used).

3. **Reserve a portion of the unallocated water to cover any potential increase in non-licensed take** – given the limiting factors for stock and domestic development identified in Section 4.2.3, it is unlikely that use would increase significantly. A volume of unallocated water could be reserved under s 166 of the NRM Act to cover any future development.

4. **Monitor use for licensed purposes and if this reaches a pre-determined value, implement a procedure to re-evaluate and more actively manage and/or monitor stock and domestic use to ensure actual take does not exceed the annual permitted take** – as above, the limiting factors for stock and domestic development will like restrict any significant increases in use. Given this, it may be acceptable to simply monitor licensed use and once this reaches a pre-determined value (for example, 5 or 10% of the licensed use component
of the SDL), put in place a plan to reevaluate stock and domestic use and potentially more actively manage this form of take. The actual percentage should be based on the magnitude of the limits on licensed take and the estimate of non-licensed take. For example, for larger volumes of licensed take a smaller percentage could be used, particularly if the stock and domestic estimate is relatively small.

Options 2 to 4 are likely to be the most cost effective options, with Option 4 a preferred fit for purpose option given the small estimates of stock and domestic take. While Option 2 would cost more, an improvement of the existing system to manage permits is suggested in Section 4.4.2 could facilitate the collection of permit information to allow for any future assessment.

Recommendation 16

It is recommended that:

- The annual permitted take for the Mallee Murray Group Limestone SDL resource unit is specified as a single value limit that is equal to the SDL [updated from the Basin Plan value as per recommendation in Section 3.3.3]. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements. If the carryover of allocations from one year to the next is permitted in a revised Mallee WAP, then an adjustment to the annual permitted take will be applied in the form of a simple adjustment;
- The annual permitted take is not split into sub-limits that represent licensed and non-licensed use;
- No additional allocation rules or rules for take are required for licensed purposes as existing controls are sufficient;
- The preferred option for managing stock and domestic take in the absence of rules for take is to monitor use for licensed purposes and if this reaches a pre-determined value, implement a procedure to re-evaluate and more actively manage and/or monitor stock and domestic use to ensure actual take does not exceed the annual permitted take. Given the 61.3 GL limit on licensed take for this SDL resource unit, the pre-determined value is suggested to be 95% of this value, which is 58.24 GL20;
- The above be put forward to the MDBA during fit for purpose negotiations; and
- Following the fit for purpose negotiations, a paper be developed to document the process to be undertaken to manage and/or monitor stock and domestic take given the absence of rules for take.

20 Applying a value of 58.24 GL leaves a buffer of 3.06 GL, which is much greater than the current estimated use of 2.278 GL for stock and domestic purposes.
Mallee (Renmark Group)

Annual determination of water permitted to be taken

Under current State management arrangements, the Mallee and Noora WAPs set out methods that essentially define the annual permitted take for licensed use only. As such, a method is needed to determine the annual permitted take for all consumptive use.

The Mallee Renmark Aquifer was included within the Deep Groundwater category (refer Section 3.1.3) as it is deeper than the resources currently accessed for productive use and stock and domestic needs. There is currently no licensed or non-licensed use. This is primarily due to high drilling costs and the uncertainty of obtaining large supplies. As such, future demand is unlikely (refer Section 3.2.4).

The Border Groundwater Agreement permits a total take of 0.89 GL per year from the Renmark Group Aquifer within the 9A and 10A Border Management Zones in the Mallee PWA (refer Section 3.2.2). Despite this, the Mallee WAP (SA MDB NRMB 2012) does not permit take from this aquifer for licensed purposes except for public water supply by SA Water, so long as there is no net increase in overall take (refer Section 3.2.2). SA Water currently hold 0.402 GL across three management zones, including 0.203 GL in the 10A Border Zone.

There is no limit on stock and domestic use. If any future stock and domestic use did occur, it would be unlikely to vary significantly between years.

Given the above, the annual permitted take could be specified in the form of a single limit. This would also be consistent with MDBA (2013), which states that for most groundwater resources, it is likely to be sufficient to specify that the limit for take in the SDL resource unit is the one that is specified in the Basin Plan, or one that is lower if desired (refer Section 4.2.3).

The matters listed in s 10.12 are required be accounted for under s 10.10(3) when determining the annual permitted take under s 10.10(1). These are considered explicitly as follows:

- s 10.12(1)(a) – Forms of take – The forms of take that must be accounted for are:
  - Take via licensed purposes;
  - Take by basic rights (stock and domestic); and
  - Take for authorised uses under s 128 of the NRM Act.

  None of the above forms of take currently occur. A volume of only 0.89 GL per year is permitted for take via licensed purposes or other authorised uses under the Border Groundwater Agreement. Should this or any other take by basic rights (stock and domestic) occur in the future, it would be accounted for under the specified single limit.

- s 10.12(1)(b) – Carryover allocations – The Mallee and Noora WAPs do not provide for allocations made in one water year to be used in another water year (no roll over or carryover). Carryover allocations are not applicable for unlicensed take.

- s 10.12(1)(c) – Return flows – Not applicable. Applies to surface water SDL resource units only.

- s 10.12(1)(d) – Trade – There is no licensed use nor Held Environmental Water that would facilitate trade. For any future licensed take for water supply purposes by SA Water, trade should only be permitted within the SDL resource unit as is the case for licensed use from the Murray Group Limestone. Trade is not applicable for unlicensed take.
• s 10.12(1)(e) – Hydrological connection – There is no licensed or non-licensed use. Given the small potential volumes, take for stock and domestic purposes, or by SA Water for public water supply, is highly unlikely to affect take in neighboring areas. Conversely, the taking of water from the same aquifer in other SDL resource units is highly unlikely to affect take from the Renmark Group Aquifer in the Mallee SDL resource unit (Steve Barnett pers. comm., 17 September 2014). This is supported by the risk assessment for the SA Murray Region (DEWNR 2015).

• s 10.12(1)(f) – Change in way water held or taken – The proposed single limit on take would not change if there was a change in the way water was held or taken. Instead, any changes would need to consider the limit.

• s 10.12(1)(g) – Change in utilisation – There is no licensed on non-licensed use. The effect of any future utilisation for non-licensed purposes is addressed with respect to the rules for take below.

• s 10.12(1)(h) – Great Artesian Basin – No water is sourced from the Great Artesian Basin.

• s 10.12(1)(i) – Aquifer recharge – There is currently no managed aquifer recharge. Aquifer recharge requires a permit under the NRM Act and would be identified through the permit system. Given the nature of the water resources across the SDL resource unit, aquifer recharge is highly unlikely.

Based on the above:

• No additional matters must be accounted for in determining the annual permitted take;

• No additional provisions should be required in the relevant WAPs or NRM Plans to account for the matters under s 10.12; and

• Applying a single limit for the annual permitted take should be acceptable.

Two options for setting the value for a single limit for annual permitted take are as follows:

1. Set the annual permitted take equal to the SDL of 2.0 GL per year. This would be consistent with the approach to be used in other groundwater SDL resource units. It would also allow any non-licensed take or take for water supply purposes to occur without having to adjust the limit in the future.

2. Set the annual permitted take as 0 GL. This would be reflective of no current non-licensed development and is consistent with State management arrangements.

For flexibility for any future non-licensed take and consistency with the setting of the annual permitted take in other groundwater SDL resource units, it is recommended that Option 1 be selected.

Section 10.10(4) requires that the WRP demonstrate that if the method for determining the annual permitted take was applied over a repeat of the historical climate that the SDL would be met, including as a result of any amendments under s 23B of the Water Act. With the SDL being applied as a maximum limit on the quantity of water permitted to be taken in conjunction with the rule for take below, actual take should always be below this level. Section 89(2)(c) of the NRM Act allows plans to be reviewed without formal procedures to include great consistency with the provisions of the Basin Plan (refer Appendix 11.5). This provision in the NRM Act should be able to be used in relation to the Mallee and Noora WAPs to incorporate and apply any adjustments to the SDL that may arise during the life of the WRP.
Rules for take, including water allocation rules

The rules for take required under s 10.11 of the Basin Plan are to ensure that the water actually taken will not exceed the annual permitted take. They should provide sufficient confidence that as long as water users operate within the rules, the annual permitted take will not be exceeded (refer Section 4.1.2).

Given the current level of development and use, limits on take and potential demand for licensed and non-licensed purposes above:

- No additional rules are required to manage licensed take.
- While there are no controls on non-licensed take, a permit is required for any new bores such that any future development could be tracked via this process (refer Section 4.4.2).

The existing arrangements should be sufficient to demonstrate that overall take would remain within the SDL

**Recommendation 17**

It is recommended that:

- The annual permitted take for the Mallee Renmark Group SDL resource unit is specified as a single value limit that is equal to the SDL. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements;
- No additional allocation rules or rules for take are required for licensed purposes as there is currently no licensed take and none is permitted under current State management arrangements;
- No rules for take are required for stock and domestic purposes as there is currently no take and future demand is unlikely. Permits under the NRM Act should be used to track any new development; and
- The above be put forward to the MDBA during fit for purpose negotiations.

### 4.3.3 Peake-Roby-Sherlock (GS5)

The alignment between the Basin Plan requirements and the current State management arrangements with respect to the annual permitted take and rules for take is very similar for both the Peake-Roby-Sherlock Unconfined and Confined SDL resource units. As such, they are evaluated together, with differences explicitly stated where necessary.

**Annual determination of water permitted to be taken**

Under current State management arrangements, the Peake, Roby and Sherlock WAP sets out a method that essentially defines the annual permitted take for licensed use only. As such, a method is needed to determine the annual permitted take for all consumptive use.

The Peake-Roby-Sherlock Unconfined and Confined Aquifers were included as within the existing planning arrangements category (refer Section 3.1.3). The limits on take for licensed purposes in the Peake, Roby and Sherlock WAP were defined as a maximum level of annual take for each aquifer, which does not change over the life of the WAP. These limits were combined with an annual estimate for stock and domestic purposes to determine the SDLs for each aquifer within the SDL resource unit. The nature of stock and domestic use means that it does not generally vary significantly between years.
Given the above, the annual permitted take for each aquifer could be specified in the form of single limits that are equal to the respective SDLs. This would also be consistent with MDBA (2013), which states that for groundwater the SDL may be used as the limit on take (refer Section 4.2.3).

The matters listed in s 10.12 are required be accounted for under s 10.10(3) when determining the annual permitted take under s 10.10(1). These are considered explicitly as follows:

- **s 10.12(1)(a) – Forms of take** – The forms of take that must be accounted for are:
  - Take via licensed purposes;
  - Take by basic rights (stock and domestic); and
  - Take for authorised uses under s 128 of the NRM Act.

  Take via licensed and basic rights are accounted for in an annual permitted take in the form of a single limit equal to the SDL. Provisions to adjust the annual permitted take by s 128 authorised use are not required in the WAP or NRM Plan. Rather, any future authorisations under s 128 would need be made with consideration of the SDL to ensure compliance.

- **s 10.12(1)(b) – Carryover allocations** – The Peake, Roby and Sherlock WAP does not provide for allocations made in one water year to be used in another water year (no roll over or carryover). Should the ability to carryover allocations from one year to the next be permitted as part of a revised WAP put forward as part of the SA Murray Region WRP accreditation, then annual adjustments would need to be applied to the annual permitted take. Carryover allocations are not applicable for unlicensed take.

- **s 10.12(1)(c) – Return flows** – Not applicable. Applies to surface water SDL resource units only.

- **s 10.12(1)(d) – Trade** – Any trade in or out of an SDL resource unit would normally increase or decrease the annual permitted take by an equivalent amount. Any trade (temporary or permanent) of licensed entitlements can only occur within this SDL resource unit under the Peake, Roby and Sherlock WAP. There is no Held Environmental Water that must be accounted for in accordance with s 10.12(3). Trade is not applicable for unlicensed take.

- **s 10.12(1)(e) – Hydrological connection** – Determination of the limits on take within the Peake, Roby and Sherlock WAP has already considered any significant hydrological connection to other areas (refer Section 8.2.2). No further consideration should be required, which is supported by the risk assessment for the SA Murray Region (DEWNR 2015).

- **s 10.12(1)(f) – Change in way water held or taken** – The proposed single limit on take would not change if there was a change in the way water was held or taken. Instead, any changes would need to consider the limit.

- **s 10.12(1)(g) – Change in utilisation** – The single limits proposed for the annual permitted take assumes full utilisation of both licensed and non-licensed take. Any increase from the level of current utilisation of licensed entitlements does not affect this limit and there are no lower security products that would be affected by any change. The effect of any increase in utilisation of non-licensed take on compliance is addressed with respect to the rules for take below.

- **s 10.12(1)(h) – Great Artesian Basin** – No water is sourced from the Great Artesian Basin.
• s 10.12(1)(i) – Aquifer recharge – There is currently no managed aquifer recharge. Aquifer recharge requires a permit under the NRM Act and would be identified through the permit system. Given the nature of the water resources across the SDL resource unit, aquifer recharge is highly unlikely.

Based on the above:

• No additional matters must be accounted for in determining the annual permitted take for the respective aquifers at this time;

• no additional provisions should be required in the relevant WAPs or NRM Plans to account for the matters under s 10.12, unless changes (principally to the carryover of allocations) are made to the current arrangements in the WAP;

• Applying the relevant SDL as a single limit for the annual permitted take for each aquifer should be acceptable; and

• Should the ability to carryover allocations be permitted in the future, then the annual permitted take for the respective aquifer would need to be adjusted each year to account for this.

• This adjustment could be a simple equation that is incorporated into a revised WAP as follows:

\[
\text{Annual permitted take (yr } t) = \text{SDL} - \text{(volume carried over to yr } t+1) + \text{(volume carried over from yr } t-1)
\]

Section 10.12(1) requires that the annual permitted take be determined for each form of take. MDBA (2013) states that the method may be composed of various independent parts in relation to the management of different forms of take. The main issue is to avoid double accounting. As the SDLs have been determined based on the limits on licensed take and estimates of non-licensed take, there is no double accounting of either form of take. As such, it is not considered necessary to separate the single limits into sub-limits.

The setting of any sub-limits would subsequently require active management in terms of accounting for take and compliance. This would present an issue with respect to non-licensed stock and domestic take as it is not actively managed, monitored or accounted for. It is also not likely to be cost effective to do so. While this issue can be avoided in terms of setting the annual permitted take, the lack of active management presents a separate issue with respect to rules for take and is considered further below.

Section 10.10(4) requires that the WRP demonstrate that if the method for determining the annual permitted take was applied over a repeat of the historical climate that the SDL would be met, including as a result of any amendments under s 23B of the Water Act. With the SDL being applied as a maximum limit on the quantity of water permitted to be taken in conjunction with the rule for take below, actual take should always be below this level. Section 89(2)(c) of the NRM Act allows plans to be reviewed without formal procedures to include great consistency with the provisions of the Basin Plan (refer Appendix 11.5). This provision in the NRM Act should be able to be used in relation to the Peake, Roby and Sherlock WAP to incorporate and apply any adjustments to the SDL that may arise during the life of the WRP.

Rules for take, including water allocation rules

The rules for take required under s 10.11 of the Basin Plan are to ensure that the water actually taken will not exceed the annual permitted take. They should provide sufficient confidence that as long as water users operate within the rules, the annual permitted take will not be exceeded (refer Section 4.1.2).
For licensed purposes:

- The volume held on licence is equal to the annual limit on take for licensed purposes (refer Section 4.2.2) and water can only be taken in accordance with the conditions on that licence (refer Section 4.2.3).
- There is no held environmental water for which adjustments due to any disposal or acquisition would be required.
- For the Unconfined Aquifer, the volume allocated is lower than the SDL (refer Section 3.2.2), current use is significantly lower than the volume allocated (refer Section 3.2.3) and future demand is unlikely (refer Section 3.2.4).
- For the Confined Aquifer, the volume allocated is lower than the SDL (refer Section 3.2.2), current use is consistently around 65 to 70% of the volume allocated (refer Section 3.2.3) although there is potential for an increase in future demand (refer Section 3.2.4).
- Any increase in actual utilisation of water allocations from either aquifer would not affect compliance with the SDLs when considering the licensed components in isolation.
- As such, no additional allocation rules or rules for take are required for licensed purposes.

For stock and domestic (non-licensed) purposes:

- The component of the SDL that reflects stock and domestic use is based on an estimate of use at 30 June 2009 and does not allow for growth.
- No limits and few controls on take for non-licensed purposes means that any increase above that estimate may put pressure on compliance with the SDL should the take for licensed purposes reach full utilisation.
- The limiting factors for stock and domestic development identified in Section 4.2.3 suggest that it is unlikely that overall use would increase significantly.
- The existing arrangements may not be considered sufficient to demonstrate that overall take would remain within the SDL. Therefore, options for managing this form of take in the absence of any limits or rules for take need to be considered and confirmed by the MDBA as being fit for purpose.

Options for addressing this issue for both the Peake-Roby-Sherlock (Confined and Unconfined) SDL resource unit and the Mallee Murray Group Limestone SDL resource unit were presented in Section 4.3.2. The option to monitor use for licensed purposes and if this reaches a pre-determined value, implement a procedure to re-evaluate and more actively manage and/or monitor stock and domestic use to ensure actual take does not exceed the annual permitted take is a preferred option that should be put forward to the MDBA for consideration as being fit for purpose. An updated permit system would facilitate the collection and holding of permit information for any future assessment (refer Section 4.4.2).
Recommendation 18

It is recommended that:

- The annual permitted take for each of the Peake-Roby-Sherlock Unconfined and Confined SDL resource units is specified as single value limits that are equal to the respective SDLs. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements. If the carryover of allocations from one year to the next is permitted in a revised WAP, then an adjustment to the annual permitted take will be applied in the form of a simple adjustment;
- The annual permitted take is not split into sub-limits that represent licensed and non-licensed use;
- No additional allocation rules or rules for take are required for licensed purposes as existing controls are sufficient;
- The preferred option for managing stock and domestic take in the absence of rules for take is to monitor use for licensed purposes and if this reaches a pre-determined value, implement a procedure to re-evaluate and more actively manage and/or monitor stock and domestic use to ensure actual take does not exceed the annual permitted take.
  - For the Unconfined Aquifer, the limit on licensed take included in the SDL is 3.22 GL. It is suggested that the pre-determined value is 90% of this limit, that is 2.828 GL\(^{21}\); and
  - For the Confined Aquifer, the limit on licensed take included in the SDL is 2.17 GL. It is suggested that the pre-determined value is 90% of this limit, which is 1.953 GL\(^{22}\).
- The above be put forward to the MDBA during fit for purpose negotiations; and
- Following the fit for purpose negotiations, a paper be developed to document the process to be undertaken to manage and/or monitor stock and domestic take given the absence of rules for take.

4.3.4 SA Murray (GS6)

Annual determinations of water permitted to be taken

The Basin Plan requires that a water resource plan must set out a method for determining the maximum quantity of water permitted to be taken during a water accounting period. The method must be able to incorporate and apply any SDL adjustments that arise during the life of a water resource plan as well as account for the disposal and acquisition of held environmental water.

As outlined in 3.2.2, while the relevant NRM plans require a permit for activities that may affect take from a groundwater system, they do not specify limits of take. There are therefore, no methods for determining the maximum quantity of water that the plans permit to be taken for consumptive use during a water accounting period for the SA Murray SDL resource unit.

\(^{21}\) Applying a value of 2.828 GL leaves a buffer of 0.322 GL, which is much greater than the current estimated use of 0.19 GL for stock and domestic purposes.

\(^{22}\) Applying a value of 1.953 GL leaves a buffer of 0.217 GL. This would allow a 50% increase over the current estimated use of 0.41 GL for stock and domestic purposes, which is considered reasonable.
Volumetric limits on take in the NRM plans (refer recommendation in Section 3.3.5), along with associated rules for take to ensure the SDL is not exceeded should be sufficient as a method for determining the maximum quantity of water that the plans permit to be taken, given that take should always stay below this limit.

The relevant NRM plans do not currently have the ability to incorporate and apply any SDL adjustments that arise during the life of the water resource plan. To cover off on the Basin Plan requirement to be able to incorporate and apply any SDL adjustments that arise during the life of the water resource plan it is proposed that the NRM plans be amended to provide for a review of the plans if the SDL is adjusted during the life of the plan.

Given that the resources in this SDL resource unit are not prescribed and no licensing arrangements are in place, the disposal and acquisition of environmental water does not apply. It is therefore not considered practical for the relevant NRM plans to include provisions for their accounting.

The method is required to consider water resources that have a significant hydrological connection. The risk assessment for the SA Murray Region (DEWNR 2015) indicates that there are no significant connections with resources in other SDL resource units that would influence the water available to be taken and hence be required to be accounted for in terms of annual permitted take.

Rules for take, including water allocation rules

The Basin Plan requires a water resource plan to set out rules to ensure that water use remains within the annual permitted take of the SDL resource unit.

Limits of take do not currently apply to the SDL resource unit, however, there is a large difference between the BDL and SDL for this non-prescribed groundwater SDL resource unit, with a low risk of a significant increase in use (DEWNR 2015). Further work may be required to develop rules for take. This should be done in conjunction with work recommended in Section 3.3.5 to develop options for applying a single limit to the SDL resource unit.

**Recommendation 19**

It is recommended that:

- As part of the paper to be developed for applying a single limit of take recommended in Section 3.3.5, the Murray-Darling Basin Policy and Strategy team work with the relevant NRM regions to develop any required rules for take;
- The relevant NRM regions implement the preferred option for any rules for take via their NRM plans;
- The Department negotiate with the MDBA to accept the approach for managing the limit of take and any associated rules for take for the SDL resource unit as the method for determining the annual permitted take; and
- The Department advise the MDBA that as the water resources in the SDL resource unit are not prescribed and no licensing arrangements are in place, the disposal and acquisition of environmental water do not apply and therefore the relevant NRM plans do not require provisions for their accounting.
4.3.5 SA Murray Salt Interception Schemes (GS7)

The SA Murray Salt Interception Schemes SDL resource unit covers a small part of the Noora PWA with the remaining area non-prescribed. As such, there are only limits on take for licensed purposes within a small area. A method is needed that determines the annual permitted take for all consumptive use.

SA Murray Salt Interception Schemes SDL resource unit was included as within the Unassigned Groundwater category as there is potential to increase extractions without compromising ELST characteristics (refer Section 3.1.3). The SDL was set to correspond with the estimate projected growth of salt interception schemes. No other forms of take were included under either the BDL or SDL.

Given the above, the annual permitted take could be specified in the form of a single limit that is equal to the SDL (as updated per recommendation in Section 3.3.3). This would also be consistent with MDBA (2013), which states that for groundwater the SDL may be used as the limit on take (refer Section 4.2.3).

The matters listed in s 10.12 are required be accounted for under s 10.10(3) when determining the annual permitted take under s 10.10(1). These are considered explicitly as follows:

- **s 10.12(1)(a) – Forms of take** – The forms of take that must be accounted for are:
  - Take via salt interception schemes;
  - Take via licensed purposes;
  - Take by basic rights (stock and domestic);
  - Net take by commercial plantations; and
  - Take for authorised uses under s 128 of the NRM Act.

Aside from the single licence within the Noora PWA for the Murtho SIS, no other take for licensed purposes is permitted. Section 3.2.3 indicated a very small area of dryland forestry and a four bores identified as being for stock and domestic purposes. These were not included within the BDL and it was recommended in Section 3.3.6 that these not be accounted for under the BDL or SDL. If this is not agreed to, this take would need to be calculated and potentially added to the BDL and SDL. All take would then be accounted for in an annual permitted take in the form of a single limit equal to the SDL. Provisions to adjust the annual permitted take by s 128 authorised use (relevant to the Noora PWA only) are not required in the WAP or NRM Plan. Rather, any future authorisations under s 128 would need be made with consideration of the SDL to ensure compliance.

- **s 10.12(1)(b) – Carryover allocations** – The Noora WAP does not provide for allocations made in one water year to be used in another water year (no roll over or carryover). Carryover allocations are not applicable for unlicensed take.

- **s 10.12(1)(c) – Return flows** – Not applicable. Applies to surface water SDL resource units only.

- **s 10.12(1)(d) – Trade** – Any trade in or out of an SDL resource unit would normally increase or decrease the annual permitted take by an equivalent amount. Any trade (temporary or permanent) of licensed entitlements can only occur within this SDL resource unit under the Noora WAP. There is no Held Environmental Water that must be accounted for in accordance with s 10.12(3). Trade is not applicable for unlicensed take.
s 10.12(1)(e) – Hydrological connection – The hydrological connection between salt interception schemes and the River Murray is significant. The schemes directly intercept water that would flow into the River Murray as the purpose is to reduce the inflow of salt. Despite this, the risk assessment for the SA Murray Region (DEWNR 2015) indicates that there are no significant connections with resources in other SDL resource units that would influence the water available to be taken and hence be required to be accounted for in terms of annual permitted take.

s 10.12(1)(f) – Change in way water held or taken – The proposed single limit on take would not change if there was a change in the way water was held or taken. Instead, any changes would need to consider the limit.

s 10.12(1)(g) – Change in utilisation – The single limit proposed for the annual permitted incorporates the potential growth of the salt interception schemes, while capping use at a sustainable limit. The effect of any increase non-licensed take on compliance is addressed with respect to the rules for take below.

s 10.12(1)(h) – Great Artesian Basin – No water is sourced from the Great Artesian Basin.

s 10.12(1)(i) – Aquifer recharge – There is currently no managed aquifer recharge. Aquifer recharge requires a permit under the NRM Act and would be identified through the permit system. Given the nature of the water resources across the SDL resource unit, aquifer recharge is highly unlikely.

Based on the above:

- No additional matters must be accounted for in determining the respective annual permitted take;
- No additional provisions should be required in the relevant WAPs or NRM Plans to account for the matters under s 10.12; and
- Applying the SDL as a single limit for the annual permitted take should be acceptable

Rules for take, including water allocation rules

The rules for take required under s 10.11 of the Basin Plan are to ensure that the water actually taken will not exceed the annual permitted take. They should provide sufficient confidence that as long as water users operate within the rules, the annual permitted take will not be exceeded (refer Section 4.1.2).

For licensed take and take via salt interception schemes:

- The volume held on licence is equal to the annual limit on take for licensed purposes (refer Section 4.2.2) and water can only be taken in accordance with the conditions on that licence (refer Section 4.2.3).
- There is no held environmental water for which adjustments due to any disposal or acquisition would be required.
- The volume currently extracted via the salt interception schemes is much lower than the SDL (refer Section 3.2.2). Future demand is unknown (refer Section 3.2.4).
- Take via salt interception schemes (which includes the licensed take) is recorded each year. If the total volume taken approaches the SDL then measures can be put in place to manage take between the schemes to ensure SDL compliance. This should be fairly straightforward as all schemes are operated by Government.
No additional allocation rules or rules for take are required for licensed purposes or take via salt interception schemes.

There was no stock and domestic take nor net take by commercial plantations included in the SDL. As above, it is recommended that the small area of commercial plantation and the four stock and domestic bores not be accounted for under the SDL. Assuming that this occurs, no additional rules for take should be required for these forms of take as future demand is very unlikely. Monitoring the number of well permits and regular updates to land coverage information would allow any changes in dryland forestry plantations to be identified.

Recommendation 20

It is recommended that:

- The annual permitted take for the SA Murray Salt Interception Scheme SDL resource unit is specified as a single value limit that is equal to the SDL. This is based on the nature of take from this resource unit together with the assessment of s 10.12 requirements;

- No additional allocation rules or rules for take are required at this point for licensed purposes or for salt interception schemes:
  - For licensed purposes existing controls are sufficient; and
  - Total take via salt interception schemes is monitored. Should this approach a pre-determined value, then a procedure should be implemented to ensure that actual take does not exceed the annual permitted take. Given an SDL of 28.6 GL, it is suggested that the pre-determined value is 90% of this limit, that is 25.74 GL\(^{23}\);

- Assuming that current stock, domestic and forestry take is not required to be included under the SDL, the water affecting activity permit system and spatial land use information will be used to identify any new take by these purposes for assessment with revisions of the water resource plan [link to recommendation in Section 4.4.2];

- The above be put forward to the MDBA during fit for purpose negotiations; and

- Following the fit for purpose negotiations, a paper be developed to document the process to be undertaken to manage take via salt interception schemes should this approach the SDL.

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\(^{23}\) Applying a value of 25.74 GL allows for an effective doubling of the extraction from the current schemes and leaves a buffer of 2.86 GL.
4.4 Associated Recommendations for Managing Take

Across the non-prescribed areas and for non-licensed purposes within prescribed areas, the principal control available to manage take is through the issuing of permits. This section identifies a number of opportunities to improve on the administration and registration of permits to assist with managing take and reporting on SDL compliance. These proposals could have statewide application and benefits.

4.4.1 Permits for Water Affecting Activities

Across the non-prescribed areas and for non-licensed purposes within prescribed areas, the principal control available to manage activities that may affect water take is through the issuing of permits. The majority of these are water affecting activity (WAA) permits under the NRM Act but there are also numerous exemptions where these WAA permits are not required. These may be as a result of WAA permit exemptions under an NRM Plan or where other legislation such as the Development Act and the South Eastern Water Conservation and Drainage Act 1992 (SA).

This report has attempted to identify as many exemptions to the requirement for a WAA permit as possible (refer Section 4.2.3). In order to use permit information to manage take within the non-prescribed areas and to keep a record of non-licensed take within the prescribed areas to fulfil Basin Plan requirements:

- A comprehensive review of the requirements for WAA permits and their exemptions is required. This will also enable appropriate links to be established to ensure that information in relation to these WAA permits can be appropriately stored (refer Section 4.4.2); and
- The development of a consistent approach to WAA policies across the three NRM regions will also be required. This links to the recommendations around rules for take in Sections 4.3.1 and 4.3.4.

Recommendation 21

It is recommended that:

- The relevant business unit work with the NRM Boards and other stakeholders to review the processes for issuing permits for activities that affect water take. This should include a review of the requirements for water affecting activity permits and exemptions, and the processes by which exemptions are managed (for example, under alternative legislation or an exemption in certain circumstances); and
- Murray-Darling Basin Policy and Strategy work with the NRM Boards and other stakeholders to develop a consistent approach to water affecting activity policies and processes across the three NRM regions, linking with the recommendations around rules for take in Sections 4.3.1 and 4.3.4.

4.4.2 Central System for Managing Activities that Affects Take

Section 226 of the NRM Act requires that the Minister keep a register (‘NRM Register’) for all permits granted under the Act. However, a central searchable register that is used by each NRM region in administering WAA permits and meeting their obligations under the NRM Act (that is, the public availability of permits issued) does not currently exist.

Information with respect to permits issued for groundwater under s 127(3)(a) to s 127(3)(c) or s 127(3)(f) of the NRM Act is stored in WILMA. Permit information with respect to dams across the non-prescribed areas of the SA
Murray Region WRP area is not held in a single location. The various NRM regions hold data from approximately July 2009 onwards, but prior to this, the Department stored this information.

**Regional Management of Water Affecting Activity Permits**

NRM Regions have each adopted an approach and/or system for managing their WAA permits, although there is not a consistent approach across all regions. Within the SA MDB region templates/letters and generic conditions for the WAA permitting process have been developed and a record of all WAA applications received (both approved and refused) are recorded on an excel spreadsheet and more recently a GIS layer. The SAAL and South East regions are using a system incorporating an Excel spreadsheet based on a version of the Eyre Peninsula NRM region system.

An NRM Board may not always be the relevant authority for granting approvals to undertake certain activities, especially with respect to Development Applications. Some WAA permits that are considered minor are ancillary to a larger development application and would not get referred but assessed under that Development Application rather than acquiring a separate WAA permit (for example, a crossing for access to a proposed house construction). This can present difficulties in keeping track of all activities that may affect take.

There is a Water Affecting Activity Working Group (WAAWG) that consists of DEWNR officers based in the City and the NRM regions that work on WAA permits. Information on the current management of WAA permits presented below was obtained through discussions with members of this group across the three NRM regions.

**Water Affecting Activity Permit System (WAAPS)**

The Water Affecting Activity Permit System (WAAPS) is a database developed by the former Department for Water, Land and Biodiversity Conservation (DWLBC) and used to enter WAA permit information prior to the NRM Boards taking over the management of certain WAA information from DWLBC.

At the time, it was envisaged that WAAPS could be used as a tool to assist regions in administering WAA permits. However, it is understood there were some issues with respect to development, ongoing maintenance, access/administrator rights, uploading/online entering of data, appropriateness of forms/templates, resourcing and funding.

Once granted, it was intended that WAA permit details are transferred from WAAPS into the WILMA system and then WILMA would provide the information for the DEWNR Water Licence and Permit Register (the Register). However, feedback from the WAAWG indicates that granted WAA permits are not appearing on the Register, which also serves as the NRM Register.

WAAPS was one of the IT systems earmarked for decommissioning with the introduction of the Common Registry Solutions (CRS). The Water Management Solution proposal would also replace the capability currently provided by WAAPS. The Water Licence and Permit Register, accessible via the WaterConnect website, uses data held in both WILMA and WAPPS to provide information to the public on WAA permits.

**Other Systems**

Information for groundwater bores and permits is also stored in the SAGEodata database. This database includes fields for bore locations, bore depth, data of drilling, permit numbers, purpose descriptions (for example, stock, domestic, irrigation, industrial, observation), operational status (for example, operational, abandoned or backfilled) and latest groundwater sampling data (for example, standing water level, yield and salinity readings). However, many of these fields are blank and as a result it is difficult to use the information in the database to identify stock
and domestic development or conjunctive use (licensed use with stock and domestic). If information was updated and then kept up to date with key fields completed, it would be a valuable tool for linking permit information with any changes in stock and domestic development (increases and decreases) and identifying where conjunctive use occurs. This would provide critical information to support the fit for purpose options for ensuring that take remains within the SDL and for future detailed assessment if required (refer recommendation in Sections 4.3.2 and 4.3.3).

**Recommendation 22**

It is recommended that:

- In consultation with the NRM Boards and other stakeholders, an assessment of the options, costs, benefits and resourcing arrangements associated with establishing a central, searchable register for permits for activities that affect take is undertaken, which will fulfill the requirements of the Basin Plan as well as the NRM Register; and

- Subject to the outcomes of the previous recommendation, the endorsed option for establishing a central, searchable register for permits is implemented.

### 4.4.3 Compliance with Water Affecting Activity Permits

Information on the approach applied for WAA permit compliance within each NRM region was gathered from regional staff. Overall, the approach to WAA compliance varies across the NRM regions with respect to resourcing and the balance between using education and enforcement to achieve the best on-ground outcome.

There is often one DEWNR WAA authorised officer in a NRM region, which can lead to resourcing challenges, especially if the person vacates the position and a new authorised officer is required, potentially leaving a gap in the system for a period of time. The SAAL NRM region doesn't currently have an authorised officer but does often utilise other state government agency staff, such as the EPA, to assist with management and compliance matters.

Not all NRM Regions include a site inspection when assessing WAA applications (or DA referrals), or a post works inspection to check compliance with any approval conditions. Where unauthorised WAA/DA activity or non-compliance has been undertaken and identified, then appropriate follow-up action can be initiated by the relevant authority.

Despite efforts in raising awareness within the community regarding when to obtain a WAA permit, the system still heavily relies upon people doing the right thing and seeking a permit, especially when not automatically captured via a Development Application (DA) referral.

Water affecting activities captured through Development Applications are generally referred to DEWNR (often regional staff) under the NRM Act or River Murray Act for comment or direction. In these cases responsibility for compliance rests with the approving authority, usually local government.
5 CALCULATING TAKE

5.1 Basin Plan Rules for Calculating Take

5.1.1 Methods for Calculating Take

Section 6.10(2) of the Basin Plan requires that annual actual take is to be calculated by summing the quantity of water actually taken by each form of take for consumptive use from the SDL resource unit.

In reference to the annual actual take, MDBA (2013) states that, consistent with the definition of take, this should, as far as possible, include all known and estimated illegal, unauthorised and unreported take. While the MDBA recognises that there may be practical constraints to incorporating the latter, but will be seeking a demonstration that states will use their best endeavours to incorporate these matters when determining annual actual take.

Section 10.15 of the Basin Plan requires that:

(1) A water resource plan must set out how the quantity of water actually taken for consumptive use by each form of take from each SDL resource unit will be determined after the end of a water accounting period using the best information available at the time.

(2) For a particular form of take, and subject to the requirement that a determination use the best information available at the time, a determination may be made by:

(a) measuring the quantity of water actually taken; or

(b) estimating the quantity of water actually taken; or

(c) a combination of these methods.

(3) Where a determination for a form of take is made by estimating the quantity of water actually taken, the water resource plan must provide for the estimate to be done consistently with the method under subsection 10.10(1) that relates to that form of take.

(4) The quantity of water actually taken must:

(a) include water that was held environmental water which was disposed of and then used in the SDL resource unit for consumptive use; and

(b) exclude water sourced from the Great Artesian Basin and released into and taken from a Basin water resource.

In relation to the requirements of s 10.15, MDBA (2013) provides the following:

- The WRP must provide for the actual take to be determined using the best information available at the time. This requires use of the best information already available, including any improvements to this information over time.

- It is expected that the actual take in most WRP areas will be determined using a combination of measurement data, methods and estimates. Additionally, the take by different forms of take in the same SDL resource unit may be measured or estimated in different ways.

- Where take is measured, this data should be used, with the most reliable data source to be used if multiple measurements of the same take are available. If take cannot be accurately measured, it must be
determined using a method that is consistent with the method for determining the annual permitted take under s 10.10(1).

Section 10.45 of the Basin Plan requires that

(1) A water resource plan must specify measures for maintain and, if practicable, improving:
   (a) The proportion of take that is measured in the water resource plan area; and
   (b) The standard to which take is measured.

(2) The water resource plan must specify the timeframe for implementing the measures.

With respect to the above, MDBA (2013) provides the following:

- It is expected that existing measurement activities will be maintained and, if practicable, improved.
- The WRP should specify measures for maintaining the proportion of take that is measured in the WRP area and the standard to which take is measured.
- The provision does not require the introduction of new and improved measurement activities, and it is acknowledged that some forms of take cannot be directly measured. However, if it is practicable to improve either the proportion of take measured or the standard to which take is measured, measures to provide for that improvement may also be included.
- Examples of ways that the proportion and standard of take that is measured in a WRP area could be provided for include:
  - providing details about proposed improvements to measurement, such as improvements made under the National Water Initiative;
  - providing information about how the level of measurement will be maintained, such as schedules and budgets for maintenance, or details of any cost recovery mechanisms that the State may have in place; and
  - identifying any regulatory requirements within the State regarding the maintenance (or improvement) of measuring devices.

### 5.1.2 Estimates of the Long-term Annual Average Quantity of Take

Section 10.44 of the Basin Plan requires that:

(1) A water resource plan must include the following information in relation to each class of water access right relating to the water resources of the water resource plan area:
   (a) The best estimate of the long-term annual average quantity of water taken that is measured;
   (b) The best estimate of the long-term annual average quantity of water taken that is not measured;
   (c) How the quantities under paragraphs (a) and (b) were calculated; and
   (d) The proportion of the quantity referred to in paragraph (a) that is measured in accordance with the standards for measuring agreed by the Basin States and the Commonwealth.
With respect to the above, the MDBA (2013) provides that:

- This seeks information about the nature of measurement of take at the beginning of the WRP period. It is not intended to impose new or additional measurement and metering requirements, but to clearly identify what is measured and what isn’t. This will help establish confidence levels for the SDLs, as well as to provide transparency around the methods used to estimate take where measurement is not in place.

- All forms of take need to be included, that is, take from a watercourse, a regulated river, by floodplain harvesting, by run-off dams, from groundwater, and net take by commercial plantations. This also includes take that is under licensed entitlement, basic rights, interception and unauthorised take.

- Standards for measuring the long-term annual average quantity of water taken have not yet been agreed between the Basin States and Australian Government but are planned for development.

5.2 State Methods for Calculating Take in the SA Murray WRP Area

5.2.1 Actual Annual Take

South Australian Non-Prescribed Areas (SS10)

Annual take is not calculated for the water resources in the South Australian Non-Prescribed Areas.

Mallee (GS3)

Mallee (Pliocene Sands)

No licensed or non-licensed take currently occurs from the Pliocene Sands Aquifer so there is no measurement or estimation of annual take required.

Mallee (Murray Group Limestone)

The Mallee WAP (Principle 56, Section 8.2) requires that the volume of water extracted for licensed purposes will be monitored and measured in accordance with the State Metering Policy (as amended from time to time). Meters have been installed to measure annual take for licensed purposes as well as take under any NRM Act s 128 authorisations. The volume taken is measured in kilolitres. As of 1 July 2014, this meter data is collected as follows:

- DEWNR meter reading process for the Border Groundwater Zones in the Mallee PWA and in the Noora PWA.

- Meters read by licence holders for remainder of the Mallee PWA and data provided to DEWNR by 14 July of each water year. The provision of this data becomes a requirement on the licence held and non-compliance will follow an escalation pathway that could result in action under the NRM Act for breach of licence conditions. Spot checks will be undertaken to ensure correct reporting.

- Annual water use by the holder of the NRM Act s 128 authorisation is provided annually to DEWNR to ensure compliance with the authorisation.

Non-licensed take for stock and domestic purposes is not metered and no annual estimation is made.

Some stock and domestic take may be taken through meters that also record licensed take. It is difficult to separate the water use data as there is no dataset that identifies those meters where this conjunctive take occurs.
No assessment is currently undertaken by Customer and Commercial Services on separating purpose of use unless there is a potential over-use penalty. As a result, there is likely to be double-counting of some stock and domestic take, although the magnitude of this is unknown.

**Mallee (Renmark Group)**

No licensed or non-licensed take currently occurs from the Renmark Group Aquifer so there is no measurement or estimation of annual take required.

If licensed take occurred for water supply purposes occurred in the future, meters would be installed to measure the annual take. This meter data would likely be collected in a similar, location based manner to that for the Murray Group Limestone Aquifer above.

**Peake-Roby-Sherlock (GS5)**

Meters are installed to measure annual take from the Confined and Unconfined Aquifers for both licensed purposes and any NRM Act s 128 authorisations. The volume taken is measured in kilolitres. As of 1 July 2014, this meter data is collected via the DEWNR meter reading process for the Peake, Roby and Sherlock PWA.

Non-licensed take for stock and domestic purposes is not metered and there is no intention for this to occur in the future. Additionally, no annual estimate is made for this form of take.

Some stock and domestic take may be taken through meters that also record licensed take. It is difficult to separate the water use data as there is no dataset that identifies those meters where this conjunctive take occurs. No assessment is currently undertaken by Customer and Commercial Services on separating purpose of use unless there is a potential over-use penalty. As a result, there is likely to be double-counting of some stock and domestic take, although the magnitude of this is unknown.

**SA Murray (GS6)**

Annual take is not calculated for the water resources in the SA Murray SDL resource unit.

**SA Murray Salt Interception Schemes (GS7)**

Meters are installed to measure the annual volume taken via all SIS bores. The volume taken is measured in kilolitres. This data is collected by SA Water who operate the schemes.

No other forms of take within the SDL resource unit are metered nor annual estimates made.

### 5.2.2 Long-term Annual Average Take

**South Australian Non-Prescribed Areas (SS10)**

The relevant NRM plans do not currently outline long-term annual average quantity of take for any forms of take from the SDL resource unit.

As indicated in Sections 3.2.2 and 3.2.3, the water resources of the SDL resource unit are not measured and the best estimate of long-term annual average quantity of water taken that is not measured is the estimate of the impact of farm dams undertaken for the National Water Commission (SKM et al., 2010). One water affecting activity permit has been issued for a new dam since this estimate was completed. It is however possible that not all new dam developments will have been captured by water affecting activity permits due to exemptions, however it is likely that there has been only very limited new development.
As indicated under Section 3.2.3 there may be some additional take from this SDL resource unit via direct extraction from watercourses, take by commercial forestry or take by mines however it is not currently possible to estimate the level of this take due to the reasons outlined in that section.

**Mallee (GS3)**

**Mallee (Pliocene Sands)**

No licensed or non-licensed take currently occurs from the Pliocene Sands Aquifer therefore no take is currently measured or estimated.

**Mallee (Murray Group Limestone)**

The Mallee WAP (SA MDB NRMB 2012), Noora WAP (RMCWMB 2001) and the MDB regional NRM Plan do not specifically outline a long-term annual average quantity of take for any form of take. The long-term annual average quantity of water taken from the Murray Group Limestone Aquifer would be calculated as the sum of the long-term average take (measured and not measured) from each of the Mallee and Noora PWAs. The following describes the data and information available.

For the Mallee PWA:

- The Mallee WAP includes data on licensed water use from 2001-02 to 2008-09, which is based on a combination of meter data and the annual water use reports required under the Mallee WAP\(^{24}\). The first Mallee WAP was adopted in December 2000 and metering commenced at this time. Recorded meter data is available within the water licensing system (WILMA) from 2001-02 until 2013-14. With all water use data sets collated using meter data, there are periods where estimates have been included due to issues such as equipment failure. It should be noted that there are some differences between data held in WILMA and the numbers presented in the Mallee WAP.

- The Mallee WAP includes an estimate of annual stock and domestic take between 1.65 and 2.25 GL (refer Section 3.2.3) from the work of Weir (2005). The upper limit was used as part of the method to calculate the SDL for this resource unit (refer Section 3.1.3). The objective of Weir (2005) was to provide, where possible, a quantified, documented and auditable estimate of total extractions of groundwater for non-licensed purposes. Various information sources were used including consumption rates for various stock types, stock numbers for each Hundred, population data and town water supply use data.

For the Noora PWA, the Noora WAP includes an estimate of stock and domestic take of 0.028 GL per year, based on a demand of 2 ML per year per active well (refer Section 3.2.3). This estimate was used as part of the method to calculate the SDL for this resource unit (refer Section 3.1.3). There is no licensed take.

**Mallee (Renmark Group)**

No licensed or non-licensed take currently occurs from the Renmark Group Aquifer therefore no take is currently measured or estimated.

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\(^{24}\) Annual water use reports are submitted by water licence holders submitted by licence holders pursuant to Principle 57 (Section 8.2) of the Mallee WAP. The information required includes the volume of water use as indicated by the water flow meter for the water year.
Peake-Roby-Sherlock (GS5)

The Peake, Roby and Sherlock WAP (SA MDB NRMB 2010a) and the MDB regional NRM Plan do not specifically outline a long-term annual average quantity of take for any form of take for either the Unconfined or Confined Aquifers. The following describes the data and information that is available:

- The Peake, Roby and Sherlock WAP includes estimates of licensed water use from 2005-06 to 2008-09 using a combination of metered data and estimates based on crop use and crop area where meters were not installed for all or part of a water year. A water use dataset is available within the water licensing system (WILMA) from 2009-10 to 2013-14. With all water use data sets collated using meter data, there are periods where estimates have been included due to issues such as equipment failure. Water use data is also available through the annual water use reports required under the Peake, Roby and Sherlock WAP.

- For the Unconfined Aquifer, the Peake, Roby and Sherlock WAP includes an estimate of stock and domestic take of 0.19 GL per year, based on a demand of 2 ML per active well (refer Section 3.2.3).

- For the Confined Aquifer, the Peake, Roby and Sherlock WAP includes an estimate of stock and domestic take of 0.41 GL per year, based on a demand of 2 ML per active well (refer Section 3.2.3).

- The stock and domestic take estimates were used as part of the method to calculate the respective SDLs for the Unconfined and Confined Aquifers within this resource unit (refer Section 3.1.3).

SA Murray (GS6)

The relevant NRM plans do not outline the long-term annual average quantity of take for any forms of take from this SDL resource unit.

As indicated in Sections 3.2.2 and 3.2.3, the water resources of the SDL resource unit are not measured and the best estimate of long-term annual average quantity of water taken that is not measured is the estimate of stock and domestic use undertaken by the Department for the Basin Plan in 2010, noting the low level of confidence in this estimate.

SA Murray Salt Interception Schemes (GS7)

There is no documented long-term annual average quantity of take for the salt interception schemes. However, the annual take is metered. The dataset for SIS take commences in 1990-91 when the Woolpunda Scheme became operational.

No other forms of take within the SDL resource unit are metered nor annual estimates made.

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25 Annual water use reports are submitted by water licence holders submitted by licence holders pursuant to Principle 30 (Section 8.2.2) of the Peake, Roby and Sherlock WAP. The information required includes the volume of water used by the licensee and recorded for each meter during the water use year.
5.3 Alignment between State Arrangements and Basin Plan Requirements – with Recommendations

5.3.1 South Australian Non-Prescribed Areas (SS10)

Calculating annual take

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both.

As indicated in Section 5.2.1, there are no currently no arrangements in place to calculate annual take for the South Australian Non-Prescribed Areas SDL resource unit.

Given that water use is not licensed, the most practical and cost effective method of calculating take for this area would be to estimate take.

Once a single limit of take has been determined for the SDL resource unit (refer Section 3.3.2), further work will need to be undertaken to determine the most appropriate method to estimate take by all forms of take covered by the limit.

It should be noted that there is currently no consolidated, central register of water affecting activity permits for dams in the non-prescribed area of the SA Murray-Darling Basin. This issue and consideration of the establishment of a central, searchable register for water affecting activity permits is considered further in Section 4.4.2.

Recommendation 23

It is recommended that:

- Once a single limit of take has been determined for the SDL resource unit [refer recommendation in Section 3.3.2], further work be undertaken by Murray-Darling Basin Policy and Strategy in consultation with the relevant NRM regions and Science, Monitoring and Knowledge to determine the most appropriate method to estimate annual take by all forms of take covered by the limit;

- The most appropriate method to estimate annual take as determined by the work referred to above is applied for annual reporting on take for Section 71 of the Water Act; and

- The most appropriate method to estimate annual take as determined above is set out in the index document for the water resource plan.
Estimates of long-term annual average quantity of take

While the Basin Plan only requires best estimates for each class of water access right, the MDBA (2013) indicates that all forms of take (i.e. licensed entitlement, basic rights, interception and unauthorised take) should be included.

To address this requirement for the South Australian Non-Prescribed Areas, the following information could be used:

- Best estimate of the long-term annual average quantity of water taken that is measured – 0 GL
  As outlined in Sections 3.2.2 and 3.2.3, the water resources of the South Australian Non-Prescribed Areas are unlicensed and unmonitored. Therefore, it is not currently possible to provide a best estimate of the long-term annual average quantity of water taken that is measured.

- Best estimate of the long-term annual average quantity of water taken that is not measured –
  This could be estimated by applying the long term climate data to the most appropriate method to estimate annual take for each form of take accounted for under the SDL (see recommendation above).

- How the quantities above were calculated – This will involve describing the method used to estimate the long term annual average quantity of water taken.

- The proportion of the quantity that is measured in accordance with the standards for measuring – 0 %
  As indicated above, none of the take in the SDL resource unit is measured.

Recommendation 24

It is recommended that:

- Estimation of the long term average annual quantity of water that is taken for each form of take from the South Australian Non-Prescribed SDL resource unit is undertaken in accordance with the method recommended above; and

- The long-term annual average quantity of water that is taken for each form of take is set out in the index document of the water resource plan.
5.3.2 Mallee (GS3)

Mallee (Pliocene Sands)

Calculating Annual Take

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both.

No licensed or non-licensed take currently occurs from the Pliocene Sands Aquifer so there is no measurement or estimation of annual take required at this time.

Information on any future development for stock and domestic purposes should be collected and stored in the water affecting activity permit system (refer Section 4.4.2). Then, given that stock and domestic take is not licensed, applying a method to estimate annual take would be the most practical and cost effective option. For the Mallee Murray-Group Limestone and Peake-Roby-Sherlock SDL resource units it has been recommended that this be in the form of an annual average value. It would be appropriate for the method used for the Pliocene Sands to be consistent with that used in one of these SDL resource units.

Recommendation 25

It is recommended that:

- The annual actual take comprise an annual average value for stock and domestic purposes (should future take occur);
- Permits required under the NRM Act or other legislation should be used to track any new development for stock and domestic purposes [refer to recommendation in Section 4.3.2];
- A method consistent with that used in either the Mallee Murray-Group Limestone or Peake-Roby-Sherlock SDL resource units should be used to calculate annual average take for stock and domestic purposes (should future take occur); and
- The method for calculating annual actual take from the Pliocene Sands Aquifer is set out in the index document for the water resource plan.

Estimates of Long-Term Annual Average Quantity of Take

No licensed or non-licensed take currently occurs from the Pliocene Sands Aquifer, therefore to fulfill the requirements of s 10.44 of the Basin Plan:

- The long-term annual average quantity of water taken that is measured = 0 GL; and
- The long-term annual average quantity of water taken that is not measured = 0 GL.

If any new stock and domestic development occurs before completion of the SA Murray Region WRP, a revised value would be required for the long-term annual average quantity of water taken that is not measured.

Recommendation 26

It is recommended that the long-term annual average quantity of water that is taken for each form of take from the Pliocene Sands Aquifer as described above is set out in the index document for the water resource plan.
Mallee (Murray Group Limestone)

Calculating Annual Take

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both.

For the Murray Group Limestone Aquifer:

\[
Total\ Annual\ Take = Licensed\ take + NRM\ Act\ s\ 128\ authorised\ take + Stock\ and\ domestic\ take
\]

Annual take for licensed purposes and NRM Act s 128 authorised purposes is metered and therefore a measured value for this take can be provided each year. However, as identified in Section 5.2.1, some stock and domestic take may be taken through meters that record licensed take leading to double-counting.

In order to overcome this issue, a purpose of use would initially need to be established for all bores that supply licensed use to identify where stock and domestic take also occurs. One such option may be to request additional information on either the annual water use report forms or the new self-meter reading forms (refer Section 5.2.1) to identify those bores where conjunctive take occurs. An estimate of the stock and domestic take from these bores could then be determined and this volume subtracted from the recorded licensed take. It would be preferable to determine the volume to be subtracted as part of an overall review of stock and domestic take. This is discussed further below. However, in the absence of such a review, identifying the number of bores where conjunctive use occurs will provide guidance on the potential magnitude of the issue and whether further investigation is worthwhile.

Stock and domestic take is not metered and no annual estimation is made. The recommended option for managing this form of take in Section 4.3.2 (rules for take) required no further assessment of the volume of take unless licensed take reaches a pre-determined value. Assuming that this fit for purpose option is accepted, then it is reasonable to assume that an annual estimate of stock and domestic take would also not be required. Instead, the annual average take of 2.278 GL used for the determination of the SDL for this resource unit could be used.

The average annual estimate of take by stock and domestic purposes within the Mallee WAP above was determined through a comprehensive assessment (Weir 2005). However, the estimate of stock and domestic take within the Noora WAP has little supporting information or reference as to how the 2 ML per bore was determined (refer Section 3.2.3). As part of amendments to the Noora WAP the method applied for the Mallee WAP could be applied.

An improvement in the current estimates of stock and domestic take across all SDL resource units in the SA Murray Region WRP area would allow current and future take to be accounted for appropriately and consistently, ensuring that more robust estimates are used. It would also reduce the level of double accounting within annually reported figures for prescribed water resources such as in the Mallee (Murray Group Limestone) SDL resource unit. MDBA (2013) highlighted that a key element of the method used to determine the annual permitted take is that there is no double-counting of the various forms of take. It is reasonable that this extends to the double-counting within the calculation of the annual take.

If a review is not possible, the methods and assumptions that support the 2.278 GL value should be documented in a single paper (including the basis for the 2 ML per bore per year for the Noora PWA). The identification of those bores where licensed take occurs conjunctively with stock and domestic take could be undertaken through the annual water use report forms or the new self-meter reading forms.
Recommendation 27

It is recommended that:

- The annual actual take comprise the measured take for licensed and authorised purposes and an annual average value for stock and domestic purposes;
- In the absence of any revised estimate, take by stock and domestic purposes should be the current estimate included in the current Mallee and Noora WAPs and subsequently in the SDL determination;
- The above is put forward to the MDBA during fit for purpose negotiations;
- The method above is used for the annual reporting on take as required by Section 71 of the Water Act;
- An assessment of the magnitude of the double-counting of licensed take and stock and domestic take due to conjunctive take is considered, which includes the incorporation of additional information requirements on either the annual water use report forms or the new self-meter reading forms to identify those bores where conjunctive take occurs;
- Determine what would be involved in developing an updated assessment of the current estimate for stock and domestic take [refer to recommendation in Section 5.3.4] and then assess the next steps based on this determination; and
- The method for calculating annual actual take is set out in the index document for the water resource plan.

Estimates of Long-Term Annual Average Quantity of Take

An assessment of the long-term annual average take for all forms of take is required under s 10.44 of the Basin Plan. To fulfill these requirements:

- Best estimate of the long-term annual average quantity of water taken that is measured – metered water use data for licensed take and any s 128 authorised take should be used to determine this value.
  - For surface water systems, long-term average water use is generally determined using a model that includes the current level of development and operational rules, applied over a long-term climate sequence. This calculation is more difficult for groundwater systems, particularly in the absence of a model. The best estimate of the long-term average water use may be an average of the licensed and s 128 authorised use over the period that data is available. Generally, data is available for the period since a groundwater resource was prescribed, the first WAP developed and licenses issued. In this case, data is available from 2001-02.
  - To prepare a single dataset of measured water use data since 2001-02, an assessment of the meter data held in WILMA and use data provided through the Annual Water Use reports (and used in the Mallee WAP) should be undertaken, reconciling any differences. The annual metered use data for the s 128 authorisation can then be added to this.
  - The majority of the water use in the dataset should be represented by metered data. However, in some cases estimates for water use will have been required (and included as part of the metered water use data set) due to issues such as equipment failure or where a meter has not been installed for part of a year. These estimates should still be included as part of the data set to determine take that is measured. To separate out water use by individual licences for short
periods of time and attempt to reconcile this use within the long-term average use that is not measured would not be an efficient use of resources nor likely provide any better overall estimation of long-term average take that is measured.

- **Best estimate of the long-term annual average quantity of water taken that is not measured** – the current best estimate is 2.278 GL, which combines the estimated annual take for stock and domestic purposes provided in the Mallee and Noora WAPs and used in the development of the SDL. If the current estimate of stock and domestic take is revised, then this would be used.

- **How the quantities above were calculated** – This will require documentation of the methods used to determine the long-term annual average quantity of water taken, particularly the estimated component. As described above, the work of Weir (2005) outlines the method used to estimate stock and domestic take for the Mallee WAP and the same method could be applied in the review of the Noora WAP.

- **The proportion of the quantity that is measured in accordance with agreed measuring standards** – this is currently not applicable as no standards for measuring have been agreed by the Basin Plan States and the Commonwealth. However, once standards are agreed, the alignment of South Australia’s State Metering Policy with these standards should be undertaken.

### Recommendation 28

It is recommended that:

- Estimation of the long term average annual quantity of water that is taken for each form of take from the Mallee (Murray Group Limestone) SDL resource unit is undertaken in accordance with the method described above. This will require:
  - A single dataset of licensed take since 2001-02, prepared through an assessment of the meter data held in WILMA and the use data provided through the Annual Water Use reports.
  - Estimates of licensed use within WILMA should be included;
  - A dataset of take under the current s 128 authorisation; and
  - The current estimate of annual average stock and domestic take, unless this is revised.

- The above is put forward to the MDBA during fit for purpose negotiations;

- A paper is prepared that summarises the methods used to determine the annual average quantities of water taken that are measured and estimated;

- Once standards for measuring take have been agreed by the Basin States and Commonwealth, a paper is produced that details how South Australia’s State Metering Policy aligns with those standards; and

- The long-term annual average quantity of water taken from the Murray Group Limestone Aquifer is set out in the index document for the water resource plan.

### Mallee (Renmark Group)

**Calculating Annual Take**

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both.
No licensed or non-licensed take currently occurs from the Renmark Group Aquifer so there is no measurement or estimation of annual take required at this time.

If licensed take occurred for water supply purposes occurred in the future, meters would be installed to measure the annual take. This meter data would likely be collected in a similar, location based manner to that for the Murray Group Limestone Aquifer above and would then be used to calculate the annual take.

Information on any future development for stock and domestic purposes should be collected and stored in the permit system (refer recommendation in Section 4.4.2). Then, given that stock and domestic take is not licensed, applying a method to estimate take would be the most practical and cost effective option to calculate the annual take. The method used should be consistent with that used to calculate this form of take elsewhere within the SA Murray WRP area such as the Mallee Murray-Group Limestone or Peake-Roby-Sherlock SDL resource units, where it is assumed that this will be in form of an annual average value.

Recommendation 29
It is recommended that:
- The annual actual take comprise the measured take for licensed purposes and an annual average value for stock and domestic purposes (should future take occur);
- Permits under the NRM Act or other legislation should be used to track any new development for stock and domestic purposes [link to recommendation in Section 4.3.2];
- A method consistent with the Mallee Murray-Group Limestone or Peake-Roby-Sherlock SDL resource units should be used to calculate annual average take for stock and domestic purposes (should future take occur); and
- The method for calculating annual actual take from the Renmark Group Aquifer is set out in the index document for the water resource plan.

Estimates of Long-Term Annual Average Quantity of Take
No licensed or non-licensed take currently occurs from the Renmark Group Aquifer, therefore to fulfill the requirements of s 10.44 of the Basin Plan:
- The long-term annual average quantity of water taken that is measured = 0 GL; and
- The long-term annual average quantity of water taken that is not measured = 0 GL.

If any new development for water supply or stock and domestic purposes occurs before completion of the SA Murray Region WRP, the values above for the long-term annual average quantity of water taken that is measured and not measured would need to be revised.

Recommendation 30
It is recommended that the long-term annual average quantity of water that is taken from the Renmark Group Aquifer as described above is set out in the index document for the water resource plan.
5.3.3 Peake-Roby-Sherlock (GS5)

Calculating Annual Take

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both.

For each of the Unconfined and Confined Aquifers:

\[ \text{Total Annual Take} = \text{Licensed take} + \text{NRM Act s 128 authorised take} + \text{Stock and domestic take} \]

Annual take for licensed purposes and authorised purposes is metered and therefore a measured value for this take can be provided each year. However, as identified in Section 5.2.1, some stock and domestic take may be taken through meters that record licensed take leading to double-counting. The approach presented in Section 4.3.2 to identify the level of conjunctive use from the Mallee Murray Group Limestone Aquifer SDL resource unit is also recommended here, irrespective of whether a review of stock and domestic take occurs.

Stock and domestic take is not metered and no annual estimation is made. The recommended option for managing stock and domestic take from both aquifers in Section 4.3.2 (rules for take) required no further assessment of the volume of stock and domestic take unless licensed take reaches a pre-determined value. Assuming that this fit for purpose option is accepted, then it is reasonable to assume that an annual estimate of stock and domestic take would also not be required. Instead, the annual average take of 0.19 GL for the Unconfined Aquifer and 0.41 GL for the Confined Aquifer that was used for the determination of the SDL for this resource unit could be used.

The estimate of take for stock and domestic purposes within the Peake, Roby and Sherlock WAP has little supporting information or reference as to how the 2 ML per bore was determined (refer Section 3.2.3). As part of amendments to the Peake, Roby and Sherlock WAP the method used to estimate stock and domestic take for the Mallee WAP could be applied.

An improvement in the current estimates of stock and domestic take across all SDL resource units in the SA Murray Region WRP area would allow current and future take to be accounted for appropriately and consistently, ensuring that more robust estimates are used. It would also reduce the level of double accounting within annually reported figures for prescribed water resources such as in the Peake-Roby-Sherlock (Confined and Unconfined) SDL resource unit. MDBA (2013) highlighted that a key element of the method used to determine the annual permitted take is that there is no double-counting of the various forms of take. It is reasonable that this extends to the double-counting within the calculation of the annual take.

If a review is then not possible, the methods and assumptions behind the 2 ML per bore per year used to determine 0.19 GL and 0.41 GL values should be documented. The identification of those bores where licensed take occurs conjunctively with stock and domestic take could be undertaken through the annual water use report forms or the new self-meter reading forms.
Recommendation 31

It is recommended that for the Unconfined and Confined Aquifers individually:

- The annual actual take comprise the measured take for licensed and authorised purposes and an annual average value for stock and domestic purposes;
- In the absence of any revised estimate, take by stock and domestic purposes should be the value included in the current Peake, Roby and Sherlock WAP and subsequently in the SDL determination;
- The above is put forward to the MDBA during fit for purpose negotiations;
- The method above is used for the annual reporting on take as required by Section 71 of the Water Act;
- An assessment of the magnitude of the double-counting of licensed take and stock and domestic take due to conjunctive take is undertaken, which includes the incorporation of additional information requirements on either the annual water use report forms or the new self-meter reading forms to identify those bores where conjunctive take occurs;
- Determine what would be involved in developing an updated assessment of the current estimate for stock and domestic take [refer to recommendation in Section 5.3.4] and then assess the next steps based on this determination; and
- The method for calculating annual actual take is set out in the index document for the water resource plan.

Estimates of Long-Term Annual Average Quantity of Take

An assessment of the long-term annual average take for all forms of take is required under s 10.44 of the Basin Plan. To fulfill these requirements for the Unconfined and Confined Aquifers:

- Best estimate of the long-term annual average quantity of water taken that is measured – metered water use data for licensed take and any s 128 authorised take (none currently occurring) should be used to determine this value for each aquifer.
  - The best estimate of the long-term average water use is likely to be an average of the licensed use and any s 128 authorised use over the period that data is available. Generally, data is available for the period since a groundwater resource was prescribed, the first WAP developed and licenses issued. In this case, data is available from 2005-06.
  - To prepare a single dataset of measured water use data since 2005-06 for each aquifer, an assessment of the meter data held in WILMA and use data provided through the Annual Water Use reports should be undertaken, reconciling any differences.
  - The majority of the water use in the dataset should be represented by metered data. However, in some cases estimates for water use have been required (and included as part of the metered water use data set) due to issues such as equipment failure or where a meter has not been installed for part of a year. These estimates should still be included as part of the data set to determine take that is measured. To separate out water use by individual licences for short periods of time and attempt to reconcile this use within the long-term average use that is not measured would not be an efficient use of resources nor likely provide any better overall estimation of long-term average take that is measured.
- **Best estimate of the long-term annual average quantity of water taken that is not measured** – the current best estimates are 0.19 GL from the Unconfined Aquifer and 0.41 GL from the Confined Aquifer, which are estimates of the annual take for stock and domestic purposes included in the Peak, Roby and Sherlock WAP and used in the development of the SDL. If the current estimate of stock and domestic take is revised, then this would be used.

- **How the quantities above were calculated** – This will require documentation of the method used to determine the long-term annual average quantity of water taken, particularly the component that is estimated. As described above, there is little supporting information for the value used in the Peake, Roby and Sherlock WAP, hence the recommendation above to document the assumptions behind this value.

- **The proportion of the quantity that is measured in accordance with agreed measuring standards** – this is currently not applicable as no standards for measuring have been agreed by the Basin Plan States and the Commonwealth. However, once standards are agreed, the alignment of South Australia’s State Metering Policy with these standards should be undertaken.

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**Recommendation 32**

It is recommended that:

- Estimation of the long term average annual quantity of water that is taken for each form of take from the Unconfined and Confined Aquifers in the Peake-Roby-Sherlock SDL resource unit is undertaken in accordance with the method described above. For each aquifer this will require:
  - Datasets of licensed take from 2005-06, prepared through an assessment of the meter data held in WILMA and the use data provided through the Annual Water Use reports. Estimates of licensed use within WILMA should be included; and
  - The current estimates of annual average stock and domestic take, unless this is revised.

- The above is put forward to the MDBA during fit for purpose negotiations;

- A paper is prepared that summarises the methods used to determine the annual average quantities of water taken that are measured and estimated;

- Once standards for measuring take have been agreed by the Basin States and Commonwealth, a paper is produced that details how South Australia’s State Metering Policy aligns with those standards; and

- The long-term annual average quantity of water taken from the Unconfined and Confined Aquifers in the Peake-Roby-Sherlock SDL resource unit is set out in the index document for the water resource plan.

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### 5.3.4 SA Murray (GS6)

**Calculating annual take**

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both. As indicated in Section 5.2.1, there are no currently no arrangements in place to calculate annual take for the SA Murray SDL resource unit.

Given that water use is not licensed, the most practical and cost effective method of calculating take for this area would be to estimate take.
As discussed in Section 3.2.3, current levels of take in the SA Murray SDL resource unit are not well understood and the estimate for the BDL has a low level of confidence. However, given the large difference between the BDL and SDL for this non-prescribed groundwater SDL resource unit, combined with a low risk of a significant increase in use (DEWNR 2015), using the current BDL estimate is reasonable. Despite this, an improvement in the current estimates of stock and domestic take across all SDL resource units in the SA Murray Region WRP area would allow current and future take to be accounted for appropriately and consistently, ensuring that more robust estimates are used.

Once compliant rules for take are implemented it is recommended that processes are put in place to estimate new take from the SDL resource unit based on well permits and land use change. Once these arrangements are in place, it will be possible to estimate annual take by adding estimated additional volumes taken each year on a cumulative basis to the estimation of current take.

**Recommendation 33**

It is recommended that:

- A method for estimating additional take based on new well permits and changes in land use is developed and applied to report on annual take;
- The estimate of additional take is added to the estimation of current take (BDL or revised estimate) and used for annual reporting on take as required by section 71 of the Water Act; and
- The most appropriate method to estimate take as determined above is set out in the index document for the water resource plan.

**Estimates of long-term annual average quantity of take**

While the Basin Plan only requires best estimates for each class of water access right, the Water Resource Planning Handbook indicates that all forms of take (i.e. licensed entitlement, basic rights, interception and unauthorised take) should be included.

The following information could be used to address this requirement.

- Best estimate of the long-term annual average quantity of water taken that is measured – 0 GL
  
  As outlined in Sections 3.2.2 and 3.2.3, the water resources of the SA Murray SDL resource unit are unlicensed and unmonitored. Therefore, it is not currently possible to provide a best estimate of the long-term annual average quantity of water taken that is measured.

- Best estimate of the long-term annual average quantity of water taken that is not measured – 1.8 GL stock and domestic use (current BDL estimate).
  
  As indicated in Section 3.2.3, the best estimate of the long-term annual average quantity of water taken that is not measured is the estimate of stock and domestic use used for the BDL, noting that confidence in this estimate is low. If this estimate is revised, then the revised value would be used.

- How the quantities above were calculated – This will involve describing the method used to estimate the long term annual average quantity of water taken.

- The proportion of the quantity that is measured in accordance with the standards for measuring – 0 %
  
  As indicated above, none of the take in the SDL resource unit is measured.
**Recommendation 34**

It is recommended that:

- The current estimate of stock and domestic take is used as the best estimate of the long-term annual average quantity of water taken that is not measured, unless this value is updated; and
- The long-term annual average quantity of water that is taken for each form of take is set out in the index document of the water resource plan.

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**5.3.5  SA Murray Salt Interception Schemes (GS7)**

**Calculating Annual Take**

The Basin Plan requires that annual actual take for all forms of take for consumptive purposes is either measured, estimated or a combination of both.

For the SA Murray SIS SDL resource unit, assuming that it is agreed that any current take via stock, domestic and forestry purposes is very minor and is not required to be accounted for under the SDL, the total annual take is as follows:

**Total Annual Take = Extraction via Salt Interception Schemes**

All extractions via the salt interceptions schemes are metered and therefore a measured value for this take can be provided each year.

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**Recommendation 35**

It is recommended that:

- The annual actual take comprise the measured take from the salt interception schemes; and
- The method for calculating annual actual take is set out in the index document for the water resource plan.

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**Estimates of Long-Term Annual Average Quantity of Take**

An assessment of the long-term annual average take for all forms of take is required under s 10.44 of the Basin Plan. To fulfill these requirements:

- **Best estimate of the long-term annual average quantity of water taken that is measured** – metered water use data for the salt interception schemes should be used to determine this value.
  
  o There are currently seven salt interception schemes that have progressively become operational since 1991 (refer Section 2.2.2). The total annual take has therefore increased over time with the addition of each new scheme. The recorded annual take for each scheme is held by SA Water.
  
  o Consideration needs to be given to the method used to determine the long-term average. There are a number of options for determining the long-term average annual take including:
    
    1. An average of the recorded take since 1990-91 is one option, similar to the calculations for licensed take in the Mallee and Peake-Roby-Sherlock SDL resource units. However, this does not take into account the changing level of development.
2. Combine the average take calculated for each scheme over its individual period of operation. This would provide an average take that is based on the current level of development.

   o Applying the first method above to the data until the end of 2013-14 gives a value of 9.78 GL. The second method gives 11.97 GL. Given the differences, the method needs to be considered and documented.

- **Best estimate of the long-term annual average quantity of water taken that is not measured** – assuming that it is agreed that any current take via stock, domestic and forestry purposes is very minor and is not required to be accounted for under the SDL, there will be no estimate required for take that is not measured.

- **How the quantities above were calculated** – This will require documentation of the method chosen to determine the long-term annual average quantity of water taken, as described above.

- **The proportion of the quantity that is measured in accordance with agreed measuring standards** – this is currently not applicable as no standards for measuring have been agreed by the Basin Plan States and the Commonwealth. However, once standards are agreed, the alignment of the methods used to monitor take via the salt interception schemes with these standards should be undertaken.

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- **Estimation of the long term average annual quantity of water that is taken for each form of take from the SA Murray Salt Interception Schemes SDL resource unit is undertaken in accordance with the method described above. This will require the recorded dataset of take via the salt interception schemes (data since 1990-91);**

- **A paper is prepared that outlines the preferred option for determining the annual average quantities of water taken;**

- **The above is put forward to the MDBA during fit for purpose negotiations;**

- **Once standards for measuring take have been agreed by the Basin States and Commonwealth, a paper should be produced that details how the methods used to monitor take via the salt interception schemes aligns with those standards; and**

- **The long-term annual average quantity of water that is taken for each form of take from the SA Murray SIS resource unit is set out in the index document for the water resource plan.**
6 REPORTING AND COMPLIANCE

6.1 Water Act and Basin Plan Reporting and Compliance Requirements

6.1.1 Section 71 Annual Reporting Requirements

Section 71 of the Water Act requires that:

1) a Basin State must, within 4 months after the end of a water accounting period for a water resource plan area, give the MDBA a written report that sets out the following:

(a) The quantity of water available;
(b) The quantity of water permitted to be taken;
(c) The quantity of water actually taken;
(d) Details of the water allocations made;
(e) Details of any other decisions made by, or under the law of, the Basin State, that permit the taking of water;
(f) Details of the trading or transfer of tradeable water rights;
   (i) within the area;
   (ii) into the area; and
   (iii) from the area.
(g) An assessment of compliance with any long-term annual diversion limit in accordance with the method specified in the Basin Plan;

(h) If there has been a non-compliance with any long-term annual diversion limit – the actions that the Basin State proposes to take to ensure that the limit is complied with in the future.

The MDBA may, in writing, extend the period within which the report must be provided.

6.1.2 Method for Determining Compliance with the Basin Plan Long-Term Annual Diversion Limit

Sections 6.10, 6.11 and 6.12 of the Basin Plan explicitly set out the process for determining compliance with the long-term annual diversion limit. This method applies to each water accounting period after 30 June 2019 following the commencement of a water resource plan relating to the SDL resource unit.

6.10 Step 1 – Calculate annual permitted take and annual actual take

1) For a water accounting period, sum the maximum quantity of water permitted to be taken by each form of take for consumptive use from the SDL resource unit, determined in accordance with the method for section 10.10 (annual permitted take).

2) For the same water accounting period, sum the quantity of water actually taken by each form of take for consumptive use from the SDL resource unit (annual actual take).
6.11 Step 2 – Record the difference between annual actual take and annual permitted take

1) If the annual actual take is greater than the annual permitted take, the difference must be recorded on the register of take for the SDL resource unit as a debit.

2) If the annual actual take is less than the annual permitted take, the difference must be recorded on the register of take as a credit.

3) If there is no difference between the annual actual take and the annual permitted take, a zero must be recorded on the register of take in both the debit column and the credit column.

4) As a result of the record made under subsections (1) to (3):
   (a) Determine the new cumulative balance of the difference between annual permitted take and annual actual take for the SDL resource unit; and
   (b) Record this balance on the register of take as either a cumulative debit, cumulative credit, or a zero.

6.12 Step 3 – Determine whether there is non-compliance

1) There is a non-compliance with a long-term annual diversion limit for an SDL resource unit in a water accounting period if:
   (a) The cumulative balance for an SDL resource unit, adjusted to account for any disposal or acquisition of held environmental water, is a debit amount equal to or greater than 20% of the long-term annual diversion limit for the SDL resource unit; and
   (b) The Basin State does not have a reasonable excuse for the excess.

2) This relates to Victorian SDL resource units only.

3) A Basin State may not claim that there is a reasonable excuse for an excess unless it has provided a report to the Authority setting out:
   (a) The reasons for the excess; and
   (b) The steps the Basin State will take to reduce the cumulative balance of the register to zero or less.

4) A Basin State is taken to have a reasonable excuse for an excess if the excess arises as the result of:
   (a) The operation of the water resource plan for the SDL resource unit; or
   (b) Circumstances beyond the Basin State’s control (for example where, for reasons beyond the Basin State’s control, the Commonwealth has not achieved the water recovery target that it has set for itself in relation to the SDL resource unit).

Section 6.12 of the Basin Plan also contains a note that states that if deemed necessary, the Authority may undertake an audit in relation to compliance using its powers under the Water Act. The findings of the audit may

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26 The Authority must establish and maintain a register of take for each SDL resource unit in accordance with s 6.08 of the Basin Plan. This register of take includes the debits, credits and cumulative balance with respect to the differences between the annual permitted take and the annual actual take. When a register of take commences for an SDL resource unit, the cumulative balance must be zero.

27 The process also relates directly to the annual reporting under s 71(1)(g) and (h) as listed above.
be published, including steps that should be taken to bring the SDL resource unit back to balance. The findings of the audit may also lead to further action being taken by the Authority to ensure compliance with other sections of the Water Act.

6.2 State Annual Reporting and Compliance Arrangements

The current South Australian management arrangements with respect to the annual reporting requirements of Section 71 of the Water Act are outlined below.

Section 71(1)(a) was not reported on in 2012-13. The reasons for this and the requirements for 2013-14 are discussed in Section 6.2.1 below.

Section 71(1)(b) requires the quantity of water permitted to be taken to be reported on. The MDBA advised in July 2013 there were currently no accredited WRPs setting out the methods for determining annual permitted take and as such, further consultation was required before this matter could be reported on. While the 2013-14 surface water reporting template does not contain a field for this reporting requirement, the 2013-14 groundwater template does. Despite their still not being any accredited WRPs, it is reasonable that this field include what is currently permitted to be taken. Where applicable, this is the approach used below.

6.2.1 Water Available – Section 71(1)(a)

Section 71(1)(a) requires the quantity of water available to be reported on. However, the term “water available” is not defined in the Water Act nor in the Basin Plan. The MDBA advised in July 2013 that until additional work undertaken on the definition of water available for s 71 reporting, no new information (other than that already provided through Cap reporting) was required. A draft paper for discussion was released in July 2014 (MDBA 2014) to the Basin Plan Implementation Committee – Water Resource Planning Working Group. Consultation is continuing and the MDBA advised in July 2014 that reporting on this item is not required for 2013-14.

MDBA (2014) stated that quantifying the annual available groundwater can be problematic due to the nature of groundwater systems and the proportion of groundwater storage that is generally available for consumptive use. For reporting purposes only, and in consideration of the contextual reference to surface water availability in the Basin Plan, it was proposed that the water available for a groundwater SDL resource unit be representative of the long-term annual recharge volume. This reflects the fact that not all recharge is allocated or available for consumptive use and is in recognition of a more pragmatic approach to data limitations in determining recharge volumes on an annual basis. MDBA (2012b) estimated the long-term average recharge volumes as part of the development of the BDL (refer Section 3.1.3) and so using this parameter would result in no additional reporting requirement from the States.

However, there are a number of aquifers in the Murray–Darling Basin that receive negligible recharge. These include the Murray Group Limestone and Renmark Group Aquifers in the Mallee SDL resource unit and the Confined and Unconfined Aquifers in the Peake-Roby-Sherlock SDL resource unit. For non-renewable resources such as these, MDBA (2014) indicated that the allowable extraction volume (SDL) is the most appropriate definition of water available.

Despite advice that reporting on water available would not be required for 2013-14 and the information within MDBA (2014), the groundwater template provided by the MDBA requests (as a trial) that the water available be reported as the long-term annual recharge volume. This is required where the recharge is greater than 0 GL per year. Where it is 0 GL per year, the water available has been specified as Not Applicable. The inclusion of only this
recharge term to represent the water available requires further discussion with the MDBA, particularly with respect to those aquifers with essentially non-renewable resources and very low estimated recharge such as the Mallee Murray Group Limestone SDL resource unit. There appears inconsistency between reporting a very small value versus a statement of Not Applicable where there is no recharge. It would normally be expected that the water available would be greater than the quantity of water permitted to be taken and the water allocated. In a system with very small volumes of recharge but a large storage volume this may not be the case and it may raise unnecessary concern when the reports are published. This will be followed up further with the MDBA through the Water Resource Planning Working Group.

The long-term average recharge volumes from MDBA (2012b) have been included as the water available under s 71(1)(a) for the groundwater SDL resource units. No information is provided for the South Australian Non-Prescribed Areas (SS10) as water available has not requested in the 2013-14 surface water template.

### 6.2.2 South Australian Non-Prescribed Areas (SS10)

**Water permitted to be taken** [s 71(1)(b)]

As outlined in 4.2.1, annual determinations of water permitted to be taken are not currently made for the South Australian Non-Prescribed Areas SDL resource unit.

Section 4.3.1 recommends that once a single limit of take has been developed and applied for this SDL resource unit, this should be used as the maximum quantity of water permitted to be taken during an accounting period.

**Water take** [s 71(1)(c)]

As outlined in Section 5.2.1, actual annual take is not calculated for the water resources in the South Australian Non-Prescribed Areas.

A process to determine the most appropriate method for calculating actual annual take is outlined in Section 5.3.1.

**Annual water allocation** [s 71(1)(d)]

Water allocations are not made in this SDL resource unit.

**Other decisions that permit the taking of water** [s 71(1)(e)]

The respective NRM plans set out the rules for taking of water in this SDL resource unit as outlined in Sections 3.2.2 and 4.2.2 of this document. Should other decisions that permit the taking of water be relevant to a particular water year, these decisions are likely to be published in the Government Gazette.

**Trade** [s 71(1)(f)]

As the water resources in this SDL resource unit are not prescribed, there is no ability to trade within, into and from the SDL resource unit.

**Compliance with long-term annual diversion limit** [s 71(1)(g) to s 71(1)(h)]

Annual assessments of compliance with the limits set in the respective NRM plans (where relevant) are not currently undertaken. Compliance with long-term annual diversion limit could be assessed by checking the annual actual take against the annual permitted take and keeping record of the cumulative balance of credits and debits.
6.2.3 Mallee (GS3)

The background information for the State arrangements with respect to the s 71 reporting requirements is the same for each of the Pliocene Sands, Murray Group Limestone and Renmark Group Aquifers. As such, they are evaluated together below, with differences explicitly stated where necessary.

Water available [s 71(1)(a)]

The estimated long-term annual recharge volume (MDBA 2012b) is as follows:

- Pliocene Sands – 267.5 GL
- Murray Group Limestone – 5.02 GL
- Renmark Group – 0 GL (reported as N/A in s 71 template)

Water permitted to be taken [s 71(1)(b)]

The quantity of water permitted to be taken each year only relates to licensed take and take permitted under an NRM Act s 128 authorisation. For licensed take, this is a sustainable limit under the Mallee and Noora WAPs, that is, the total volume permitted to be taken annually is the cumulative volume issued on licence (refer Section 4.2.1).

As stock and domestic take is unlicensed, there is no limit on the volume that is permitted to be taken. In terms of s 71 reporting, the annual permitted take for stock and domestic purposes has been assumed to be the estimated annual demand included in the Mallee and Noora WAPs and in the calculation of the SDL.

For s 71 reporting, the water permitted to be taken is currently determined as follows:

- Pliocene Sands – 0 GL as there is no licensed take nor stock and domestic take.
- Murray Group Limestone – 68.376 GL. This is the sum of the estimated annual stock and domestic demand (2.278 GL), the cumulative volume on licence (60.098 GL\(^{28}\)) and the maximum annual take under the s 128 authorisation (6.0 GL\(^{29}\)).
- Renmark Group – 0 GL as there is no licensed take nor stock and domestic take.

Section 4.3.2 recommends that the annual permitted take be set as single limits equal to the individual SDLs:

- Pliocene Sands – 41.4 GL.
- Murray Group Limestone – 63.578 GL (adjusted from 65.7 GL as per recommendation in Section 3.3.3, and assuming the current management arrangements for carryover allocations and trade under the Mallee WAP in Section 4.3.2).
- Renmark Group – 2.0 GL.

Once agreed through accreditation of the SA Murray Region WRP, these values will be used as the quantity of water permitted to be taken from the respective aquifers for subsequent s 71 reporting.

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\(^{28}\) This is the total volume on licence now that the volumetric conversion process has been completed (subject to any further adjustment as a result of appeals). For 2012-13 the volume reported was slightly higher as it included a component that was converted from haIE.

\(^{29}\) The allocation and take for the s 128 authorisation was overlooked for 2012-13 reporting but will be included from 2013-14 until it expires or upon accreditation of the SA Murray Region WRP plan, whichever comes first.
**Water take [s 71(1)(c)]**

Section 5.2.1 outlines the information available to determine the annual actual take. There is currently no take for any purpose from either of the Pliocene Sands or Renmark Group Aquifers and as such the annual take is 0 GL.

Within the Murray Group Limestone Aquifer take for licensed purposes and under NRM Act s 128 authorisations is metered. However, it was identified that there is likely to be some double-counting of stock and domestic take that is taken through meters that also record licensed take. Stock and domestic take is not metered and no annual estimation is made.

The annual actual take from the Murray Group Limestone Aquifer therefore comprises the following:

\[
\text{Total Annual Take} = \text{Metered Licensed take} + \text{Metered NRM Act s 128 authorised take} + \text{Annual average demand for stock and domestic purposes}
\]

As an initial step to identifying the potential magnitude of the double-counting of stock and domestic take, a proposal to identify those bores where conjunctive use occurs was recommended in Section 5.3.2.

It is not likely to be cost effective to monitor stock and domestic take and as such this has not been recommended. Unless an update to the current value is undertaken (refer recommendation in Section 5.3.2), this value will continue to be 2.278 GL per year.

**Annual water allocation [s 71(1)(d)]**

Annual allocations only relate to licensed take. As for the water permitted to be take above, the annual allocation for licensed purposes in the form of a sustainable limit under the Mallee and Noora WAPs, that is, the total volume allocated annually is the cumulative volume issued on licence.

In the 2013-14 groundwater reporting template, the MDBA have specified that as a trial this reporting requirement will be the allocation announcement as applied to water access entitlements in a given water accounting period (as a percentage).^30^ There are currently no licensed purposes in either of the Pliocene Sands or Renmark Group Aquifers and therefore the annual allocation is 0%.

For the Murray Group Limestone Aquifer, the annual allocation will be 100%, unless a notice of restriction under section 132 of the NRM Act is issued.

**Other decisions that permit the taking of water [s 71(1)(e)]**

This reporting requirement includes any decisions that permit the taking of water other than under licensed water access entitlements.

There is not currently take for any purpose in either of the Pliocene Sands or Renmark Group Aquifers.

^30^ In 2012-13, the estimated annual stock and domestic demand was included under s 71(1)(d) despite this not being an actual allocation. This will now be included under s 71(1)(e).
For the Murray Group Limestone Aquifer, other permitted forms of take are as follows:

- An NRM Act s 128 authorisation that specifies a maximum volume (6.0 GL) that may be taken each year. Note that this authorisation is only in place until 30 June 2017.

- Stock and domestic take. As this is unlicensed, there are no allocations made (annual or otherwise). Given a volume is required under this reporting field in the 2013-14 groundwater template, this will be reported on as the estimated annual demand for stock and domestic purposes included in the Mallee and Noora WAPs and used in the calculation of the SDL. Unless an update to the current value is undertaken (refer recommendation in Section 5.3.2), this value will continue to be 2.278 GL per year.

Trade [s 71(1)(f)]

Section 4.3.2 outlined the arrangements for trade within the Mallee SDL resource unit.

Trade is only applicable with respect to licensed entitlements. As there are no licensed entitlements from the Pliocene Sands or Renmark Group Aquifers, trade is not applicable.

With respect to the Murray Group Limestone, any trade (temporary or permanent) of licensed entitlements can only occur within the Mallee PWA. It is also only possible to trade between specified management zones as listed in the Mallee WAP. There are no licensed entitlements in the Noora PWA so trade is not applicable.

Compliance with long-term annual diversion limit [s 71(1)(g) to s 71(1)(h)]

Annual compliance is assessed with respect to the terms and conditions on water access entitlements for licensed take and any NRM Act s 128 authorisations. This includes compliance with annual take limits (including allocations and trade).

Section 4.2.1 outlined a number of responses to non-compliance with respect to annual take limits. A penalty may be issued to those who take water in an unauthorised or unlawful manner under Section 115 of the NRM Act and a water management authorisation may be cancelled or suspended under s 164P of the NRM Act if water in excess of any entitlement is taken or other licence conditions are breached.

6.2.4 Peake-Roby-Sherlock (GS5)

Peake-Roby-Sherlock (unconfined)

The background information for the State arrangements with respect to the s 71 reporting requirements is the same for each of the Unconfined and Confined Aquifers. As such, they are evaluated together below, with differences explicitly stated where necessary.

Water available [s 71(1)(a)]

The estimated long-term annual recharge volume (MDBA 2012b) is as follows:

- Unconfined Aquifer – 0 GL (reported as N/A in s 71 template)
- Confined Aquifer – 0 GL (reported as N/A in s 71 template)

Water permitted to be taken [s 71(1)(b)]

The quantity of water permitted to be taken each year only relates to licensed take and take permitted under an NRM Act s 128 authorisation. For licensed take, this is a sustainable limit under the Peake, Roby and Sherlock
WAP, that is, the total volume permitted to be taken annually is the cumulative volume issued on licence (refer Section 4.2.1).

As stock and domestic take is unlicensed, there is no limit on the volume that is permitted to be taken. In terms of s 71 reporting, the annual permitted take for stock and domestic purposes has been assumed to be the estimated annual demand included in the Peake, Roby and Sherlock WAP and in the calculation of the SDL.

For s 71 reporting, the water permitted to be taken is currently determined as follows:

- **Unconfined Aquifer** – 0.482 GL. This is the sum of the estimated annual stock and domestic demand (0.19 GL) and the cumulative volume on licence (0.292 GL).
- **Confined Aquifer** – 2.33 GL. This is the sum of the estimated annual stock and domestic demand (0.41 GL) and the cumulative volume on licence (1.92 GL).

Section 4.3.3 recommends that the annual permitted take be set as single limits equal to the individual SDLs:

- **Unconfined Aquifer** – 3.41 GL (assuming the current management arrangements for carryover allocations and trade under the Peake, Roby and Sherlock WAP in Section 4.3.3).
- **Unconfined Aquifer** – 2.58 GL (assuming the current management arrangements for carryover allocations and trade under the Peake, Roby and Sherlock WAP in Section 4.3.3).

Once agreed through accreditation of the SA Murray Region WRP, these values will be used as the quantity of water permitted to be taken from the respective aquifers for subsequent s 71 reporting.

**Water take [s 71(1)(c)]**

Section 5.2.1 outlines the information available to determine the annual actual take.

Take for licensed purposes is metered, however, it was identified that there is likely to be some double-counting of stock and domestic take that is taken through meters that also record licensed take. Stock and domestic take is not metered and no annual estimation is made.

The annual actual take from each of the Unconfined and Confined Aquifers therefore comprises the following:

\[
\text{Total Annual Take} = \text{Metered Licensed take} + \text{annual average demand for stock and domestic purposes}
\]

As an initial step to identifying the potential magnitude of the double-counting of stock and domestic take, a proposal to identify those bores where conjunctive use occurs was recommended in Section 5.3.3.

It is not likely to be cost effective to monitor stock and domestic take and as such this has not been recommended. Unless an update to the current values is undertaken (refer recommendation in Section 5.3.3), these values will continue to be 0.19 GL per year for the Unconfined Aquifer and 0.41 GL per year for the Confined Aquifer.

**Annual water allocation [s 71(1)(d)]**

Annual allocations only relate to licensed take. As for the water permitted to be take above, the annual allocation for licensed purposes in the form of a sustainable limit under the Peake, Roby and Sherlock WAP, that is, the total volume allocated annually is the cumulative volume issued on licence.
In the 2013-14 groundwater reporting template, the MDBA have specified that as a trial this reporting requirement will be the allocation announcement as applied to water access entitlements in a given water accounting period (as a percentage)\(^{31}\).

For both the Unconfined and Confined Aquifers the annual allocation will be 100%, unless a notice of restriction under section 132 of the NRM Act is issued.

**Other decisions that permit the taking of water** [s 71(1)(e)]

This reporting requirement includes any decisions that permit the taking of water other than under licensed water access entitlements.

The only other permitted form of take is for stock and domestic purposes. As this is unlicensed, there are no allocations made (annual or otherwise). Given a volume is required under this reporting field in the 2013-14 groundwater template, this will be reported on as the estimated annual demand for stock and domestic purposes included in the Peake, Roby and Sherlock WAP and used in the calculation of the SDL. Unless an update to the current values is undertaken (refer recommendation in Section 5.3.3), these value will continue to be 0.19 GL per year for the Unconfined Aquifer and 0.41 GL per year for the Confined Aquifer.

**Trade** [s 71(1)(f)]

Section 4.3.3 outlined the arrangements for trade within the Peake-Roby-Sherlock SDL resource unit.

Trade (temporary or permanent) of licensed entitlements can only occur within the Peake, Roby and Sherlock PWA. There is no trade permitted between the aquifers. It is also only possible to trade between specified management zones within the aquifers as listed in the Peake, Roby and Sherlock WAP.

**Compliance with long-term annual diversion limit** [s 71(1)(g) to s 71(1)(h)]

Annual compliance is assessed with respect to the terms and conditions on water access entitlements for licensed take and any NRM Act s 128 authorisations. This includes compliance with annual take limits (including allocations and trade).

Section 4.2.1 outlined a number of responses to non-compliance with respect to annual take limits. A penalty may be issued to those who take water in an unauthorised or unlawful manner under Section 115 of the NRM Act and a water management authorisation may be cancelled or suspended under s 164P of the NRM Act if water in excess of any entitlement is taken or other licence conditions are breached.

### 6.2.5 SA Murray (GS6)

**Water available** [s 71(1)(a)]

The estimated long-term annual recharge volume (MDBA 2012b) is 483.3 GL per year.

**Water permitted to be taken** [s 71(1)(b)]

As outlined in 4.2.1, annual determinations of water permitted to be taken are not made for the SA Murray SDL resource unit.

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\(^{31}\) In 2012-13, the estimated annual stock and domestic demand was included under s 71(1)(d) despite this not being an actual allocation. This will now be included under s 71(1)(e).
Water take [s 71(1)(c)]

As outlined in Section 5.2.1, actual annual take is not calculated for the water resources in the SA Murray SDL resource unit.

A process to determine the most appropriate method for calculating actual annual take is outlined in Section 5.3.4.

Annual water allocation [s 71(1)(d)]

Annual water allocations are not made in this SDL resource unit.

Other decisions that permit the taking of water [s 71(1)(e)]

The respective NRM plans set out the rules for taking of water in this SDL resource unit as outlined in Sections 3.2.2 and 4.2.2 of this document. Should other decisions that permit the taking of water be relevant to a particular water year, these decisions are likely to be published in the Government Gazette.

Trade [s 71(1)(f)]

As the water resources are not prescribed, there is no ability to trade within, into and from the SDL resource unit.

Compliance with long-term annual diversion limit [s 71(1)(g) to s 71(1)(h)]

Annual assessments of compliance with the limits set in the respective NRM plans (where relevant) are not currently undertaken. Compliance with long-term annual diversion limit could be assessed by checking the annual actual take against the annual permitted take and keeping record of the cumulative balance of credits and debits.

6.2.6 SA Murray Salt Interception Schemes (GS7)

DEWR (2015) identified four bores for stock and domestic purposes and dryland forestry with an area of 0.008% of the total SDL resource unit area (refer Section 3.2.3). Section 3.3.6 recommended that any current take via these stock, domestic and forestry purposes is minor and should not be accounted for under the SDL. The information below assumes that this recommendation is accepted.

Water available [s 71(1)(a)]

The estimated long-term annual recharge volume (MDBA 2012b) is 40.41 GL per year.

Water permitted to be taken [s 71(1)(b)]

The quantity of water permitted to be taken each year only relates to licensed take and take permitted under an NRM Act s 128 authorisation. This only relates to take within the Noora PWA component of this SDL resource unit. In this area there is currently only one licence of 2.144 GL issued for the Murtho scheme. The water permitted to be taken for this licence is in the form of a sustainable limit under the Noora WAP, that is, the total volume permitted to be taken annually is the cumulative volume issued on licence (refer Section 4.2.1).

The water permitted to be taken from this SDL resource unit was not reported on in 2012-13. That take under the single licence issued is a small proportion of the overall take by the salt interception schemes, as shown by the BDL of 11.1 GL. There is clearly an inconsistency between the volume of water permitted to be taken and the BDL due to the large area that is not prescribed.
Section 4.3.5 recommends that the annual permitted take be set as a single limit equal to the SDL of 28.6 GL. Once agreed through accreditation of the SA Murray Region WRP, this value will be used as the quantity of water permitted to be taken from the respective aquifers for subsequent s 71 reporting. It is recommended that reporting on the water permitted to be taken for the SA Murray SIS SDL resource unit does not occur until this time.

**Recommendation 37**

It is recommended that the water permitted to be taken in the SA Murray Salt Interception Schemes SDL resource unit is not reported on through the annual Section 71 reporting process until accreditation of the SA Murray Region water resource plan occurs.

**Water take** [s 71(1)(c)]

Meters are installed to measure the annual volume taken via all salt interception scheme bores, as outlined in Section 5.2.1. This volume is currently reported on as the annual actual take.

**Annual water allocation** [s 71(1)(d)]

Annual allocations only relate to licensed take. As above, the only licence issued for SIS purposes is for the Murtho scheme. No other annual water allocations are made within this SDL resource unit.

No annual allocation was reported on in 2012-13. As for annual permitted take, it is recommended that the annual water allocation is not reported on until accreditation of the SA Murray Region WRP.

**Other decisions that permit the taking of water** [s 71(1)(e)]

This reporting requirement includes any decisions that permit the taking of water other than under licensed water access entitlements. There are no other forms of take to be reported on at this time. It is unclear whether take via the non-licensed salt interception schemes would need to be reported as part of this category in the future.

**Trade** [s 71(1)(f)]

Trade is only applicable with respect to licensed entitlements. As there is only one licensed entitlement, trade is not applicable.

**Compliance with long-term annual diversion limit** [s 71(1)(g) to s 71(1)(h)]

Annual compliance is assessed with respect to the terms and conditions on water access entitlements for licensed take within the Noora PWA, including compliance with annual take limits. This currently only relates to the licence held for the Murtho SIS. Section 4.2.1 outlined a number of responses to non-compliance with respect to annual take limits.
7 INTERCEPTION ACTIVITIES

7.1 Basin Plan Requirements for Interception Activities

Section 10.23 relates to listing types of interception activities and requires the following:

(1) A water resource plan must, having regard to the risk identification and assessment conducted for section 10.41, specify whether there are any types of interception activity in the water resource plan area which have the potential to have an impact on:

(a) the water resources of the water resource plan area; or

(b) water resources that are hydrologically connected to the water resources of the water resource plan area; whether on an activity-by-activity basis, or cumulatively.

(2) If there are any such types of interception activity, the water resource plan must list those types.

(3) For the purposes of determining whether a type of interception activity is of the kind referred to in subsection (1), regard must be had to the following factors:

(a) The location of particular activities of the type in the water resource plan area;

(b) The impact of the type of activity on the availability of:

(i) The water resources of the water resource plan area; and

(ii) Any water resources which are hydrologically connected to the water resources of the water resource plan area;

(c) The projected growth of the type of activity over the period for which the water resource plan will have effect.

The following are types of interception activity which may have a significant impact:

- Interception by runoff dams;
- Interception by commercial plantations;
- Interception by mining activities, including coal seam gas mining;
- Interception by floodplain harvesting.

The risk assessment undertaken for the water resource plan should directly inform this assessment.

Section 10.24 requires that if a water resource plan includes a list referred to in subsection 10.23(2), that it must also set out a process for monitoring the impact of these interception activities on:

a) The water resources of the water resource plan area;

b) Water resources which are hydrologically connected to the water resources of a water resource plan area.

Section 10.25 requires that a water resource plan must identify actions that will be taken in the event that the monitoring under section 10.24 shows that:

a) An impact of a type of interception activity comprises the meeting of an environmental watering requirement; or
b) An impact of several types of activity together compromises the meeting of an environmental watering requirement; or

c) There is an increase in the quantity of water being intercepted by a type of activity; after the commencement of the water resource plan.

This provision does not apply if the outcome listed above has already been accounted for in the method for determining the annual volume of water permitted to be taken.

7.2 Interception Activities and State Arrangements for Managing and Monitoring Interception Activities

7.2.1 Interception Activities

Interception by Farm Dams

Interception by farm dams is currently managed via water affecting activity provisions in the relevant NRM plans or under water allocation plans where the resource has been prescribed.

Interception by Commercial Forestry

*Managing the Water Resource Impacts of Plantation Forests – A Statewide Policy Framework* outlines a number of different options for managing the water resource impacts of commercial plantation forests including via a water license under the NRM Act, via a water-affecting activity permit under the NRM Act or via codes of practice and industry agreement. The applicability of these options depends on whether a water resource is prescribed or not under the NRM Act, the condition of and extent of pressure on water resources, the current and future likely extent of plantation forests, and their impacts relative to other water uses.

Interception by Mining

Interception by mining is currently unmanaged where the resource is not prescribed or managed under water allocation plans where the resource has been prescribed.

7.2.2 Managing and Monitoring Interception Activities

South Australian Non-Prescribed Areas (SS10)

Interception by Farm Dams

The best understanding of interception from farm dams is the estimate of the BDL outlined in Section 3.1.3. State arrangements for managing and monitoring dam construction in the area are set out in Sections 3.2.2 and 4.2.2.

Interception by Commercial Forestry

The Department holds spatial information on land use coverage which indicates the presence of approximately 2,804,553 m$^2$ of dry land forestry which would intercept run off within the SDL resource unit. This dryland forestry may also access water from the unconfined aquifer where it is shallower than 10m in depth. As a percentage of the SDL resource unit, dryland forestry coverage equates to 0.0005% and as such it is not considered a significant interception activity.
Interception by Mines

The Department's mineral tenements data GIS layer shows that there are a number of small mineral operations in the SDL resource unit. Some of these tenements may have expired.

Because the SDL resource unit is not prescribed, there is currently no way of knowing how much water (if any) these mines use or intercept, or the method by which this water is accessed (i.e. via a well, interception, dam or direct extraction from a watercourse,) or what type of water resource is being accessed (i.e. surface water or groundwater) unless this information was specifically required to be provided under the mining licence.

Mallee (GS3)

Interception by Commercial Forestry

Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Interception by Mines

Mining within the Mallee SDL resource unit is required to be licensed, or take authorised by an s 128 authorisation under the NRM Act. Under an s 128 authorisation a specified volume is permitted to be taken, take is measured and compliance is assessed. Any take is required to be within the SDL.

Peake-Roby-Sherlock (GS5)

Interception by Commercial Forestry

Spatial land use information (DEH 2008) indicates no dryland plantation forestry (DEWNR 2015).

Interception by Mines

Mining within the Peake-Roby-Sherlock SDL resource unit is required to be licensed, or take authorised by an s 128 authorisation under the NRM Act. Under an s 128 authorisation a specified volume is permitted to be taken, take is measured and compliance is assessed. Any take is required to be within the SDL.

SA Murray (GS6)

Interception by Commercial Forestry

The Department holds spatial information on land use coverage which indicates the presence of approximately 878,289 m² of dry land forestry which could access unconfined aquifers that are shallower than 10 m within the SDL resource unit. This dryland forestry would also access water from surface water runoff. As a percentage of the SDL resource unit, dryland forestry coverage equates to 0.0002% of the SDL resource unit and as such it is not considered a significant interception activity.

Interception by Mines

The Department’s mineral tenements data GIS layer shows that there are a number of small mineral operations in the SDL resource unit. Some of these tenements may have expired.

Because the SDL resource unit is not prescribed, there is currently no way of knowing how much water (if any) these mines use or intercept, or the method by which this water is accessed (i.e. via a well, interception, dam or direct extraction from a watercourse,) or what type of water resource is being accessed (i.e. surface water or groundwater) unless this information was specifically required to be provided under the mining license.
SA Murray Salt Interception Schemes (GS7)

Interception by Commercial Forestry

DEWNR (2015) identified dryland forestry with an area of 0.008% of the total SDL resource unit area that may access groundwater (refer Section 3.2.3). Section 3.3.6 recommended that any current take from this identified forestry is minor and should not be accounted for under the SDL. It is not considered a significant interception activity.

Interception by Mines

The mineral tenements data GIS layer held by DEWNR shows that there are no mineral operations in the SDL resource unit.

7.3 Alignment between State Arrangements and Basin Plan Requirements – with Recommendations

7.3.1 South Australian Non-Prescribed Areas (SS10)

The Basin Plan requires that water resource plans identify, monitor and manage any interception activities not accounted for in the annual permitted take, which have a significant impact on the water resources of the water resource plan area or hydrologically connected water resources.

It is considered that the potential impact of mining and forestry interception is not significant. Data and information from the risk assessment may be able to be used to support this conclusion. If this data and information is not considered adequate, further work may be required to justify why these activities have not been considered significant interception activities.

The impact of dams, which is considered significant has been accounted for in the BDL.

Annual take by is calculated for the purposes of reporting for section 71 under the Water Act. It is proposed that the calculation of annual take by farm dams is used to monitor the impact of interception activities as required by section 10.24 of the Basin Plan.

Given that the Basin Plan outlines that the BDL is equal to the SDL, and the accredited water resource plan will implement rules to ensure this SDL is complied with, it is considered that section 10.25 of the Basin Plan which requires actions that will be taken if there is an increase in the quantity of water being intercepted or a compromise to an environmental watering requirement as a result of interception activities, is not relevant to this SDL resource unit.
Recommendation 38

It is recommended that:

- The State negotiate with the MDBA that interception from commercial forestry and mining is minor and should not be considered a significant interception activity under the Basin Plan. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue;

- If necessary, the State could offer to assess commercial forestry and mining coverage every five years and if there is an increase (level would need to be determined) then this form of interception activity would be identified and accounted for in the next version of the water resource plan;

- The index of the water resource plan identifies farm dams as the only interception activity that has the potential to have a significant impact on the water resources of the water resource plan area; and

- The calculation of annual take for the purposes of reporting under section 71 of the Water Act is used to monitor the impact of farm dam interception in the South Australian Non-Prescribed Areas SDL resource unit. This monitoring process should be set out in the index document for the water resource plan.

7.3.2 Mallee (GS3)

The Basin Plan requires that water resource plans identify, monitor and manage any interception activities not accounted for in the annual permitted take, which have a significant impact on the water resources of the water resource plan area or hydrologically connected water resources.

There is currently no plantation forestry and future development for this purpose is unlikely due to the prevailing climatic conditions. Any development that did occur could be identified via updates to the spatial land use information of DEH (2008) (refer recommendation in Section 4.3.5).

Any mining development would require a licence and hence would be accounted for in the annual permitted take.

7.3.3 Peake-Roby-Sherlock (GS5)

The Basin Plan requires that water resource plans identify, monitor and manage any interception activities not accounted for in the annual permitted take, which have a significant impact on the water resources of the water resource plan area or hydrologically connected water resources.

There is currently no plantation forestry and future development for this purpose is unlikely due to the prevailing climatic conditions. Any development that did occur could be identified via updates to the spatial land use information of DEH (2008) (refer recommendation in Section 4.3.5).

Any mining development would require a licence and hence would be accounted for in the annual permitted take.

7.3.4 SA Murray (GS6)

The Basin Plan requires that water resource plans identify, monitor and manage any interception activities not accounted for in the annual permitted take, which have a significant impact on the water resources of the water resource plan area or hydrologically connected water resources.

It is considered that the potential impact of mining and forestry interception is not significant. Data and information from the risk assessment may be able to be used to support this conclusion. If this data and
information is not considered adequate, further work may be required to justify why these activities have not been considered significant interception activities.

As there are no known interception activities in the SDL resource unit that have a significant impact on the water resources of the SDL resource unit or on water resources that are hydrologically connected, the requirements above do not apply to this SDL resource unit.

**Recommendation 39**

It is recommended that:

- The State negotiate with the MDBA that interception from commercial forestry and mining is minor and should not be considered a significant interception activity under the Basin Plan. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue; and

- If necessary, the State could offer to assess commercial forestry and mining coverage every five years and if there is an increase (level would need to be determined) then this form of interception activity would be identified and accounted for in the next version of the water resource plan.

### 7.3.5 SA Murray Salt Interception Schemes (GS7)

The Basin Plan requires that water resource plans identify, monitor and manage any interception activities not accounted for in the annual permitted take, which have a significant impact on the water resources of the water resource plan area or hydrologically connected water resources.

DEWNR (2015) identified dryland forestry with an area of 0.008% of the total SDL resource unit area that may access groundwater (refer Section 3.2.3). Section 3.3.6 recommended that the State negotiate with the MDBA that any current take from this identified forestry is minor and should not be accounted for under the SDL. It would therefore not be considered a significant interception activity that requires identification, monitoring or management. Any future development could be identified via updates to the spatial land use information of DEH (2008) (refer recommendation in Section 4.3.5).

There is currently no mining development and future development for this purpose is unlikely.

**Recommendation 40**

It is recommended that:

- Existing dryland commercial forestry is minor and should not be considered a significant interception activity under the Basin Plan [link to recommendation in Section 3.3.6]. Data and information from the risk assessment (DEWNR 2015) should be used to support any negotiations on this issue; and

- Spatial land use information will be used to identify any new take by dryland forestry for assessment with revisions of the water resource plan [link to recommendation in Section 4.3.5].
8 EFFECTS OF CONNECTED WATER RESOURCES

8.1 Overview including Basin Plan and Water Act Requirements

Section 10.05 of the Basin Plan requires that a water resource plan must be prepared having regard to the management and use of any water resources which have a significant hydrological connection and describe the way in which this requirement has been complied with.

Hydrological connectivity may occur either naturally or through infrastructure, including:

- Longitudinally along rivers and laterally between rivers and their floodplains (and associated wetlands) and anabranches;
- Laterally and longitudinally with connected rivers;
- Between surface water and groundwater, or between groundwater systems; or
- By way of infrastructure that connects water resources.

A connection is considered significant for the purposes of this requirement if the connection is of consequence to the effective management of the water resources of either area.

Having regard may include sharing technical information; considering relevant issues in the risk assessment for the water resource plan area; and being aware of, and acknowledging, regulatory impacts transcending the boundaries of each resource or the use of cross-boundary consultative arrangements.

If the connected water resource is in a different Basin state, it is expected that the other Basin state will have been consulted in accordance with section 63(2) of the Water Act.

A description of how these matters were considered may include:

- Identification of water resources with a hydrological connection to the water resource plan area, including an assessment of the level and relevance of the connection;
- A description of such an identification and assessment undertaken by another party;
- An outline of actions taken to understand any relevant impacts of management and use of water resources outside the water resource plan area on the water resources of the water resource plan area;
- A summary of consultation undertaken within another Basin state or any other parties, where relevant; and
- A description of any agreements in place, e.g. why these agreements were developed and how they operate.

Section 10.14 of the Basin Plan relates to the effects, and potential effects, on water resources of the water resource plan area. It requires that:

(1) A water resource plan must identify the effect, or potential effect, if any, of the following on the use and management of the water resources of the water resource plan area:

(a) The taking of groundwater that is not a Basin water resource resulting in water being removed from a groundwater SDL resource unit in the water resource plan area because of a pre-existing hydrological connection or a hydrological connection created by the process of taking the groundwater;
(b) The taking of groundwater that is not a Basin water resource resulting in water that would otherwise flow directly or indirectly into an SDL resource unit in the water resource plan area no longer flowing into that unit.

(2) If the water resource plan identifies an effect, or potential effect, the water resource plan must set out:

(a) The process for monitoring that effect or potential effect; and

(b) Actions that will be taken to respond to that effect or potential effect.

(3) Without limiting paragraph (2)(b), the water resource plan may require a person to hold a water access right in the water resource plan area in relation to the effect, or potential effect, identified.

8.2 Connected Water Resources

The risk assessment for the SA Murray Region (DEWNR 2015) has evaluated hydrological connections across the WRP area, including those between SDL resource units. This analysis has determined where there are significant connections that could potentially lead to an impact in one or both of those connected resources. This includes where the actions in one SDL resource unit could affect the water available to be taken in another. The sections below detail additional information about the nature of hydrological connections between SDL resource units.

8.2.1 Description of Water Resource Connections

South Australian Non-Prescribed Areas (SS10)

There are some limited connections between the surface water systems of the South Australian Non-Prescribed Areas SDL resource unit and the River Murray SDL resource unit.

Surface water flows from the Burra Creek to the River Murray are rare as the lower reaches are essentially floodout plains and lack defined drainage. The last time that catchment-wide flow is known to have reached the River Murray was in 1941.

The Coorong received inflows from the River Murray via the Lower Lakes and barrages, the ocean via the Murray Mouth, groundwater and from the South East via Salt Creek and the South East drainage system. Inflows from all sources have been severely impacted upon by river regulation, periods of drought and modified land use.

The interaction between surface water and groundwater resources is significant throughout the SDL resource unit in an otherwise dry environment. Salinisation of fresh water caused by saline discharges from local and regional groundwater represents a threat to the water resources of this SDL resource unit. Intermittent surface water stream flow in very wet years in the Eastern Mount Lofty/Olary Ranges along the western and north western boundaries of the SDL resource unit may recharge local fractured rock aquifers in the highlands and possibly groundwater resources in sedimentary aquifers on the plains.

Ephemeral watercourses also play an important role in recharging groundwater.

Mallee (GS3)

Mallee (Pliocene Sands)

The Mallee WAP (SA MDB NRMB 2012) indicates that the Pliocene Sands Aquifer underlying the Mallee SDL resource unit extends westwards to the River Murray and eastwards into Victoria and the Murrayville Supply
Protection Area. Only in the eastern part of the Mallee PWA does it contain underground water. In the western part it is higher than the water table and therefore unsaturated.

The Noora WAP (RMCWMB 2001) states that the underground water resources within the Noora PWA are continuous with the resources of the Mallee PWA.

**Mallee (Murray Group Limestone)**

The Murray Group Limestone Aquifer extends from the Mount Lofty Ranges in the west to Swan Hill, Victoria, in the east (SA MDB NRMB 2012). Very little, if any, rainfall recharges this aquifer at the Mallee PWA. The main recharge source is rainfall in south-western Victoria. From there, it moves slowly within the Mallee PWA and drains into the River Murray. The rate of movement of the underground water is slow due to the flat terrain and large distances resulting in low water table gradients.

In the eastern area of the Mallee PWA the aquifer is confined. Although confined by a clay layer in this area, drawdown due to irrigation could possibly result in downward leakage of more saline underground water from the water table above the clay layer (SA MDB NRMB 2012). However, modelling suggests that this is a long-term risk over the next 100 to 150 years.

The Noora WAP (RMCWMB 2001) states that the underground water resources within the Noora PWA are continuous with the resources of the Mallee PWA.

**Mallee (Renmark Group)**

The Mallee WAP (SA MDB NRMB 2012) indicates that the Renmark Group Aquifer underlying the Mallee SDL resource unit extends westwards to the River Murray and eastwards into Victoria and the Murrayville Supply Protection Area.

The Noora WAP (RMCWMB 2001) states that the underground water resources within the Noora PWA are continuous with the resources of the Mallee PWA.

**Peake-Roby-Sherlock (GS5)**

**Peake-Roby-Sherlock (unconfined)**

The Unconfined Aquifer in the Peake-Roby-Sherlock SDL resource unit extends from the River Murray into the Mallee SDL resource unit (Murray Group Limestone).

**Peake-Roby-Sherlock (confined)**

The Confined Aquifer in the Peake-Roby-Sherlock SDL resource unit extends from the River Murray into the Mallee SDL resource unit (Renmark Group).

**SA Murray (GS6)**

The interaction between groundwater resources and surface water is significant throughout the SDL resource unit in an otherwise dry environment. Saline discharges from local and regional groundwater cause salinisation of freshwater and represent a threat to the surface water resources connected to this SDL resource unit.
The groundwater aquifers in the SA Murray SDL resource unit are often confined, lie deep below the ground surface and are not connected to surface water resources. Where unconfined aquifers are close to the surface, they may discharge groundwater to the following surface water systems:

- River Murray;
- Lakes Alexandrina and Albert; and
- The Coorong

These connections are considered significant for planning purposes.

Discharges into the River Murray, and to a lesser extent into the Lower Lakes, have a negative impact on salinity levels because of the generally high groundwater salinities.

In the past, groundwater naturally fed the wetlands of the South East and flowed into the Coorong until the South East drains were built for agriculture and pasturing purposes, altering and reducing the groundwater flow. Now, discharges into the Coorong either directly or via the South East drains can have positive salinity impacts because the groundwater salinities are lower than the receiving waters.

Intermittent surface water stream flow in very wet years in the Eastern Mount Lofty/Olary Ranges along the western and north western boundaries of the SDL resource unit may recharge local fractured rock aquifers in the highlands and possibly groundwater resources in sedimentary aquifers on the plains.

Take of groundwater in surrounding groundwater systems may have some minimal local impacts around the boundaries. Vice versa, any take from the SA Murray SDL resource unit which would be for stock supplies, will have minimal local impacts if any, on surrounding groundwater systems.

**SA Murray Salt Interception Schemes (GS7)**

The unconfined groundwater resources of this SDL resource unit are hydrologically connected to the SA River Murray surface water WRP area, the Wimmera-Mallee WRP area (GW3) and the Western Porous Rock WRP area (GW6) (DEWNR 2015). Other connections are likely with the Mallee (GS3) and SA Murray (GS6) SDL resource units.

Take by salt interception schemes intercepts water that would flow into the River Murray as this is the explicit purpose of these schemes, that is, to intercept salt to improve water quality in the River Murray.

**8.2.2 State Arrangements for Dealing with the Effects on Connected Water Resources**

Section 76(4)(a)(ii) of the NRM Act requires that a water allocation plan must include an assessment as to whether the taking or use of water from the resource will have a detrimental effect on the quantity or quality of water that is available from any other water resource.

Section 74(6) states that if the taking, or the taking and use, of water from a water resource has, or is likely to have, a detrimental effect on the quantity or quality of water that is available from another water resource, the water allocation plan for the first mentioned resource must take into account the needs of persons and ecosystems using water from the other resource as well as the needs of persons and ecosystems using water from its own resource and may, to achieve an equitable balance between competing interests, include provisions designed to prevent or reduce those detrimental effects.

Section 74(7) states that if the taking, or the taking and use, of water from a water resource affects, or is likely to affect, the management of water in another water resource, the water allocation plan for the second mentioned
water resource may include provisions relating to the taking, or the taking and use, of water from the first mentioned water resource.

There is no requirement for NRM plans to make an assessment of or provision for effects on connected water resources.

The following describes the specific arrangements in place for each SDL resource unit for dealing with effects on connected water resources.

**South Australian Non-Prescribed Areas (SS10)**

There are no provisions in the relevant NRM plans for dealing with effects on connected water resources.

There are no references in the River Murray water allocation plan to water resources contained in the South Australian Non-Prescribed Areas SDL resource unit discharging into the River Murray.

The South East Flows Restoration Program (SEFRP) proposes to undertake water quality monitoring of the Coorong, before, during and after construction to ensure water entering the Coorong is of a suitable standard. Water quality impacts to the Coorong as a result of the SEFRP are proposed to be managed through a site operations procedure, supported by the water quality monitoring, which will act as a decision support system to guide operation of the SEFRP once construction is completed. The procedure will also be incorporated into the Upper South East Drainage Network Strategy and the Coorong, Lower Lakes and Murray Mouth Site Operations Manual.

Water quality and salinity monitoring is also undertaken by the South East Water Conservation and Drainage Board.

**Mallee (GS3)**

There are no references in the River Murray Water Allocation Plan to water resources contained in the Mallee SDL resource unit.

**Mallee (Pliocene Sands)**

There are no references in the Mallee or Noora WAPs to connections in other areas with the Pliocene Sands Aquifer.

**Mallee (Murray Group Limestone)**

For the Mallee PWA (SA MDB NRMB 2012):

- **Renmark Group Confined Aquifer** - The Murray Group Limestone Aquifer lies above Ettrick formation, which acts as a confining layer to the underlying Renmark Group Aquifer (refer Section 2.2.2). The potentiometric surface of the Remark Group Aquifer is naturally higher than that in the Murray Group Limestone Aquifer, and this head difference creates a potential for minor upward leakage. Extractions from the Murray Group Limestone Aquifer have increased the head difference, and may lead to an increased potential for upward leakage. However, this is not considered to be significant. Observation wells completed in the Renmark Group Aquifer show little or no response to extractions from the Murray Group Limestone. There are currently no users extracting water from the Renmark Group Aquifer.

- **River Murray Prescribed Watercourse** - The Murray Group Limestone Aquifer eventually discharges into the River Murray. However, the travel time for this underground flow from the Mallee PWA to the River
Murray is thousands of years. Whilst extraction from this aquifer is greater than the recharge, the overall capacity ensures that the through flow connection is maintained.

- **Murrayville Water Supply Protection Area** - The taking of water from the Murray Group Limestone Aquifer in the Mallee PWA may have contributed to drawdown of underground water levels in the Murrayville Water Supply Protection Area in addition to that caused by local extractions.

- **Peake, Roby and Sherlock PWA** - For the Murray Group Limestone Unconfined Aquifer (in the western area of the Mallee PWA), there may be small drawdown impacts on the Unconfined Aquifer in the Peake, Roby and Sherlock PWA if extractions were to concentrate close to the common boundary. The principles in Section 6.1 of the Mallee WAP intend to prevent this concentration.

As there are no extractions in the Mallee PWA from the Renmark Group Confined Aquifer, there will be no impacts on users from this aquifer in the Peake, Roby and Sherlock PWA.

- **Tintinara Coonalpyn PWA** - The Murray Group Limestone Aquifer extends towards the south-west in the Tintinara area. Underground water moves to the west on a completely different flowpath to that beneath the Mallee PWA and the vast majority of users will not be affected by the taking of underground water in the Mallee PWA. There may, however, be small drawdown impacts on the Tintinara Coonalpyn PWA if extractions in the Mallee PWA are concentrated close to the common boundary.

- **Tatiara PWA** - The Murray Group Limestone Aquifer extends southwards into the Tatiara PWA in Border Sub-Zone 9A South within the Border Designated Area. The area within three kilometres of the common boundary is a National Park with no licensed extractions, and therefore there will be negligible impacts on the Tatiara PWA from any extractions within the Mallee PWA.

For the Noora PWA (RMCWMB 2001):

- As the underground water resources within the Noora PWA are continuous with the resources of the Mallee PWA, using the underground water in either location has the potential to impact on the other PWA. However, the extent of impact is restricted to the area of influence of pumping from a bore or group of bores. The area of influence has been determined to be a maximum of five kilometres around a single bore.

- It has been assessed that the taking or use of water from the Noora PWA for current purposes will not have a detrimental effect on the quality or quantity of water available from the Mallee PWA.

- It has been assessed that the taking and use of water from the Noora PWA will not have any detrimental impact on the quantity or quality of water available from the River Murray Prescribed Watercourse.

**Mallee (Renmark Group)**

There is potential for minor upwards leakage from the Renmark Group Aquifer to the Murray Group Limestone Aquifer as indicated above. Extractions from the Murray Group Limestone Aquifer may lead to an increased potential for upward leakage but this is not considered to be significant (SA MDB NRMB 2012).

**Peake-Roby-Sherlock (GS5)**

There are no references in the Water Allocation Plan for the River Murray Prescribed Watercourse to water resources contained in the Peake-Roby-Sherlock SDL resource unit.
Peake-Roby-Sherlock (unconfined)

The Peake, Roby and Sherlock WAP (SA MDB NRMB 2010a) states that it is possible that if future extractions in the Mallee and Tintinara Coonalpyn PWAs are concentrated close to the Peake, Roby and Sherlock PWA boundaries, in the east and south respectively, there may be drawdown impacts in the Unconfined Aquifer. Policies within the Mallee and the Tintinara Coonalpyn WAPs seek to minimise concentration of the taking of underground water and therefore impacts from taking are unlikely to occur in the short term.

The Mallee WAP (SA MDB NRMB 2012) states that there may be small drawdown impacts on the Unconfined Aquifer in the Peake, Roby and Sherlock PWA if extractions in the Mallee Murray Group Limestone Unconfined Aquifer (in the western area of the Mallee PWA) were to concentrate close to the common boundary. The principles in Section 6.1 of the Mallee WAP intend to prevent this concentration.

Peake-Roby-Sherlock (confined)

The Peake, Roby and Sherlock WAP (SA MDB NRMB 2010a) states that:

- Drawdown impacts caused by the taking of underground water from the Confined Aquifer in the Tintinara Coonalpyn PWA may have the potential to extend as far north as the southern boundary of the Peake, Roby and Sherlock PWA. However, policies within the Tintinara Coonalpyn WAP seek to minimise concentration of the taking of underground water and therefore, impacts from taking are unlikely to occur in the short term.

- Historically there has been no taking of underground water from the Confined Aquifer in the western region of Mallee PWA.

- Taking underground water from the adjacent water resources is unlikely to have a significant impact on the Confined Aquifer in the Peake, Roby and Sherlock PWA.

The Mallee WAP (SA MDB NRMB 2012) states that as there are no extractions in the Mallee PWA from the Renmark Group Confined Aquifer, there will be no impacts on users from this aquifer in the Peake, Roby and Sherlock PWA.

SA Murray (GS6)

There are no provisions in the relevant NRM plans for dealing with effects on connected water resources.

Measures currently in place to minimise the volume of saline groundwater discharging to the River Murray in South Australia include salt interception schemes, salinity zoning policy (this policy is intended to be included in the revised River Murray WAP) and requirements for certain levels of irrigation efficiency under the River Murray WAP.

Salt interception schemes extract saline groundwater before entering rivers and are a reactive measure, whereas improved irrigation practices and the salinity zoning policy reduce groundwater recharge and are preventative measures. The effectiveness of these measures in reducing salinity levels in the River Murray is assessed through surface and groundwater modelling and monitoring by the MDBA, SA Water and DEWNR. While these measures are effective in reducing salt loads delivered to the River Murray they may also reduce surface water flows in some instances.
SA Murray Salt Interception Schemes (GS7)

Take by salt interception schemes intercepts water that would flow into the River Murray. However, this is the explicit purpose of these schemes, that is, to intercept salt to improve water quality in the River Murray, and as such the take is beneficial. The limits on take from the River Murray Prescribed Watercourse have been determined based on South Australia's Entitlement Flow under cl 88 of the Murray-Darling Basin Agreement 2008 at the South Australian Border. As such, intercepting groundwater via the salt interception schemes should not affect take from the River Murray. Salt interception schemes operate to achieve a target groundwater level. Although unlikely, any impact on groundwater levels in this SDL resource unit as a result of take in other SDL resource units is therefore not considered to be a negative occurrence as it may reduce take in this SDL resource unit. The effect of take from this SDL resource unit on take from other SDL resource units is unknown.

8.3 Alignment between State Arrangements and Basin Plan Requirements

The Basin Plan requires that a water resource plan must have regard to the management and use of any water resources which have a significant hydrological connection and describe the way in which this requirement has been complied with.

As outlined in Section 8.2 above, there are various hydrological connections applicable to this water resource plan area, either between SDL resource units, between water resource plan areas or between this water resource plan area and areas external to the Murray-Darling Basin. These connections vary in their level of significance.

The risk assessment for the SA Murray Region (DEWNR 2015) has assessed the risk of management of connected water resources and risks to connected water resources. With the exception of the interaction between the River Murray connected water resources to the Coorong and Coorong Lower Lakes and River Murray unconfined groundwater, the risks have been assessed as low. The current controls in the various WAPs and under the Border Groundwater Agreement are considered sufficient management controls.

Given the above, it is felt that no additional work should be required on the nature and significance of hydrological connections at this time.
9 Summary of Recommendations

<table>
<thead>
<tr>
<th>Basin Plan: Schedules 2, 3 and 4</th>
<th>All SDL resource units</th>
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<tbody>
<tr>
<td>Section 3.3.1</td>
<td>• The State negotiate with the MDBA that take for those purposes covered by State-wide s 128 authorisations is small and is not required to be accounted for under the BDL or SDL for any SDL resource unit. If this is not possible, it may be necessary to adjust the BDLs for all SDL resource units with an estimate of take for these purposes as at 30 June 2009.</td>
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<tr>
<th>Basin Plan: Schedule 3 – Surface water BDLs</th>
<th>SA Non-Prescribed Areas (SS10)</th>
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<tr>
<td>Section 3.3.2</td>
<td>BDL and Take Limits at 30 June 2009</td>
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<td></td>
<td>• An investigation is undertaken to determine a long term average baseline limit of take for the relevant portions of the SA MDB region that had limits applied to them as of 30 June 2009;</td>
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<td>• Should this investigation indicate that a higher BDL could be justified, the State should negotiate with the MDBA to revise the estimate of the BDL and SDL. This revised BDL and SDL would be based on the long term average limit of take determined in the investigation above for the relevant portion of the SA MDB region plus the data on farm dams compiled for the National Water Commission for all other areas; and</td>
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<td></td>
<td>• If the MDBA requires accounting for take via forestry, mining and direct extraction (if any) under the SDL [link to recommendation on the forms of take required to be accounted for under the SDL below], then the State will need to undertake an analysis of the impacts of these forms of take as of 30 June 2009 and request that the BDL is updated to account for these.</td>
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<tr>
<th>Basin Plan: Schedule 2 – Surface water SDLs</th>
<th>SA Non-Prescribed Areas (SS10)</th>
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<tr>
<td>Section 3.3.2</td>
<td>SDL and Current Limits of Take</td>
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<td></td>
<td>• The Murray-Darling Basin Policy and Strategy team work with the relevant NRM regions to develop a paper that outlines and assesses options for applying a single limit of take to the SDL resource unit, after it has been determined whether the BDL and SDL estimate will be revised [link to recommendation in Section 4.3.1]. This may include the re- apportionment of the revised BDL across the SDL resource unit;</td>
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<td></td>
<td>• The relevant NRM regions implement the preferred option for applying a single limit of take [link to recommendation in Section 4.3.1]; and</td>
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<td></td>
<td>• The State formally request that the MDBA reconsider the SDL for the South Australian Non-Prescribed Areas SDL resource unit as part of the review of the Basin Plan in 2022.</td>
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</table>
### Basin Plan: Schedule 4 – Groundwater BDLs and SDLs

<table>
<thead>
<tr>
<th>Recommendation 4</th>
<th>SDL and Current Take</th>
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<tbody>
<tr>
<td>• If the MDBA does not agree to revise the estimate of the BDL, the Department argue that the estimates of current take undertaken for the purposes of estimating the BDL were rough and that additional take since these estimates were done is very small and unlikely to result in a breach of the SDL.</td>
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<tr>
<td>• The State negotiate with the MDBA that take via forestry, mining and direct extraction from watercourses is minor and should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue.</td>
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<tr>
<th>Mallee (Pliocene Sands) (GS3)</th>
<th>Section 3.3.3</th>
<th>SDL and Current Limits on Take / Current Take</th>
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</thead>
<tbody>
<tr>
<td>Recommendation 5</td>
<td></td>
<td>• The limits within the Noora WAP for the Mallee Pliocene Sands aquifer be updated to reflect the Border Groundwater Agreement.</td>
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<tr>
<th>Mallee (Murray Group Limestone) (GS3)</th>
<th>Section 3.3.3</th>
<th>SDL resource unit area and area used for determination of the BDL/SDL</th>
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<tbody>
<tr>
<td>Recommendation 6</td>
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<td>• For ease of reporting and administration, continue to manage take within the SDL resource unit and reporting by including the full Mallee PWA within the Mallee (GS3) SDL resource unit boundary, despite the area inconsistency; and</td>
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<tr>
<td>Recommendation 7</td>
<td></td>
<td>• Inform the MDBA of the identified inconsistency and the approach to be applied for managing it.</td>
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<tr>
<td>Recommendation 8</td>
<td></td>
<td>• The BDL be revised to remove the Noora PWA entitlement of 2.144 GL and include the authorised use of 4.292 GL per year (average) for sand mining.</td>
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<td>• The SDL for the Mallee Murray Group Limestone aquifer be revised to remove the Noora PWA entitlement of 2.144 GL.</td>
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<tr>
<th>Mallee (Renmark Group) (GS3)</th>
<th>Section 3.3.3</th>
<th>SDL and Current Limits on Take / Current Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation 9</td>
<td></td>
<td>• The limits within the Mallee WAP for the Renmark Group aquifer be updated to reflect the Border Groundwater Agreement; and</td>
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<td>• The allocation criteria and limits in the Noora WAP be updated to reflect the Border Groundwater Agreement.</td>
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<tr>
<td>SA Murray (GS6) Recommendation 10</td>
<td>Section 3.3.5</td>
<td>SDL and Current Take</td>
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<td>• The State negotiate with the MDBA that take via forestry and mining is minor and should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue.</td>
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</table>

**SDL and Current Limits on Take**

- Murray-Darling Basin Policy and Strategy work with the relevant NRM regions to develop a paper that outlines options for applying a limit of take to the SDL resource unit by limiting and/or monitoring well construction and specific types of land use [link to recommendation in Section 4.3.4]; and
- The relevant NRM regions implement the preferred option for applying a limit of take [link to recommendation in Section 4.3.4].

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<tr>
<th>SA Murray Salt Interception Schemes (GS7) Recommendation 11</th>
<th>Section 3.3.5</th>
<th>SDL and Current Take</th>
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<tbody>
<tr>
<td></td>
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<td>• The State negotiate with the MDBA that take via forestry and mining is minor and should not be accounted for under the SDL. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue.</td>
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</table>

**SDL and Current Limits on Take**

- Murray-Darling Basin Policy and Strategy work with the relevant NRM regions to develop a paper that outlines options for applying a limit of take to the SDL resource unit by limiting and/or monitoring well construction and specific types of land use [link to recommendation in Section 4.3.4]; and
- The relevant NRM regions implement the preferred option for applying a limit of take [link to recommendation in Section 4.3.4].

<table>
<thead>
<tr>
<th>SA Murray Salt Interception Schemes (GS7) Recommendation 12</th>
<th>Section 3.3.6</th>
<th>BDL and Take Limits at 30 June 2009</th>
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<tr>
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<td>• The BDL be revised to include the Noora PWA entitlement of 2.144 GL for SIS purposes;</td>
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<td>• The State negotiate with the MDBA to reach an agreement that current take via stock, domestic or forestry purposes within this SDL resource unit is minor and should not be accounted for under the BDL or SDL. Additionally, that the water activity permit system and spatial land use information will be used to identify any new take by these purposes. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue; and</td>
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<td>• A paper to be developed to document the process for updating and analysing the spatial land use information to allow any changes in land use to commercial forestry.</td>
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**Basin Plan: Sections 10.10, 10.11 and 10.12 – Annual Permitted Take and Rules for Take**

<table>
<thead>
<tr>
<th>SA Non-Prescribed Areas (SS10) Recommendation 14</th>
<th>Section 4.3.1</th>
<th>Basin Plan: Sections 10.10, 10.11 and 10.12 – Annual Permitted Take and Rules for Take</th>
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<tbody>
<tr>
<td></td>
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<td>• As part of the paper to be developed for applying a single limit of take recommended in Section 3.3.2, the Murray-Darling Basin Policy and Strategy team work with the relevant NRM regions to develop rules for enforcing a single limit of take;</td>
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<td>• The relevant NRM regions implement the preferred option for rules for take via their NRM plans;</td>
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<td>• The Department negotiate with the MDBA to accept the single limit of take and associated rules for take for the SDL resource unit as the method for determining the annual permitted take; and</td>
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<td>• The Department advise the MDBA that as the water resources in the SDL resource unit are not prescribed and no licensing arrangements are in place, SDL adjustments and the disposal and acquisition of environmental water do not apply and therefore the relevant NRM plans do not require provisions for their accounting.</td>
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<tr>
<td>Mallee (Pliocene Sands) (GS3)</td>
<td>Section 4.3.2</td>
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<tr>
<td><strong>Recommendation 15</strong></td>
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<tr>
<td>• The annual permitted take for the Mallee Pliocene Sands SDL resource unit is specified as a single value limit that is equal to the SDL. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements;</td>
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<td>• No additional allocation rules or rules for take are required for licensed purposes as there is currently no licensed take and none is permitted under current State management arrangements;</td>
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<tr>
<td>• No rules for take are required for stock and domestic purposes as there is currently no take and future demand is unlikely. Permits under the NRM Act should be used to track any new development. Additionally, given the SDL is equal to 41.4 GL, it is very unlikely that this form of take would ever reach the SDL; and</td>
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<tr>
<td>• The above be put forward to the MDBA during fit for purpose negotiations.</td>
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<table>
<thead>
<tr>
<th>Mallee (Murray Group Limestone) (GS3)</th>
<th>Section 4.3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 16</strong></td>
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</tr>
<tr>
<td>• The annual permitted take for the Mallee Murray Group Limestone SDL resource unit is specified as a single value limit that is equal to the SDL [updated from the Basin Plan value as per recommendation in Section 3.3.3]. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements. If the carryover of allocations from one year to the next is permitted in a revised Mallee WAP, then an adjustment to the annual permitted take will be applied in the form of a simple adjustment;</td>
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<tr>
<td>• The annual permitted take is not split into sub-limits that represent licensed and non-licensed use;</td>
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<tr>
<td>• No additional allocation rules or rules for take are required for licensed purposes as existing controls are sufficient;</td>
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<tr>
<td>• The preferred option for managing stock and domestic take in the absence of rules for take is to monitor use for licensed purposes and if this reaches a pre-determined value, implement a procedure to re-evaluate and more actively manage and/or monitor stock and domestic use to ensure actual take does not exceed the annual permitted take. Given the 61.3 GL limit on licensed take for this SDL resource unit, the pre-determined value is suggested to be 95% of this value, which is 58.24 GL(^{32});</td>
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<tr>
<td>• The above be put forward to the MDBA during fit for purpose negotiations; and</td>
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<tr>
<td>• Following the fit for purpose negotiations, a paper be developed to document the process to be undertaken to manage and/or monitor stock and domestic take given the absence of rules for take.</td>
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</table>

\(^{32}\) Applying a value of 58.24 GL leaves a buffer of 3.06 GL, which is much greater than the current estimated use of 2.278 GL for stock and domestic purposes.
<table>
<thead>
<tr>
<th>Mallee (Renmark Group) (GS3)</th>
<th>Section 4.3.2</th>
</tr>
</thead>
</table>
| Recommendation 17 | • The annual permitted take for the Mallee Renmark Group SDL resource unit is specified as a single value limit that is equal to the SDL. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements;  
  • No additional allocation rules or rules for take are required for licensed purposes as there is currently no licensed take and none is permitted under current State management arrangements;  
  • No rules for take are required for stock and domestic purposes as there is currently no take and future demand is unlikely. Permits under the NRM Act should be used to track any new development; and  
  • The above be put forward to the MDBA during fit for purpose negotiations. |

<table>
<thead>
<tr>
<th>Peake-Roby-Sherlock (Unconfined and Confined) (GS5)</th>
<th>Section 4.3.3</th>
</tr>
</thead>
</table>
| Recommendation 18 | • The annual permitted take for each of the Peake-Roby-Sherlock Unconfined and Confined SDL resource units is specified as single value limits that are equal to the respective SDLs. This is based on the nature of the resource and limits currently in place, together with the assessment of s 10.12 requirements. If the carryover of allocations from one year to the next is permitted in a revised WAP, then an adjustment to the annual permitted take will be applied in the form of a simple adjustment;  
  • The annual permitted take is not split into sub-limits that represent licensed and non-licensed use;  
  • No additional allocation rules or rules for take are required for licensed purposes as existing controls are sufficient;  
  • The preferred option for managing stock and domestic take in the absence of rules for take is to monitor use for licensed purposes and if this reaches a pre-determined value, implement a procedure to re-evaluate and more actively manage and/or monitor stock and domestic use to ensure actual take does not exceed the annual permitted take.  
  o For the Unconfined Aquifer, the limit on licensed take included in the SDL is 3.22 GL. It is suggested that the pre-determined value is 90% of this limit, that is 2.828 GL\(^{33}\); and  
  o For the Confined Aquifer, the limit on licensed take included in the SDL is 2.17 GL. It is suggested that the pre-determined value is 90% of this limit, which is 1.953 GL\(^{34}\).  
  • The above be put forward to the MDBA during fit for purpose negotiations; and  
  • Following the fit for purpose negotiations, a paper be developed to document the process to be undertaken to manage and/or monitor stock and domestic take given the absence of rules for take. |

\(^{33}\) Applying a value of 2.828 GL leaves a buffer of 0.322 GL, which is much greater than the current estimated use of 0.19 GL for stock and domestic purposes.  
\(^{34}\) Applying a value of 1.953 GL leaves a buffer of 0.217 GL. This would allow a 50% increase over the current estimated use of 0.41 GL for stock and domestic purposes, which is considered reasonable.
<table>
<thead>
<tr>
<th>Recommendation 19</th>
<th>Section 4.3.4</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>SA Murray (GS6)</td>
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</tr>
<tr>
<td>As part of the paper to be developed for applying a single limit of take recommended in Section 3.3.5, the Murray-Darling Basin Policy and Strategy team work with the relevant NRM regions to develop any required rules for take;</td>
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<tr>
<td>The relevant NRM regions implement the preferred option for any rules for take via their NRM plans;</td>
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<tr>
<td>The Department negotiate with the MDBA to accept the approach for managing the limit of take and any associated rules for take for the SDL resource unit as the method for determining the annual permitted take; and</td>
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<tr>
<td>The Department advise the MDBA that as the water resources in the SDL resource unit are not prescribed and no licensing arrangements are in place, the disposal and acquisition of environmental water do not apply and therefore the relevant NRM plans do not require provisions for their accounting.</td>
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<table>
<thead>
<tr>
<th>Recommendation 20</th>
<th>Section 4.3.5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SA Murray Salt Interception Schemes (GS7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The annual permitted take for the SA Murray Salt Interception Scheme SDL resource unit is specified as a single value limit that is equal to the SDL. This is based on the nature of take from this resource unit together with the assessment of s 10.12 requirements;</td>
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</tr>
<tr>
<td>No additional allocation rules or rules for take are required at this point for licensed purposes or for salt interception schemes:</td>
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<tr>
<td>o For licensed purposes existing controls are sufficient; and</td>
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<tr>
<td>o Total take via salt interception schemes is monitored. Should this approach a pre-determined value, then a procedure should be implemented to ensure that actual take does not exceed the annual permitted take. Given an SDL of 28.6 GL, it is suggested that the pre-determined value is 90% of this limit, that is 25.74 GL;</td>
<td></td>
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</tr>
<tr>
<td>Assuming that current stock, domestic and forestry take is not required to be included under the SDL, the water affecting activity permit system and spatial land use information will be used to identify any new take by these purposes for assessment with revisions of the water resource plan [link to recommendation in Section 4.4.2];</td>
<td></td>
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<tr>
<td>The above be put forward to the MDBA during fit for purpose negotiations; and</td>
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<tr>
<td>Following the fit for purpose negotiations, a paper be developed to document the process to be undertaken to manage take via salt interception schemes should this approach the SDL.</td>
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</tr>
</tbody>
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35 Applying a value of 25.74 GL allows for an effective doubling of the extraction from the current schemes and leaves a buffer of 2.86 GL.
### Basin Plan: Section 10.15 – Annual Actual Take

<table>
<thead>
<tr>
<th>Area</th>
<th>Recommendation</th>
<th>Section</th>
<th>Notes</th>
</tr>
</thead>
</table>
| SA Non-Prescribed Areas (SS10)| 23             | 5.3.1      | - Once a single limit of take has been determined for the SDL resource unit [refer recommendation in Section 3.3.2], further work be undertaken by Murray-Darling Basin Policy and Strategy in consultation with the relevant NRM regions and Science, Monitoring and Knowledge to determine the most appropriate method to estimate annual take by all forms of take covered by the limit;  
  - The most appropriate method to estimate annual take as determined by the work referred to above is applied for annual reporting on take for Section 71 of the Water Act; and  
  - The most appropriate method to estimate annual take as determined above is set out in the index document for the water resource plan.                                                                                           |
| Mallee (Pliocene Sands) (GS3) | 25             | 5.3.2      | - The annual actual take comprise an annual average value for stock and domestic purposes (should future take occur);  
  - Permits under the NRM Act or other legislation should be used to track any new development for stock and domestic purposes [link to recommendation in Section 4.3.2];  
  - A method consistent with that used in either the Mallee Murray-Group Limestone or Peake-Roby-Sherlock SDL resource units should be used to calculate annual average take for stock and domestic purposes (should future take occur); and  
  - The method for calculating annual actual take from the Pliocene Sands Aquifer is set out in the index document for the water resource plan.                                                                                           |
| Mallee (Murray Group Limestone) (GS3) | 27             | 5.3.2      | - The annual actual take comprise the measured take for licensed and authorised purposes and an annual average value for stock and domestic purposes;  
  - In the absence of any revised estimate, take by stock and domestic purposes should be the current estimate included in the current Mallee and Noora WAPs and subsequently in the SDL determination;  
  - The above is put forward to the MDBA during fit for purpose negotiations;  
  - The method above is used for the annual reporting on take as required by Section 71 of the Water Act;  
  - An assessment of the magnitude of the double-counting of licensed take and stock and domestic take due to conjunctive take is considered, which includes the incorporation of additional information requirements on either the annual water use report forms or the new self-meter reading forms to identify those bores where conjunctive take occurs;  
  - Determine what would be involved in developing an updated assessment of the current estimate for stock and domestic take [refer to recommendation in Section 5.3.4] and then assess the next steps based on this determination; and  
  - The method for calculating annual actual take is set out in the index document for the water resource plan.                                                                                           |
<table>
<thead>
<tr>
<th><strong>Mallee (Renmark Group) (GS3)</strong></th>
<th><strong>Section 5.3.2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 29</strong></td>
<td>• The annual actual take comprise the measured take for licensed purposes and an annual average value for stock and domestic purposes (should future take occur);</td>
</tr>
<tr>
<td></td>
<td>• Permits under the NRM Act or other legislation should be used to track any new development for stock and domestic purposes [link to recommendation in Section 4.3.2];</td>
</tr>
<tr>
<td></td>
<td>• A method consistent with the Mallee Murray-Group Limestone or Peake-Roby-Sherlock SDL resource units should be used to calculate annual average take for stock and domestic purposes (should future take occur); and</td>
</tr>
<tr>
<td></td>
<td>• The method for calculating annual actual take from the Renmark Group Aquifer is set out in the index document for the water resource plan.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Peake-Roby-Sherlock (Unconfined and Confined) (GS5)</strong></th>
<th><strong>Section 5.3.3</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 31</strong></td>
<td>The following applies to the Unconfined and Confined Aquifers individually:</td>
</tr>
<tr>
<td></td>
<td>• The annual actual take comprise the measured take for licensed and authorised purposes and an annual average value for stock and domestic purposes;</td>
</tr>
<tr>
<td></td>
<td>• In the absence of any revised estimate, take by stock and domestic purposes should be the value included in the current Peake, Roby and Sherlock WAP and subsequently in the SDL determination;</td>
</tr>
<tr>
<td></td>
<td>• The above is put forward to the MDBA during fit for purpose negotiations;</td>
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<tr>
<td></td>
<td>• The method above is used for the annual reporting on take as required by Section 71 of the Water Act;</td>
</tr>
<tr>
<td></td>
<td>• An assessment of the magnitude of the double-counting of licensed take and stock and domestic take due to conjunctive take is undertaken, which includes the incorporation of additional information requirements on either the annual water use report forms or the new self-meter reading forms to identify those bores where conjunctive take occurs;</td>
</tr>
<tr>
<td></td>
<td>• Determine what would be involved in developing an updated assessment of the current estimate for stock and domestic take [refer to recommendation in Section 5.3.4] and then assess the next steps based on this determination; and</td>
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<tr>
<td></td>
<td>• The method for calculating annual actual take is set out in the index document for the water resource plan.</td>
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<thead>
<tr>
<th><strong>SA Murray (GS6)</strong></th>
<th><strong>Section 5.3.4</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 33</strong></td>
<td>• A method for estimating additional take based on new well permits and changes in land use is developed and applied to report on annual take;</td>
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<tr>
<td></td>
<td>• The estimate of additional take is added to the estimation of current take (BDL or revised estimate) and used for annual reporting on take as required by section 71 of the Water Act; and</td>
</tr>
<tr>
<td></td>
<td>• The most appropriate method to estimate take as determined above is set out in the index document for the water resource plan.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th><strong>SA Murray Salt Interception Schemes (GS7)</strong></th>
<th><strong>Section 5.3.5</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 35</strong></td>
<td>• The annual actual take comprise the measured take from the salt interception schemes; and</td>
</tr>
<tr>
<td></td>
<td>• The method for calculating annual actual take is set out in the index document for the water resource plan.</td>
</tr>
</tbody>
</table>
### Basin Plan: Section 10.44 – Long-Term Annual Average Quantity of Take

| SA Non-Prescribed Areas (SS10) Recommendation 24 | Section 5.3.1 | • Estimation of the long term average annual quantity of water that is taken for each form of take from the South Australian Non-Prescribed SDL resource unit is undertaken in accordance with the method recommended in Section 5.3.1; and  
| | | • The long-term annual average quantity of water that is taken for each form of take is set out in the index document of the water resource plan. |
| Mallee (Pliocene Sands) (GS3) Recommendation 26 | Section 5.3.2 | • The long-term annual average quantity of water that is taken for each form of take from the Pliocene Sands Aquifer as described in Section 5.3.2 is set out in the index document for the water resource plan. |
| Mallee (Murray Group Limestone) (GS3) Recommendation 28 | Section 5.3.2 | • Estimation of the long term average annual quantity of water that is taken for each form of take from the Mallee (Murray Group Limestone) SDL resource unit is undertaken in accordance with the method described in Section 5.3.2. This will require:  
| | | o A single dataset of licensed take since 2001-02, prepared through an assessment of the meter data held in WILMA and the use data provided through the Annual Water Use reports. Estimates of licensed use within WILMA should be included;  
| | | o A dataset of take under the current s 128 authorisation; and  
| | | o The current estimate of annual average stock and domestic take, unless this is revised. |
| | | • The above is put forward to the MDBA during fit for purpose negotiations;  
| | | • A paper is prepared that summarises the methods used to determine the annual average quantities of water taken that are measured and estimated;  
| | | • Once standards for measuring take have been agreed by the Basin States and Commonwealth, a paper is produced that details how South Australia’s State Metering Policy aligns with those standards; and  
<p>| | | • The long-term annual average quantity of water taken from the Murray Group Limestone Aquifer is set out in the index document for the water resource plan. |
| Mallee (Renmark Group) (GS3) Recommendation 30 | Section 5.3.2 | • The long-term annual average quantity of water that is taken for each form of take from the Renmark Group Aquifer as described in Section 5.3.2 is set out in the index document for the water resource plan. |</p>
<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| Peake-Roby-Sherlock (Unconfined and Confined) (GS5) | 5.3.3 | **Estimation of the long term average annual quantity of water that is taken for each form of take from the Unconfined and Confined Aquifers in the Peake-Roby-Sherlock SDL resource unit is undertaken in accordance with the method described in Section 5.3.3.** For each aquifer this will require:  
  - Datasets of licensed take from 2005-06, prepared through an assessment of the meter data held in WILMA and the use data provided through the Annual Water Use reports. Estimates of licensed use within WILMA should be included; and  
  - The current estimates of annual average stock and domestic take, unless this is revised. |
| SA Murray (GS6) | 5.3.4 | **The current estimate of stock and domestic take is used as the best estimate of the long-term annual average quantity of water taken that is not measured, unless this value is updated; and**  
  - The long-term annual average quantity of water that is taken for each form of take is set out in the index document of the water resource plan. |
| SA Murray Salt Interception Schemes (GS7) | 5.3.5 | **Estimation of the long term average annual quantity of water that is taken for each form of take from the SA Murray Salt Interception Schemes SDL resource unit is undertaken in accordance with the method described in Section 5.3.5.** This will require the recorded dataset of take via the salt interception schemes (data since 1990-91);  
  - A paper is prepared that outlines the preferred option for determining the annual average quantities of water taken;  
  - The above is put forward to the MDBA during fit for purpose negotiations;  
  - Once standards for measuring take have been agreed by the Basin States and Commonwealth, a paper should be produced that details how the methods used to monitor take via the salt interception schemes aligns with those standards; and  
  - The long-term annual average quantity of water that is taken for each form of take from the SA Murray SIS resource unit is set out in the index document for the water resource plan. |
### Basin Plan: Sections 10.23, 10.24 and 10.25 – Interception Activities

<table>
<thead>
<tr>
<th>SA Non-Prescribed Areas (SS10)</th>
<th>Section 7.3.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 38</strong></td>
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<tr>
<td></td>
<td>• The State negotiate with the MDBA that interception from commercial forestry and mining is minor and should not be considered a significant interception activity under the Basin Plan. Data and information from the risk assessment (DEWNR 2015) should be used to support negotiations on this issue;</td>
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<tr>
<td></td>
<td>• If necessary, the State could offer to assess commercial forestry and mining coverage every five years and if there is an increase (level would need to be determined) then this form of interception activity would be identified and accounted for in the next version of the water resource plan;</td>
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<td>• The index of the water resource plan identifies farm dams as the only interception activity that has the potential to have a significant impact on the water resources of the water resource plan area; and</td>
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<td></td>
<td>• The calculation of annual take for the purposes of reporting under section 71 of the Water Act is used to monitor the impact of farm dam interception in the South Australian Non-Prescribed Areas SDL resource unit. This monitoring process should be set out in the index document for the water resource plan.</td>
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</table>

<table>
<thead>
<tr>
<th>SA Murray (GS6)</th>
<th>Section 7.3.4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 39</strong></td>
<td></td>
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<tr>
<td></td>
<td>• The State negotiate with the MDBA that interception from commercial forestry and mining is minor and should not be considered a significant interception activity under the Basin Plan. Data and information from the risk assessment should be used to support negotiations on this issue; and</td>
</tr>
<tr>
<td></td>
<td>• If necessary, the State could offer to assess commercial forestry and mining coverage every five years and if there is an increase (level would need to be determined) then this form of interception activity would be identified and accounted for in the next version of the water resource plan.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SA Murray Salt Interception Schemes (GS7)</th>
<th>Section 7.3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 40</strong></td>
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<td></td>
<td>• Existing dryland commercial forestry is minor and should not be considered a significant interception activity under the Basin Plan [link to recommendation in Section 3.3.6]. Data and information from the risk assessment should be used to support any negotiations on this issue; and</td>
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<tr>
<td></td>
<td>• Spatial land use information will be used to identify any new take by dryland forestry for assessment with revisions of the water resource plan [link to recommendation in Section 4.3.5].</td>
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### Basin Plan: Section 10.51 – Extreme Events

<table>
<thead>
<tr>
<th>All SDL resource units</th>
<th>Section 4.2.4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation 13</strong></td>
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<td>• Noting the management arrangements currently in place, the development of the water resource plan will need to consider whether these are adequate for managing extreme events in relation to water supplies for remote communities and Government involvement in short term emergency water supply situations.</td>
</tr>
<tr>
<td>Non Basin Plan Section Specific Recommendations</td>
<td></td>
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<td>-----------------------------------------------</td>
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</tr>
<tr>
<td>All SDL resource units</td>
<td>Section 4.4.1</td>
</tr>
</tbody>
</table>
| Recommendation 21 | • The relevant business unit work with the NRM Boards and other stakeholders to review the processes for issuing permits for activities that affect water take. This should include a review of the requirements for water affecting activity permits and exemptions, and the processes by which exemptions are managed (for example, under alternative legislation or an exemption in certain circumstances); and  
• Murray-Darling Basin Policy and Strategy work with the NRM Boards and other stakeholders to develop a consistent approach to water affecting activity policies and processes across the three NRM regions, linking with the recommendations around rules for take in Sections 4.3.1 and 4.3.4. |
| All SDL resource units | Section 4.4.2 |
| Recommendation 22 | • In consultation with the NRM Boards and other stakeholders, an assessment of the options, costs, benefits and resourcing arrangements associated with establishing a central, searchable register for permits for activities that affect take is undertaken, which will fulfill the requirements of the Basin Plan as well as the NRM Register; and  
• Subject to the outcomes of the previous recommendation, the endorsed option for establishing a central, searchable register for permits is implemented. |
| SA Murray Salt Interception Schemes (GS7) | Section 6.2.6 |
| Recommendation 37 | • The water permitted to be taken in the SA Murray Salt Interception Schemes SDL resource unit is not reported on through the annual Section 71 reporting process until accreditation of the SA Murray Region water resource plan occurs. |
10 References


Basin Plan (2012)


Murray-Darling Basin Authority (MDBA), 2012b, *Groundwater Sustainable Diversion Limit Resource Unit Summary Report Cards: South Australia*, MDBA publication no. 49/12, Murray-Darling Basin Authority, Canberra.


11 Appendices

11.1 Summary of BDLs and SDLs for Groundwater and Surface Water

Table 19  Surface Water SDL Resource Units – BDLs and SDLs

<table>
<thead>
<tr>
<th>Surface water SDL resource unit (code)</th>
<th>BDL</th>
<th>Long term average SDL</th>
</tr>
</thead>
</table>
| South Australian Non-Prescribed Areas (SS10) | The BDL is the long-term annual average limit on the quantity of water that can be taken by runoff dams and from watercourse calculated by:  
   i) Summing the quantity of water that would have been taken by those forms of take for each year of the historical climate conditions under State water management law as at 30 June 2009, and  
   ii) Dividing that quantity by all of the years of the historical climate conditions.  
   Note: The Authority estimates this to be 3.5 GL per year. | The limit is the BDL. |
<table>
<thead>
<tr>
<th>Groundwater SDL resource unit (code)</th>
<th>Groundwater covered by groundwater SDL resource unit</th>
<th>BDL (GL/y)</th>
<th>Long-term SDL (GL/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mallee (Pliocene Sands) (GS3)</td>
<td>Groundwater in Pliocene sands</td>
<td>0</td>
<td>41.4</td>
</tr>
<tr>
<td>Mallee (Murray Group Limestone) (GS3)</td>
<td>Groundwater in the Murray Group Limestone</td>
<td>65.7</td>
<td>65.7</td>
</tr>
<tr>
<td>Mallee (Renmark Group) (GS3)</td>
<td>Groundwater in the Renmark Group and all other groundwater excluding groundwater in Mallee (Pliocene Sands) and (Murray Group Limestone)</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>Groundwater in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>i) The unconfined Murray Group Limestone comprising the Coomandook and Bridgewater Formations; and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>ii) The unconfined Quaternary limestone</td>
<td>3.41</td>
<td>3.41</td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>Groundwater in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>i) The confined Renmark Group; and</td>
<td>2.58</td>
<td>2.58</td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>ii) The confined Buccleuch Group; and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peake-Roby-Sherlock (confined) (GS5)</td>
<td>iii) All other groundwater excluding groundwater in Peake-Roby-Sherlock (unconfined)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA Murray (GS6)</td>
<td>All groundwater</td>
<td>1.8</td>
<td>64.8</td>
</tr>
<tr>
<td>SA Murray Salt Interception Schemes (GS7)</td>
<td>All groundwater</td>
<td>11.1</td>
<td>28.6</td>
</tr>
</tbody>
</table>
11.2 SA MDB NRM Region - Surface Water Subcatchment Zones and Limits

Figure 7 Surface water sub catchment zones: SA Murray-Darling Basin NRM Region
Table 21  Surface water sub-catchment zone limits in the South Australian Non-Prescribed Areas SDL resource unit

<table>
<thead>
<tr>
<th>Catchment</th>
<th>Surface water sub-catchment zone limit (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldina Creek</td>
<td>909</td>
</tr>
<tr>
<td>Burra Creek - Razorback</td>
<td>491</td>
</tr>
<tr>
<td>Burra Creek – Mount Bryan TS</td>
<td>629</td>
</tr>
<tr>
<td>Burra Creek – Firewood Creek</td>
<td>1031</td>
</tr>
<tr>
<td>Burra Creek – Springbank Valley</td>
<td>415</td>
</tr>
<tr>
<td>Burra Creek – Upper Burra Creek</td>
<td>876</td>
</tr>
<tr>
<td>Burra Creek – Logan Creek</td>
<td>510</td>
</tr>
<tr>
<td>Burra Creek – Worlds End</td>
<td>553</td>
</tr>
<tr>
<td>Burra Creek – Mid Burra Creek</td>
<td>409</td>
</tr>
<tr>
<td>Burra Creek – Lower Burra Creek</td>
<td>1583</td>
</tr>
<tr>
<td>Caroona Creek</td>
<td>104</td>
</tr>
<tr>
<td>Craigie Plain</td>
<td>910</td>
</tr>
<tr>
<td>Keynes Plain</td>
<td>3163</td>
</tr>
<tr>
<td>Levi Creek</td>
<td>888</td>
</tr>
<tr>
<td>Narcoota – Deep Creek</td>
<td>1999</td>
</tr>
<tr>
<td>Newikie Creek</td>
<td>2274</td>
</tr>
<tr>
<td>Pilbritiappa Creek</td>
<td>45</td>
</tr>
<tr>
<td>Pine creek</td>
<td>452</td>
</tr>
<tr>
<td>Red Creek</td>
<td>1110</td>
</tr>
<tr>
<td>Robertstown Lagoon</td>
<td>1130</td>
</tr>
<tr>
<td>Stone Chimney Creek</td>
<td>436</td>
</tr>
<tr>
<td>Sedan</td>
<td>1387</td>
</tr>
<tr>
<td>Spring Hut Creek</td>
<td>1842</td>
</tr>
<tr>
<td>Stonefield</td>
<td>860</td>
</tr>
<tr>
<td>Towitta Creek</td>
<td>745</td>
</tr>
<tr>
<td>Truro Creek</td>
<td>1693</td>
</tr>
<tr>
<td>Waupundyah Creek</td>
<td>1116</td>
</tr>
<tr>
<td>Wonna Creek</td>
<td>2847</td>
</tr>
<tr>
<td>Wild Dog</td>
<td>197</td>
</tr>
<tr>
<td>Witto Creek</td>
<td>808</td>
</tr>
<tr>
<td>Williams Reservoir</td>
<td>162</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31,574</strong></td>
</tr>
</tbody>
</table>
11.3 South East NRM Region - Water Affecting Activity Policy Areas

Figure 8 Water affecting activity permit policy areas – SE NRM Region
11.4 Unallocated Water Policy - SA Government

The South Australian Unallocated Water Policy Statement (2013) provides guidance in the process of identifying unallocated water and granting licences to access unallocated water if required.

Unallocated water is defined as:

*Water within a prescribed water resource identified as being potentially available for licensed consumptive use, without compromising the reliability of existing entitlements, authorised or exempted unlicensed use, provisions for environmental, social or cultural water and reserved water.*

The objectives of the policy are to:

1. provide a clear and consistent approach to the management of unallocated water statewide;
2. ensure unallocated water is available for consumptive purposes in a manner that is fair and equitable and makes certain that environmental water requirements are met prior to granting water for consumptive purposes;
3. create a decision-making process that carefully evaluates the risks of any decision that may adversely affect the environment or ecosystems that depend on the water resource; and
4. support the effective and efficient operation of water markets.

The policy is guided by the NRM Act and the State Strategic Plan, as well as the National Water Initiative (NWI), in particular, paragraphs 70 to 72 as follows:

- Paragraph 70 - Release of unallocated water will be a matter for the States and Territories to determine. Any release of unallocated water should be managed in the context of encouraging the sustainable and efficient use of scarce water resources.
- Paragraph 71 - If a release is justified, generally, it should occur only where alternative ways of meeting water demands, such as through water trading, making use of the unused parts of existing entitlements or by increasing water use efficiency, have been fully explored.
- To the extent practicable, releases should occur through market-based mechanisms.

Where unallocated water is identified, the policy identifies a number of options as follows:

1. Reserving Excess Water
   - The Minister may reserve all or a portion of excess water in accordance with section 166 of the NRM Act, through a notice published in the Gazette.
   - If the Minister is satisfied that it is necessary or desirable for the proper management of the water of the resource to reserve the whole or part of that excess water either from allocation under any circumstances or for allocation subject to restrictions [s 166(1)(c)].
   - The notice must state whether the water is reserved from allocation under any circumstances or may be allocated by the Minister if the requirements referred to in a regulation under section 167 are satisfied [s 166(2)(b)].
2. Release Unallocated Water

- Justification for release should be made in accordance with the NWI principles and the objects of the NRM Act.
- It is important that the demand for unallocated water is demonstrated prior to or as part of the release of unallocated water, such as through an Expression of Interest process.
- Where the Minister is satisfied that demands for the unallocated water on that resource have been demonstrated, a market-based approach will be applied to the release.
- Where there is a limited number of interested parties, unallocated water should not be released and remain unallocated. However, a private sale may be considered in this case.
11.5 Processes for Amending Limits of Take

The NRM Act provides a number of different avenues for amending limits of take, including:

- **S81 (1) and (4) – Review and amendment of plans**
  
  (1) A regional NRM board may initiate procedures to amend a plan at any time.
  
  (4) A regional NRM board must review its entire regional NRM plan at least once during each period of 10 years following adoption of the plan.

- **S89 (2) (c)– Amendment of plans without formal procedures**
  
  The Minister may amend a plan in order to achieve greater consistency with –
  
  (i) The terms of requirements of the Murray-Darling Basin Agreement, or any relevant resolution of the Ministerial Council under the agreement; or
  

  without following procedures for amendment under Division 3 of the Act if the Minister certifies, at the time of making the amendment, that the amendment is not to be used to effect a reduction in existing water access entitlements of the licences affected by the plan or the basis for the determination of a consumptive pool and that the Minister has consulted with the relevant regional NRM plan before taking such action.

- **S132 (1), (2), (4) and (5) – Restrictions in case of inadequate supply or overuse of water**
  
  (1) If, in the opinion of the Minister –

  a) The rate at which water is taken from a watercourse, lake or well (whether prescribed or note) –

     (i) Is such that the quantity of water available can no longer meet the demand or there is a risk that the available water will not be sufficient to meet future demand; or
  
     (ii) Is affecting, or is likely to affect, the quality of the water in the watercourse, lake or underground aquifer; or
  
     (iii) In the case of water taken from a watercourse or lake – is having a serious effect on another watercourse or lake, or the level or water in an underground aquifer, that depends on water from the watercourse or lake for replenishment; or
  
  b) The rate at which water is taken from a well (whether prescribed or not) is such that the underground aquifer is likely to collapse or suffer any other damage; or
  
  c) The rate at which surface water is taken (whether from a surface water prescribed area or not) –

     (i) Is such that the surface water available can no longer meet the demand; or
  
     (ii) Is having a serious effect on a watercourse or lake, or the level of water in an underground aquifer, that depends on the surface water for replenishment,

  The Minister may, by notice published in the Gazette and in a newspaper circulating in that part of the State in which the watercourse, lake or well or the surface water is situated -

  d) Prohibit or restrict the taking of water from the water course, lake or well or the taking or surface water; or
e) Limit the quantity of water that may be taken from the watercourse, lake or well, or from any surface water, or

f) Direct that dams, reservoirs, embankments, walls or other structures be modified to allow water to pass over, under or through them.

(2) When determining the demands on available water under subsection (1), the need for water of the ecosystems that depend on water from the water resource concerned must be taken into account.

(4) A notice under subsection (1) remains in force for such a period (not exceeding 2 years) as is stated in the notice unless it is revoked under subsection (9).

(5) If in the opinion of the Minister, the rate at which, or the manner in which, water is taken from a water resource that has not been prescribed is causing, or is likely to cause, damage to ecosystems that depend on water from the water resources, the Minister may, by notice served on a person taking the water –

(a) Restrict the rate and times at which he or she may take water; or

(b) Direct him or her to take such action as is specified in the notice to rectify any problem relating to the manner in which water is taken.

- S155 (1), (2) and (3): Reduction of water allocation

(1) The Minister may reduce the water allocations that apply in relation to a particular water resource if in the opinion of the Minister it is necessary or desirable to do so –

(a) to prevent a reduction, or further reduction, in the quantity of the water in the resource or in the quality of the water in the resource or in a water resource that is affected by the taking of water from the first mentioned resource; or

(b) to prevent damage, or further damage, to an ecosystem that depends on that water or on the water from a resource that is affected by the taking of water from the first mentioned resource; or

(c) because there is insufficient water to meet the existing demand or expected future demand for water from the resource or from a water resource that is affected by the taking of water from the first mentioned resource; or

(d) because there has been, or is to be, a reduction in the quantity of water available –

   (i) under or by virtue of the Groundwater (Border Agreement) Act 1985; or

   (ii) on account of the operation of the Murray-Darling Basin Agreement, the operation or effect of a resolution of the Ministerial Council under that agreement, or the operation or effect of the basin Plan under the Water Act 2007 of the Commonwealth.

(2) Subject to regulations made under subsection (3), the Minister must, in acting under this section, reduce the allocation of all water allocations that apply in relation to a particular water resource proportionately.

(3) Instead of allocations being reduced proportionately, they may be reduced pursuant to a scheme set out in regulations made by the Governor on the recommendation of the Minister.