

# **South Australian–Victorian Border Groundwaters Agreement Review Committee**



## **Thirtieth Annual Report**

**To 30 June 2015**

**Adelaide and Melbourne**

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## PREFACE

The Border Groundwaters Agreement Review Committee’s Annual Report for 2014–15 fulfils the requirement under clause 30(1) of the Border Groundwaters Agreement to report on its activities during the year to 30 June 2015. This report has been compiled with reference to reports from South Australia and Victoria.

Clause 30(2) requires the Review Committee to forward a copy of the report to the appropriate minister in each government.

Section 11 of the *Victorian Groundwater (Border Agreement) Act 1985*, and Section 13 of the *South Australian Groundwater (Border Agreement) Act 1985* provides that the relevant minister shall cause a copy of the annual report to be laid before the parliament within fourteen sitting days of the receipt of the report.

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## 1. The year in summary

Along the South Australian–Victorian border, groundwater is the only reliable water source. It is used extensively in both states for irrigation, industry use and urban water supply, as well as farm stock and domestic use.

While groundwater supplies are relatively secure for the short term, the Border Groundwaters Agreement Review Committee (Review Committee) has sought to improve the technical understanding and management responses affecting the ongoing sustainable and equitable use of groundwater along the border.

The Review Committee has agreed to undertake the development of a process to review the Border Groundwaters Agreement (the Agreement). The Agreement has guided water resource management in the Designated Area and has influenced groundwater management in the neighbouring regions of both states. Other than for minor amendments which were adopted in 2006, the Agreement has not undergone any other revision and amendment since its introduction in 1986.

During the year, the responsible ministers from the Contracting Governments agreed that the Review Committee should undertake a review of the Agreement and accordingly advise recommendations for further consideration. A review process has been agreed to by the Review Committee. This will include an assessment of whether the Agreement has delivered the strategic outcomes that were envisaged at the time of its introduction, its relevance for groundwater management today, and its relationship with other bilateral agreements such as the Basin Plan and the National Water Initiative.

During the year the Review Committee continued its analysis of groundwater level trends and techniques for trend grouping and analysis.

## 2. About the Agreement and the Review Committee

### South Australian–Victorian Border Groundwaters Agreement

The groundwater resource along the South Australian–Victorian border is shared between the states. In recognition of the need to cooperatively manage these resources, the two states entered into the Agreement in 1985. The Agreement was updated in 2006 and both states have agreed to a detailed review of the Agreement and its operation.

The Agreement establishes a Designated Area, extending 20 kilometres either side of the border, and from the coast to the River Murray. The Agreement applies specifically to this Designated Area. The Designated Area is divided into 22 management zones with 11 zones in each state (Figure 1).

The Agreement provides that the available groundwater shall be shared equitably between the two states and applies to all existing and future bores within the Designated Area. Bores that extract groundwater for domestic and stock purposes are not covered by the Agreement.

Extraction licences or permits may not be granted or renewed within the Designated Area, other than in accordance with the management prescriptions set out in the Agreement. The prescriptions limit water use to a Permissible Annual Volume for total withdrawals from all aquifers, or each aquifer, to a permissible rate of potentiometric surface lowering and to a permissible level of salinity. The prescriptions also provide that, where appropriate, casing of new bores shall be sealed between aquifers to prevent inter-aquifer contamination.

The allocation of water is the responsibility of the licensing agencies in each state, in accordance with the relevant groundwater management plan or water allocation plan prepared under the states' respective water resources legislation.

The approach taken by the states in developing management plans has included objectives to better quantify the resource, to establish appropriate mechanisms for allocating the resource or, if needed, to restrict the use of the resource. Plans are developed through consultative committees to maximise community and industry involvement in making and implementing the arrangements.

The management areas relevant to the Designated Area are set out in Table 1. The location of the zones relevant to state water administration areas are shown in Figure 2.

**Table 1: Management areas relevant to the Designated Area**

South Australia	Victoria
Noora Prescribed Wells Area Mallee Prescribed Wells Area Tatiara Prescribed Wells Area Lower Limestone Coast Prescribed Wells Area	Murrayville Water Supply Protection Area West Wimmera Groundwater Management Area Glenelg Water Supply Protection Area

## Border Groundwaters Agreement Review Committee

The Review Committee<sup>1</sup>, with membership from both states, is established under the Border Groundwaters Agreement as the operating body for the effective implementation and administration of the Agreement.

The Review Committee is required at intervals of not more than five years to review the management prescriptions – that is, the Permissible Annual Volume, the Allowable Annual Volume for sub-zones, the permissible distance, the permissible rate of potentiometric surface lowering (drawdown) and the permissible level of salinity (if any such levels have been declared). The next reviews are: 2015 – Province 3, 2017 – Province 2, and 2018 for Province 1.

The Agreement provides that the Review Committee shall have the power to alter the permissible distance, Permissible Annual Volume, Allowable Annual Volume and to declare a period of restriction. The relevant state ministers have the power to alter the permissible rate of potentiometric surface lowering and the permissible level of salinity, on the recommendation of the Review Committee<sup>2</sup>.

The Agreement provides that the Review Committee may also:

- coordinate, or cause to be carried out, surveys, investigations and studies concerning the use, control, protection, management or administration of the groundwater in the Designated Area
- make recommendations to the Contracting Governments or to any authority, agency or tribunal of the Contracting Governments concerning any matter which, in the opinion of the Review Committee, may in any way affect the investigation, use, control, protection, management or administration of the groundwater within the Designated Area
- review the Agreement and, if in its opinion, amendments thereto are necessary or desirable, make recommendations to the Contracting Governments accordingly.

The Review Committee met twice during the year:

12 December 2014	Meeting 126	Teleconference
17 April 2015	Meeting 127	Teleconference

During the year membership of the Review Committee comprised:

South Australia		Victoria	
Ms J Grant	member	Mr A Spall	member
Dr L Mensforth	member	Mr R Nott	member
Mr T Collins	deputy member	Mr T McDevitt	deputy member

Ms J Grant was re-elected President at the meeting held on 17 April 2015.

The Review Committee is supported by a Technical Working Group of representatives from both Contracting Governments.

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<sup>1</sup> The Review Committee does not manage or control any public finances or assets.

<sup>2</sup> A list of Government Gazette notices relating to the current prescriptions is provided in the Appendix.

### 3. General information

#### **Groundwater resources in the South Australian–Victorian border region**

There are two main aquifer systems along the border, comprising the Tertiary Confined Sand Aquifer and the overlying Tertiary Limestone Aquifer (Figure 3). A thin Pliocene Sands Aquifer overlies the Upper Tertiary Aquitard in parts of the area.

The Tertiary Limestone Aquifer is the principal source of groundwater throughout the Designated Area, with water being used for a range of purposes – municipal supplies for towns such as Mount Gambier, Penola and Pinnaroo, individual domestic and stock water supplies, industry and irrigation of agricultural crops and recreational grounds.

Groundwater salinity in the Tertiary Limestone Aquifer is mostly less than 3000 EC (about 1700 mg/L TDS) in the Designated Area, except in the north where it exceeds 30 000 EC (about 18 000 mg/L TDS).

In the Designated Area, the Tertiary Limestone Aquifer has been subdivided into three hydrogeological provinces as shown in Figure 4 and described below:

Province 1 occurs largely in the Otway Basin and is characterised by Quaternary calcareous sandstone overlying the Tertiary Limestone Aquifer (Gambier Limestone) forming one unconfined aquifer system

Province 2 is located in the Murray Basin where the Tertiary Limestone Aquifer (Murray Group Limestone) is unconfined and either outcrops at the surface, or is overlain directly by the Pliocene Sands Aquifer

Province 3 is in an area of the Murray Basin where the Tertiary Limestone Aquifer (Murray Group Limestone) is confined by the Upper Tertiary Aquitard. A thin Pliocene Sands Aquifer overlies the Upper Tertiary Aquitard in some parts of this province.

#### **Management approach**

When the Agreement was introduced in 1986, the groundwater shares (Permissible Annual Volumes) between the two adjacent state Designated Area zones were equal. As more has been learned about the groundwater resources and the risks to the resources from use, the limits have been amended to ensure the protection of the existing entitlements and the protection of the resource from undue depletion or degradation.

In accordance with its role to advise the states, as outlined in the previous section, the Review Committee has taken the following management approach for each province.

##### Tertiary Limestone Aquifer – Province 1

The Tertiary Limestone Aquifer is a high yielding and renewable resource and is replenished by rainfall. Parts of Province 1 are experiencing long-term declines in groundwater levels. The current mix of land use and groundwater extractions is out of balance (in that outflows and extractions exceed inflows) and is not sustainable in the long term. The estimated quantity of water utilised by plantation forestry is a significant component of the regional water balance being some three times that used for irrigation purposes in Province 1. Without a change in the current land and water use, groundwater levels will continue to decline over parts of Province 1.



In 2008, following its management review of Province 1 (Border Groundwaters Agreement Review Committee 2008), the Review Committee recommended that a new management approach is needed to achieve long term sustainability. It was the view of the Review Committee at that time that this may require reductions in the area under plantation forestry and the volume extracted via bores under groundwater entitlements. In the meantime the Review Committee proposed a management strategy to address four key issues. These are:

- water accounting
- inter-aquifer connectivity
- sea-water intrusion
- aquifer depletion.

Both states are addressing the need to account for plantation forestry on water resources. The Review Committee proposed that an integrated water accounting system encompassing all major water users is essential. It recommended the states develop a consistent approach to account for the water used by plantation forests.

There are two issues of immediate concern to be resolved with the declines observed in 2008. These were: the potential for sea-water intrusion along the South Australian coast, and the other is the effect of the declines on groundwater users in the shallow and thin aquifer around the Lake Mundi area in Victoria. The Review Committee recommended that each of the states undertake studies into the risks and measures to address any adverse impacts. As a precaution the Review Committee divided Zone 1A into two sub-zones to help prevent any further intensification of extractions in Sub-zone 1A South.

#### *Inter-aquifer connectivity*

The deeper Tertiary Confined Sand Aquifer is exhibiting declines similar to those observed in the Tertiary Limestone Aquifer even though there is little water being extracted from the Tertiary Confined Sand Aquifer. This may indicate a higher degree of connection between the two aquifers than previous models indicated. The Review Committee recommended that the states undertake studies on the interaction of the aquifers to guide the possible development of management options.

The National Water Commission provided funding to the governments of South Australia and Victoria to undertake a joint project to investigate the inter-aquifer connectivity of the Tertiary Limestone Aquifer and Tertiary Confined Sand Aquifer in Province 1. The results of the project indicate that there is a moderate to very good hydraulic connection between the Tertiary Confined Sand Aquifer and the Tertiary Limestone Aquifer. In doing so, the project has achieved its principal objective. The results point to the two aquifers being more highly connected than previously understood. This information and implications for managing groundwater in this area is yet to be considered by the Review Committee.

#### Tertiary Limestone Aquifer – Province 2

Groundwater in Tertiary Limestone Aquifer is not being significantly replenished by modern recharge across most of Province 2. As such, the groundwater resource is considered a non-renewable for water allocation and management purposes.

In the area of concentrated extractions in Zones 5A, 6A, 5B and 6B (Frances and Neuarpur) groundwater levels are declining due to extraction (~0.2 m/y since 1996). These declines in groundwater levels appear to be manageable, with respect to the capacity of the resource in the short term. However, as part of its management review of Province 2 in 2007 (Border Groundwaters Agreement Review Committee 2007) the Review Committee advised the states

of the need to develop a common policy for the long-term management and use of groundwater on the basis that this is a non-renewable resource.

In the northern part of Province 2 (northern part of Zone 7A, Zone 8A, Sub-zone 9A South and the northern part of Zone 6B, Zones 7B, 8B and 9B) the groundwater level trends are generally stable reflecting the limited development and extraction. The extraction ‘threshold point’ between stable water level trends and declining levels is not able to be quantified. As a precaution against further declines, the Review Committee:

- reduced the Permissible Annual Volumes for Zones 7A, 7B, 8A, and 8B to the allocated volumes for each zone at that time
- established sub-zones in Zone 6A and set an Allowable Annual Volume at the level of current allocations for Sub-zone 6A South.

The Review Committee will seek discussion between the relevant regional management authorities towards developing a common policy approach for managing the groundwater as a non-renewable resource.

### Tertiary Limestone Aquifer – Province 3

Groundwater is not being replenished by modern recharge and has been managed as a non-renewable resource since 2001. The aquifer is confined and distant from recharge areas. Consequently the aquifer does not respond to seasonal recharge from rainfall. Intensive groundwater development began after 2001 and the observed long-term water level trends and seasonal drawdowns are consistent with pressure response of pumping in a confined aquifer. A cone of depression has formed with its centre located at Peebinga, an area of intensive groundwater extraction north of Pinnaroo.

The Tertiary Limestone Aquifer is responding as expected to the level of use, in terms of drawdown and salinity. The full potential response of the aquifer is yet to be realised as groundwater extraction in Victoria has been less than the Permissible Annual Volume. Further drawdown in groundwater levels are anticipated if groundwater extractions increase.

There is no immediate risk of increased groundwater salinity due to either the lateral movement of saline groundwater or the vertical leakage of saline water from the Pliocene Sands Aquifer. There is a need to continue monitoring salinity in the aquifer.

There is potential for localised increased drawdown, which if developed would impact on the users of groundwater for domestic and stock groundwater purposes, increase the risks of partial dewatering of the aquifer or accelerating water quality change. As part of its management review of Province 3 in 2010 (Border Groundwaters Agreement Review Committee 2010) the Review Committee recommended that the states adopt management measures to prevent uncontrolled localised drawdown arising from intense groundwater extraction.

### Tertiary Confined Sand Aquifer

Management prescriptions for the Tertiary Confined Sand Aquifer in the Designated Area remain unchanged since 2001.

### Pliocene Sands Aquifer

The Pliocene Sands Aquifer overlies the Tertiary Limestone Aquifer in the Murray Basin mainly in the northern part of the Designated Area. The groundwater in the Pliocene Sands Aquifer is generally saline. In 2007, the Review Committee determined a Permissible Annual Volume for the Pliocene Sand Aquifer in Zone 11A to provide for salinity mitigation extractions for the

Murtho Salt Interception Scheme. The scheme is designed to intercept groundwater that would enter the Murray River.

### Permissible Annual Volumes and Allowable Annual Volumes

The Permissible Annual Volumes for each aquifer in each zone at 30 June 2015 are set out in Table 2.

**Table 2: Permissible Annual Volumes at 30 June 2015**

South Australia				Victoria		
Permissible Annual Volume			Zone	Zone	Permissible Annual Volume	
Pliocene Sands Aquifer (ML/y)	Tertiary Limestone Aquifer (ML/y)	Tertiary Confined Sand Aquifer (ML/y)			Tertiary Limestone Aquifer (ML/y)	Tertiary Confined Sand Aquifer (ML/y)
2144	3700	0	11A	11B	1823	0
	14 000	320	10A	10B	6720	560
	11 595	570	9A	9B	5960	630
	5121	340	8A	8B	3500	330
	8259	350	7A	7B	5782	350
	8758	360	6A	6B	10 811	360
	18 943	540	5A	5B	12 201	570
	22 102	710	4A	4B	14 000	300
	24 054	1900	3A	3B	16 500	1000
	25 000	2900	2A	2B	25 000	5100
	31 812	9200	1A	1B	45 720	14 500

The Allowable Annual Volumes for the sub-zones that have been determined for the Tertiary Limestone Aquifer in Zones 1A, 6A and 9A at 30 June 2015 are set out in Table 3. The locations of these sub-zones are shown in Figure 5.

**Table 3: Allowable Annual Volumes for the Tertiary Limestone Aquifer for year ending 30 June 2015**

South Australia Allowable Annual Volumes	
Tertiary Limestone Aquifer (ML/y)	Sub-zone
2400	9A North
7760	9A South
4658	6A South
12 507	1A South

## Allocations and volumes extracted

The allocations and the volumes extracted<sup>3</sup> for the Tertiary Limestone Aquifer are listed in Tables 4 and 5.

**Table 4: Permissible Annual Volumes, number of licences, allocations and volumes extracted for the Tertiary Limestone Aquifer at 30 June 2015**

South Australia					Victoria				
Tertiary Limestone Aquifer				Zone	Zone	Tertiary Limestone Aquifer			
Permissible Annual Volume (ML/y)	Licensed Allocations					Permissible Annual Volume (ML/y)	Licensed Allocations		
	No. of Licences	Volume Allocated (ML)	Volume Extracted (ML)	No. of Licences	Volume Allocated (ML)		Volume Extracted (ML)		
3700	13	3700	2835	11A	11B	1823	3	1600	919
14 000	33	13 946	9130	10A	10B	6720	19	6718	3608
11 595	11	10 160	9108	9A	9B	5960	3	5300	415
5121	26	6927	1480	8A	8B	3500	8	3430	1
8259	81	9133	4581	7A	7B	5782	15	5782	2847
8758	49	11 099	5925	6A	6B	10 811	17	10 079	7203
18 943	129	25 614	18 516	5A	5B	12 201	42	12 833	6000
22 102	176	30 956	14 605	4A	4B	14 000	6	2880	315
24 054	252	33 639	13 900	3A	3B	16 500	5	515	49
25 000	88	27 876	11 411	2A	2B	25 000	36	24 127	3994
31 812	313	45 999	28 234	1A	1B	45 720	17	4409	2376

**Table 5: Allowable Annual Volumes, number of licences, allocations and volumes extracted for the Tertiary Limestone Aquifer at 30 June 2015**

South Australia				
Tertiary Limestone Aquifer				Sub-Zone
Allowable Annual Volume (ML/y)	Licensed Allocations			
	No. of Licences	Volume Allocated (ML)	Volume Extracted (ML)	
2400	3	2400	962	9A North
7760	8	7760	8146	9A South*
4658	18	5649	2218	6A South
12 507	62	20 064	13 336	1A South*

\* It is noted that extractions have exceeded the PAV in these sub-zones

<sup>3</sup> Note that the 'volume extracted' is the volume of groundwater extracted under a permit/licence and does not take into account the volume extracted for domestic and stock use or the impacts of plantation forests. The Agreement does not apply to bores for domestic and stock purposes.

Many of the zones are fully committed in the Tertiary Limestone Aquifer, in that the volumes licensed have reached the Permissible Annual Volumes. There is un-allocated water in the Tertiary Limestone Aquifer in Zones 1B, 3B and 4B. There is a moratorium on new licences and permanent transfers of groundwater entitlements in Zones 1B, 2B, 3B and part of Zone 4B under Victoria’s water legislation. In South Australia, there has been an ongoing process of converting all existing area-based irrigation allocations to volumetric allocations. While not granting any new allocations it has resulted in allocations and extractions exceeding the Permissible Annual Volumes in some zones. Although still in a transition phase, this matter will be addressed by the Review Committee.

The allocations and volumes extracted for the Tertiary Confined Sand Aquifer are listed in Table 6. A moratorium exists under the Victorian *Water Act 1989* on issuing groundwater licences for the Tertiary Confined Sand Aquifer in Zones 1B, 2B and 3B.

**Table 6: Permissible Annual Volumes, allocations and volumes extracted for the Tertiary Confined Sand Aquifer at 30 June 2015**

South Australia				Victoria					
Tertiary Confined Sand Aquifer				Zone	Zone	Tertiary Confined Sand Aquifer			
Permissible Annual Volume (ML/y)	Licensed Allocations					Permissible Annual Volume (ML/y)	Licensed Allocations		
	No. of Licences	Volume Allocated (ML)	Volume Extracted (ML)	No. of Licences	Volume Allocated (ML)		Volume Extracted (ML)		
0	0	0	0	11A	11B	0	0	0	0
320	0	0	0	10A	10B	560	0	0	0
570	0	0	0	9A	9B	630	0	0	0
340	0	0	0	8A	8B	330	0	0	0
350	0	0	0	7A	7B	350	0	0	0
360	0	0	0	6A	6B	360	0	0	0
540	0	0	0	5A	5B	570	0	0	0
710	1	102	84	4A	4B	300	0	0	0
1900	1	250	150	3A	3B	1000	0	0	0
2900	2	150	25	2A	2B	5100	0	0	0
9200	4	1704	1585	1A	1B	14 500	0	0	0

The allocation and volume extracted for the Pliocene Sands Aquifer are listed in Table 7.

**Table 7: Permissible Annual Volume, number of licences, volume allocated and volume extracted for the Pliocene Sands Aquifer at 30 June 2015**

South Australia				
Pliocene Sands Aquifer				
Permissible Annual Volume (ML/y)	Licensed Allocations			Zone
	No. of Licences	Volume Allocated (ML)	Volume Extracted (ML)	
2144	1	2144	0	11A

While the Agreement does not apply to bores for domestic and stock purposes, the large number of bores in the Designated Area indicates the important role groundwater plays for these purposes. The estimated number of domestic and stock bores for each zone is listed in Table 8.

**Table 8: Number of domestic and stock bores**

South Australia		Victoria	
Number of Domestic and Stock Bores <sup>1</sup>	Zone	Zone	Number of Domestic and Stock Bores <sup>2</sup>
16	11A	11B	17
166	10A	10B	243
25	9A	9B	47
62	8A	8B	113
749	7A	7B	104
391	6A	6B	56
1370	5A	5B	162
896	4A	4B	339
1155	3A	3B	79
632	2A	2B	577
1648	1A	1B	625

Note 1: The numbers of domestic and stock bores are derived from spatial analysis of the state SA Geodata borehole records. It does not necessarily indicate the bores in use.

Note 2: The numbers of domestic and stock bores are best estimates made in 2004, based on State database records.

### Permissible distance from the border

The permissible distance is the distance from the border within which all applications for a permit or licence must be forwarded to the Review Committee for approval. The permissible distances at 30 June 2015 are specified in Table 9.

**Table 9: Permissible distances at 30 June 2015**

South Australia			Victoria		
Tertiary Confined Sand Aquifer Distance (km)	Tertiary Limestone Aquifer Distance (km)	Zone	Zone	Tertiary Limestone Aquifer Distance (km)	Tertiary Confined Sand Aquifer Distance (km)
3	3	11A	11B	3	3
3	3	10A	10B	3	3
3	1	9A	9B	1	3
3	1	8A	8B	1	3
3	1	7A	7B	1	3
3	1	6A	6B	1	3
3	1	5A	5B	1	3
3	1	4A	4B	1	3
3	1	3A	3B	1	3
3	1	2A	2B	1	3
3	1	1A	1B	1	3

## Permissible potentiometric surface lowering

The Agreement provides for a rate of drawdown that must not be exceeded. The prescribed permissible potentiometric surface lowering rates for each zone are shown in Table 10.

**Table 10: Permissible potentiometric surface lowering rates at 30 June 2015**

South Australia		Victoria	
Rate (m/y)	Zone	Zone	Rate (m/y)
0.65	11A	11B	0.65
0.65	10A	10B	0.65
0.65	9A	9B	0.65
0.05	8A	8B	0.65
0.05	7A	7B	0.05
0.05	Sub-zone 6A North	6B	0.20
0.20	Sub-zone 6A South		
0.20	5A	5B	0.20
0.25	4A	4B	0.25
0.25	3A	3B	0.25
0.25	2A	2B	0.25
0.25	1A	1B	0.25

## Permissible salinity

The Agreement allows for the setting of Permissible salinity levels. Following the reviews of Province 1, Province 2 and Province 3 (Border Groundwaters Agreement Review Committee 2010, 2012 and 2013 respectively) the Review Committee has determined that there is no need to recommend that permissible salinity levels should be set.

## Reports from the states

The Agreement requires that the Contracting Governments provide an annual report to the Review Committee detailing the number of permits or licences issued, volumes authorised, and details of potentiometric surface levels in each zone. In addition, the states also reported on a number of other activities that related to groundwater management in the Designated Area, as follows:

### South Australia – Volumetric licence conversion

The South Australian Government continued its program to convert irrigation water licences from area-based to volume-based during the year. While the issuing of volumetric allocations was completed by 30 June 2015 in the Lower Limestone Coast Prescribed Wells Area, the current period is considered to be a transition period until all appeals are resolved. The Review Committee was advised by the South East Natural Resources Management region in 2013 that implementing the proposed water allocation plan would result in allocations exceeding the Permissible Annual Volumes in some zones. This will be addressed by the Review Committee during the 2015–16 year.

### South Australia – Plantation forestry accountability

The water allocation plan for the Lower Limestone Coast Prescribed Wells Area requires all commercial plantation forest to be accountable for their hydrological impacts on the groundwater resource with licensed forest water allocations. This accountability includes the forest impacts on recharge, and where the water table is considered to be six metres or less below ground level, at June 2004, direct extraction by the plantation will apply. Volumetric licenses, based on deemed values laid down in the water allocation plan, were granted to forest managers during the past year. Whilst forest water licensing lays outside of the responsibility of the Agreement, it is a significant and historic water resource management measure for managing groundwater sustainability in the Designated Area.

### Groundwater level monitoring review

Both South Australia and Victoria continued to review the groundwater monitoring network in their respective states.

### Condition of the resource

Groundwater trends remained generally about the same as last year for most parts of the Designated Area, with declines still evident in the Frances–Neuarpur area and under the forested areas in Province 1.

Victoria completed its program of installing meters on bores in 2003, while South Australia adopted meters in 2006. The 2006–07 period was the first year that complete metering records were obtained. Figure 6 is a chart showing the annual water use since 2005–06.

Details of the potentiometric levels trends from representative observation bores for the Tertiary Limestone Aquifer and the Tertiary Confined Sand Aquifer are shown in Figures 7 and 8.



### **Decision statements**

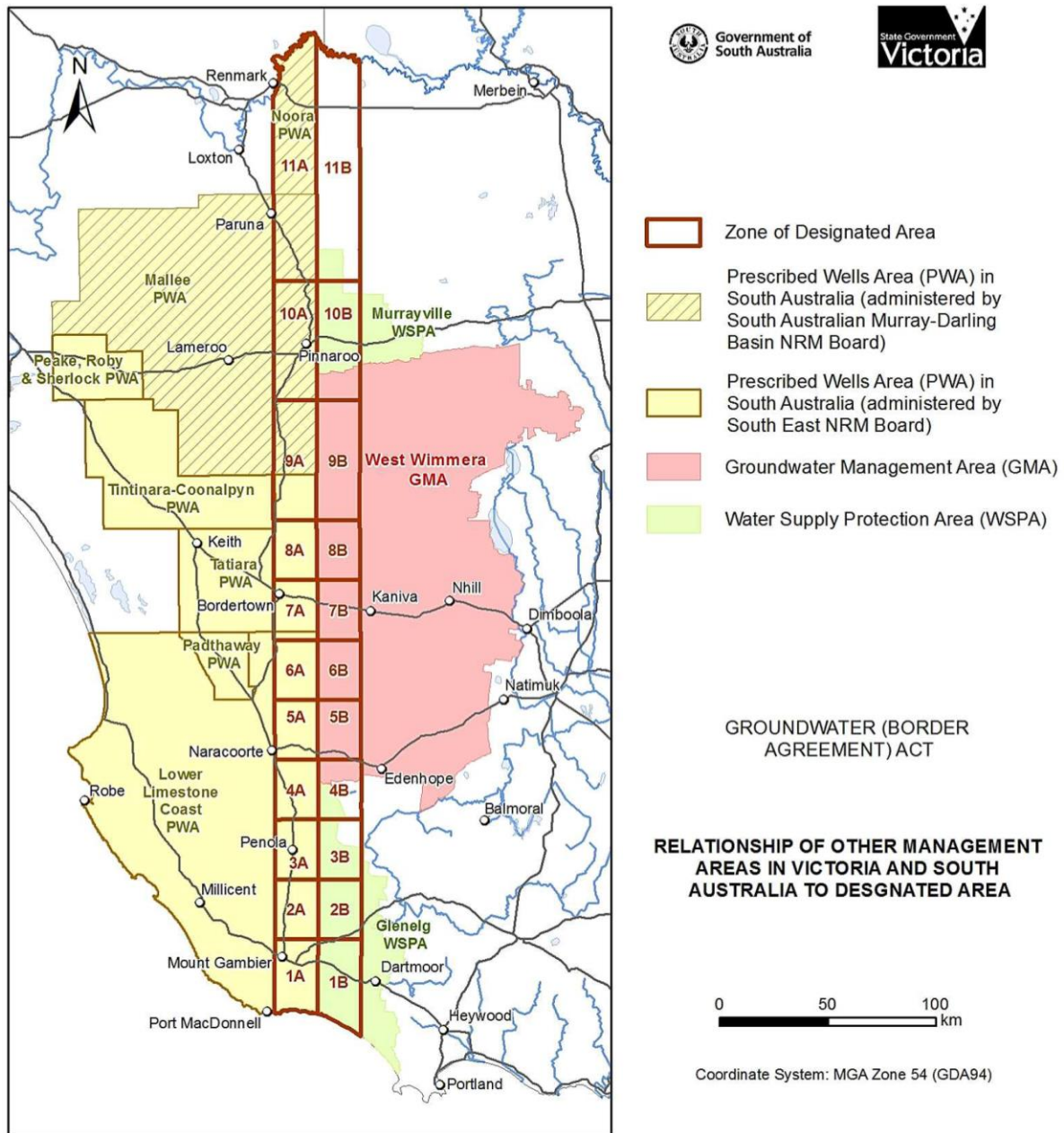
There were no prescription decisions by the Review Committee during the 2014–15 year.

## FIGURES

Figure 1: Designated Area and Zones

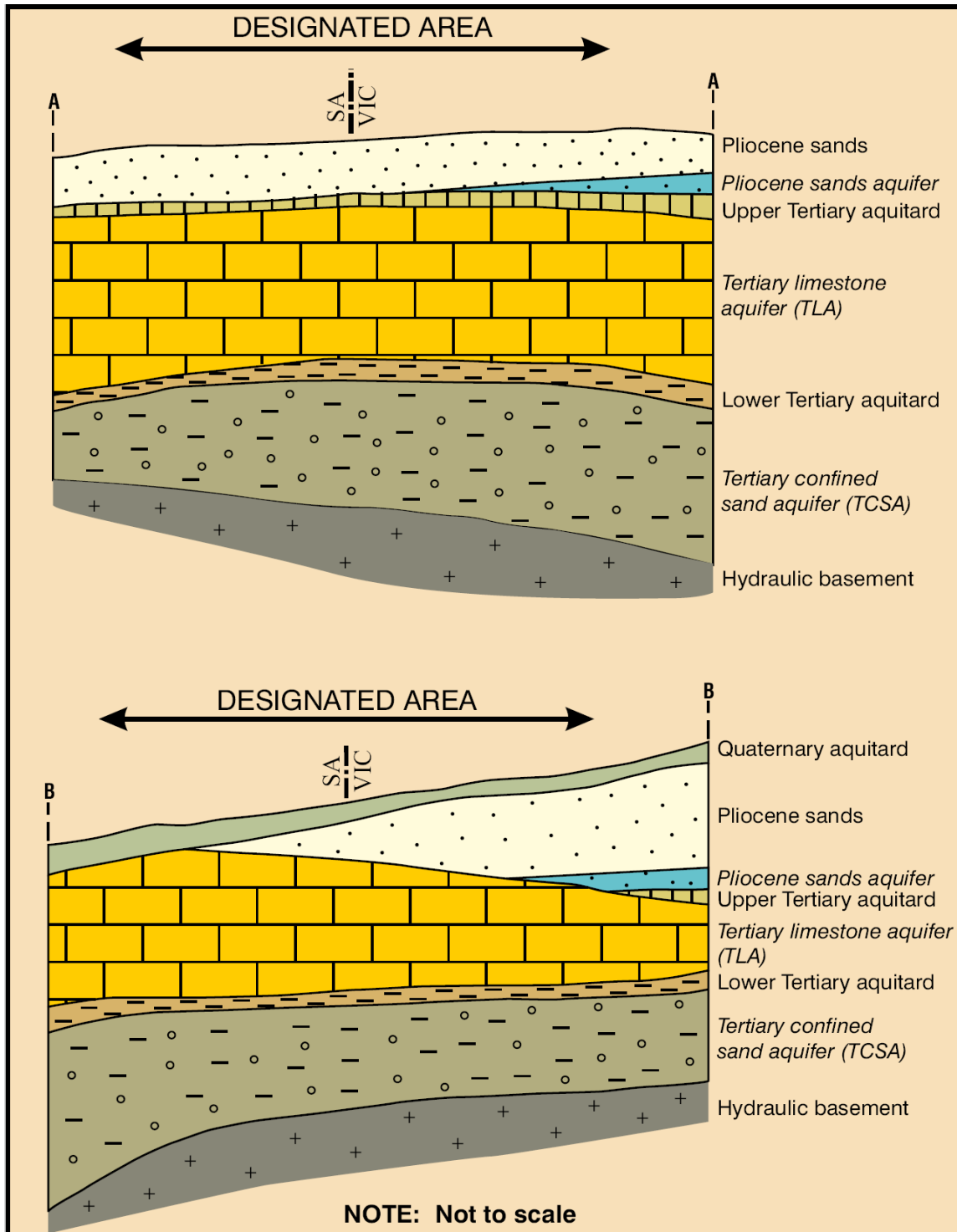


**Figure 2: Relationship of management areas in South Australia and Victoria to the Designated Area**

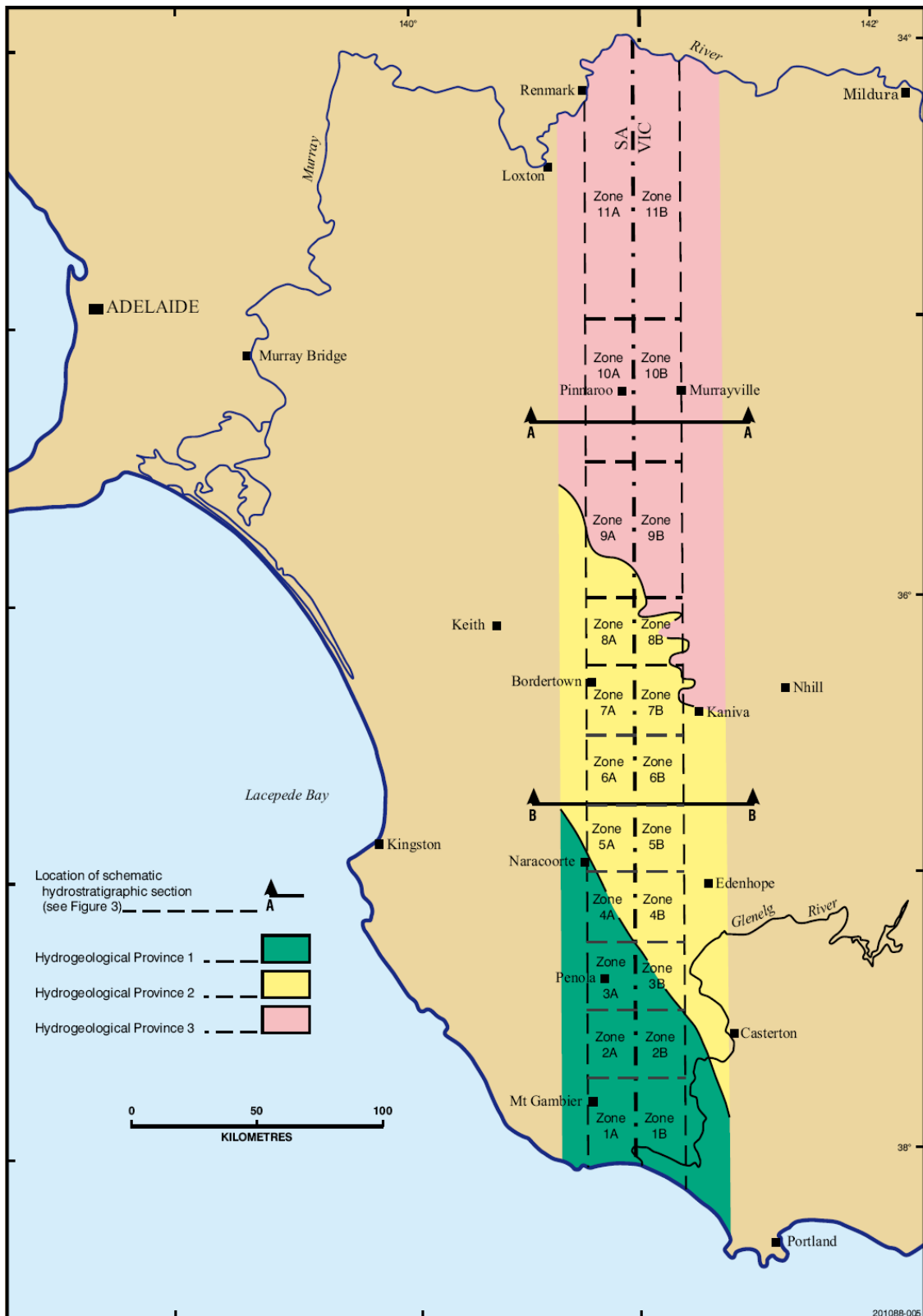


**Figure 3: Schematic hydrostratigraphic cross-sections relating to Figure 4**

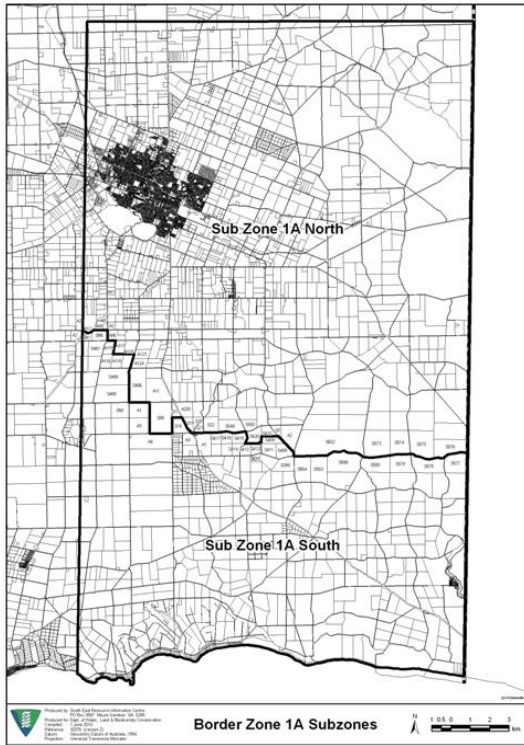
(The locations of the cross-sections are shown in Figure 4)



**Figure 4: Hydrogeological provinces**



**Figure 5: Sub-zone boundaries for Zones 1A, 6A and 9A**

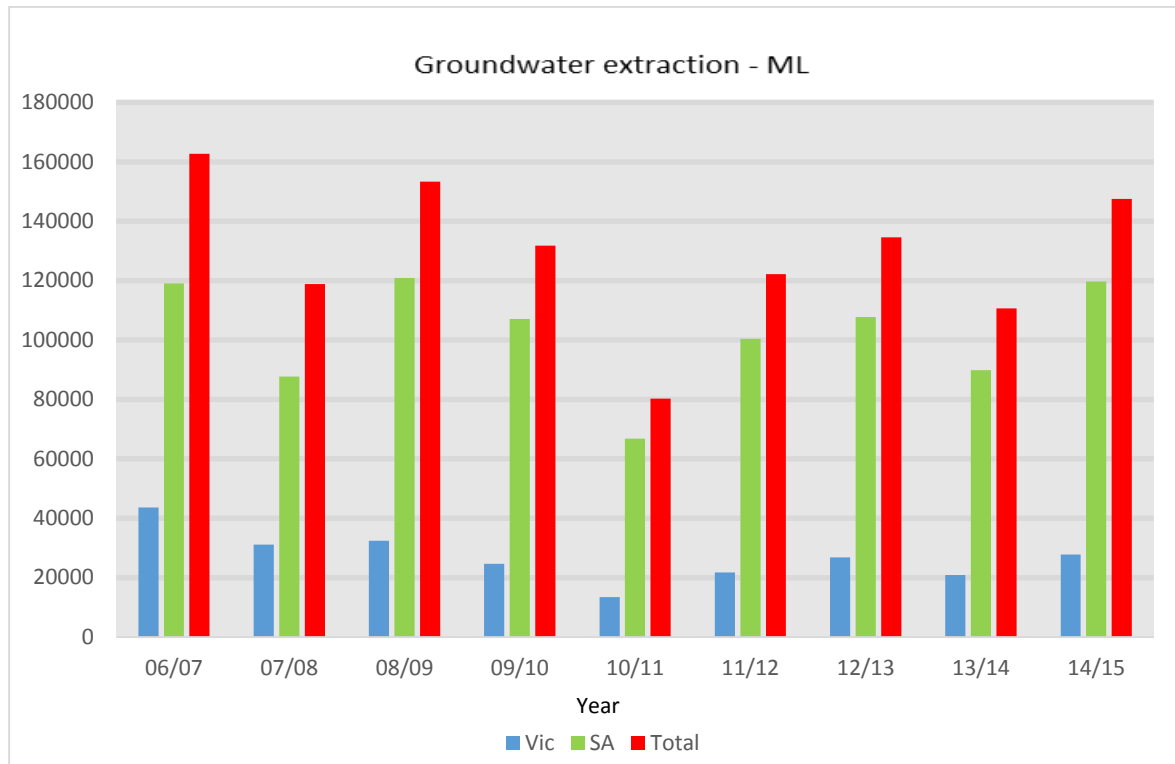


Boundaries of sub-zones are registered on :

- Plan number 35/2010 (Zone 1A)
- Plan number 34/2010 (Zone 6A)
- Plan number 36/2010 (Zone 9A)

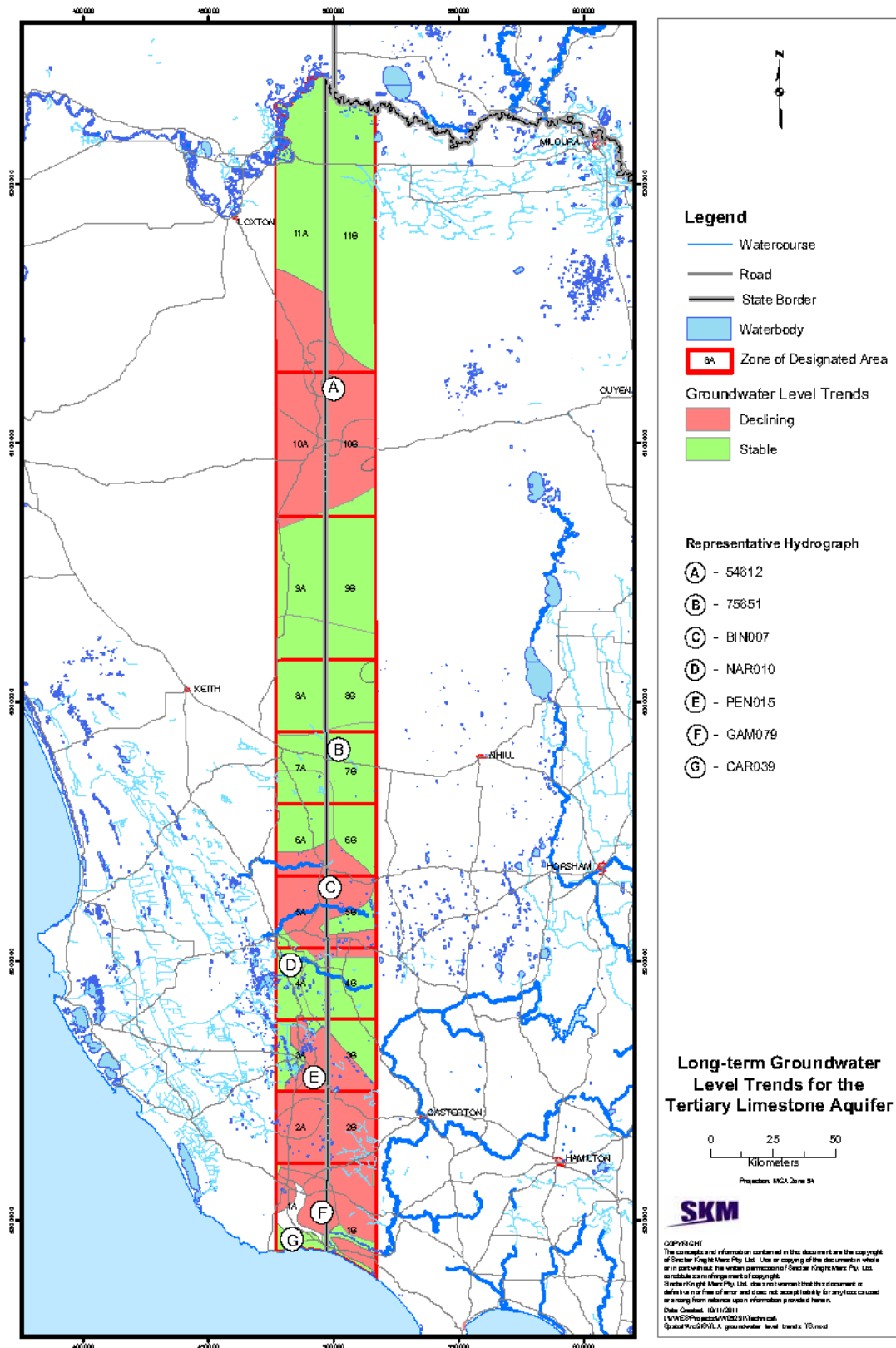
Plans can be viewed at Lands Titles Office at  
101 Grenfell Street Adelaide, South Australia.

**Figure 6: Annual volume extracted from the Tertiary Limestone Aquifer since 2006–07**



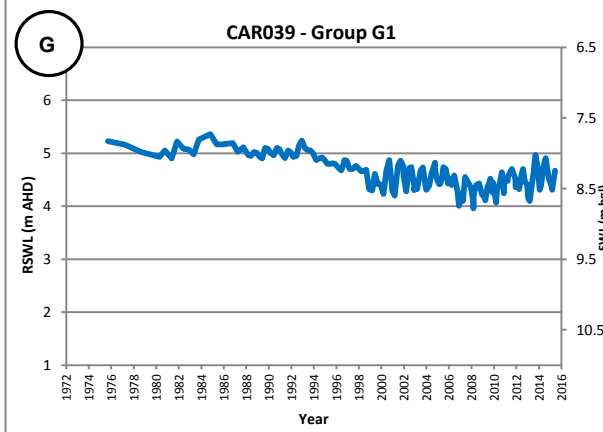
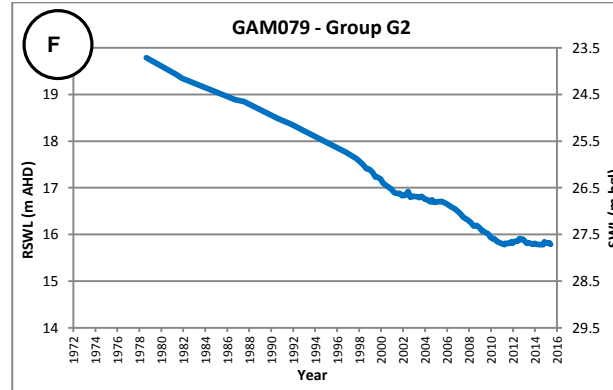
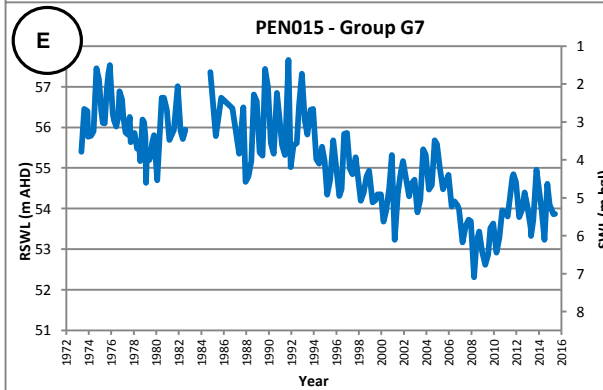
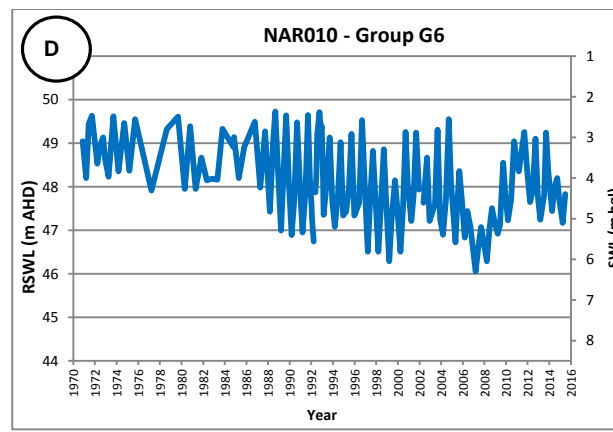
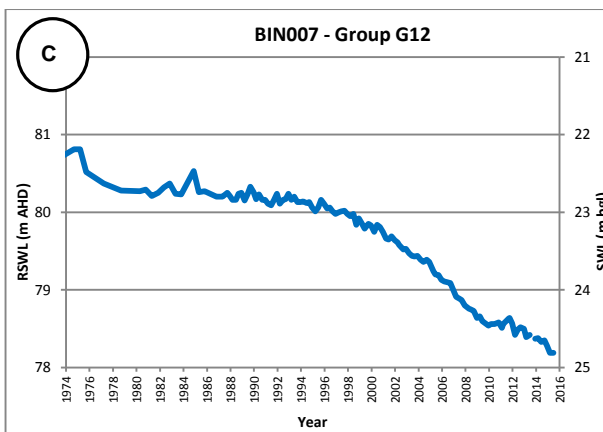
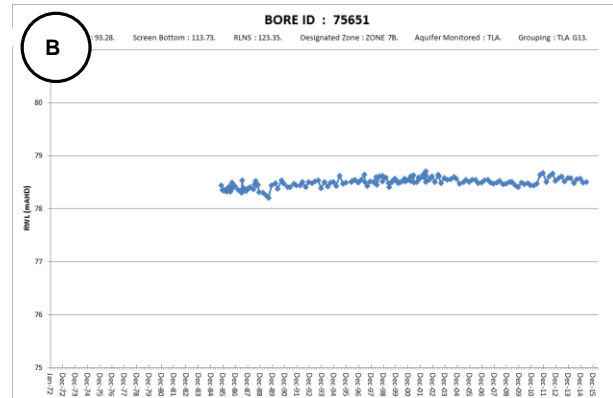
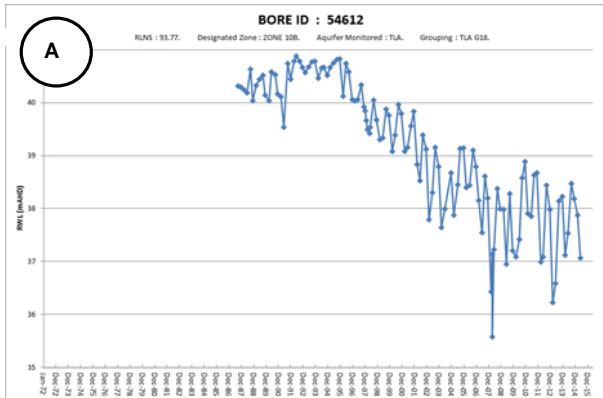
Note: The first year that complete metering records were obtained was 2006–07.

**Figure 7: Groundwater-level trends for the Tertiary Limestone Aquifer with some representative hydrographs**

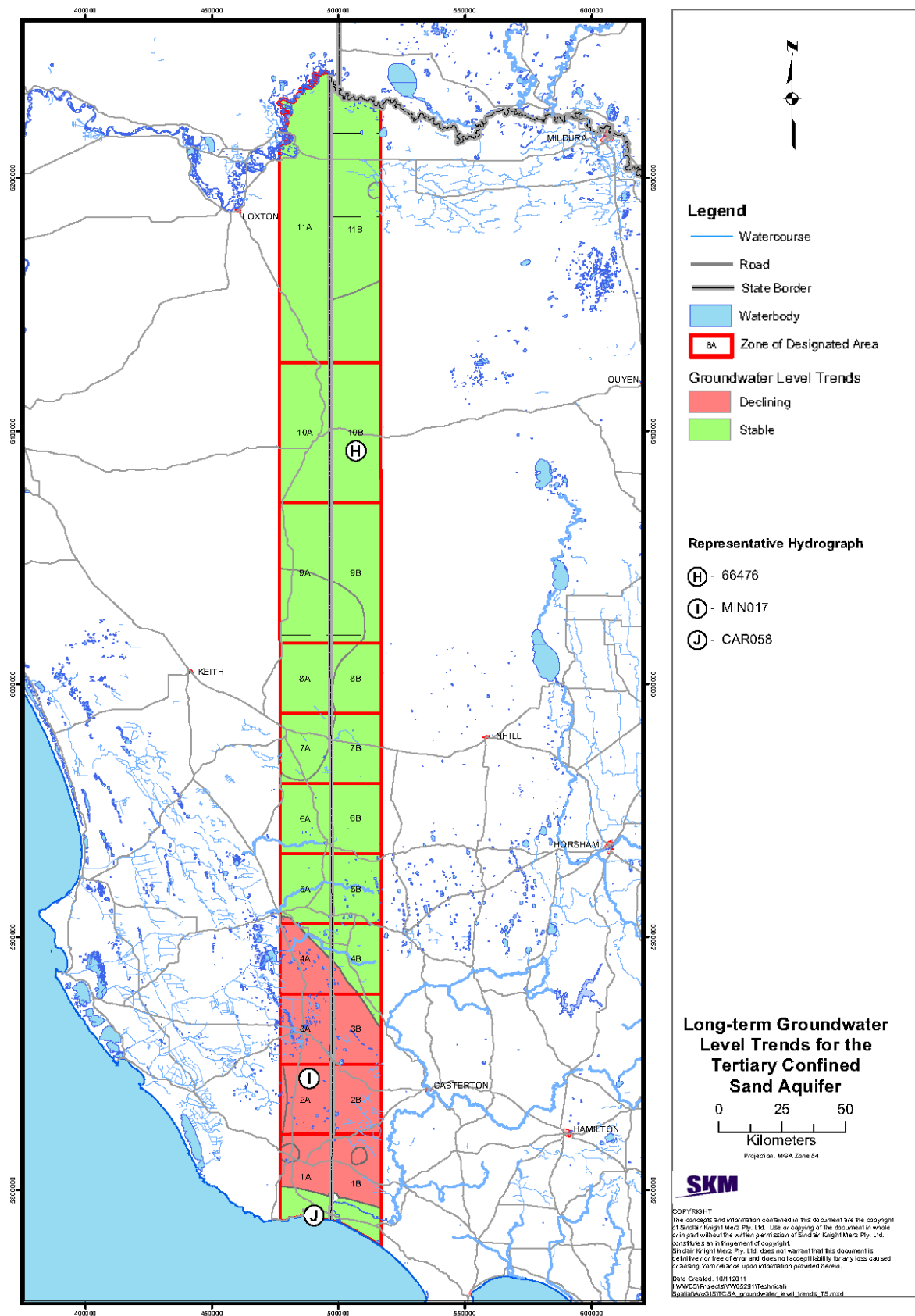




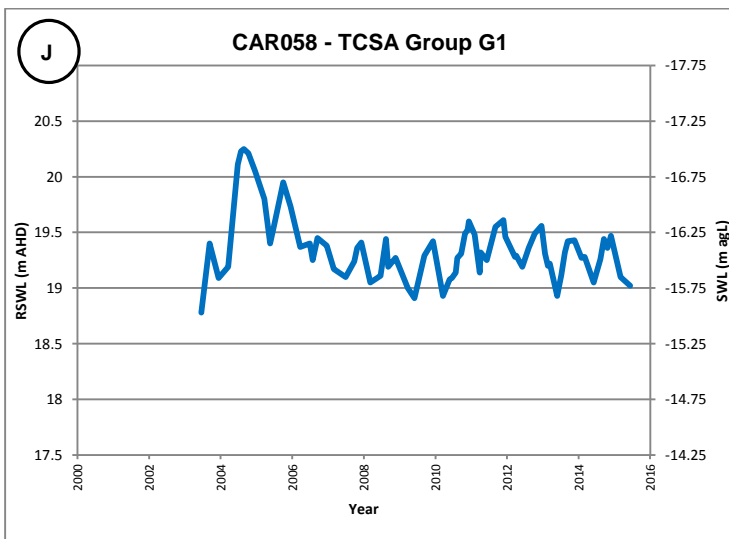
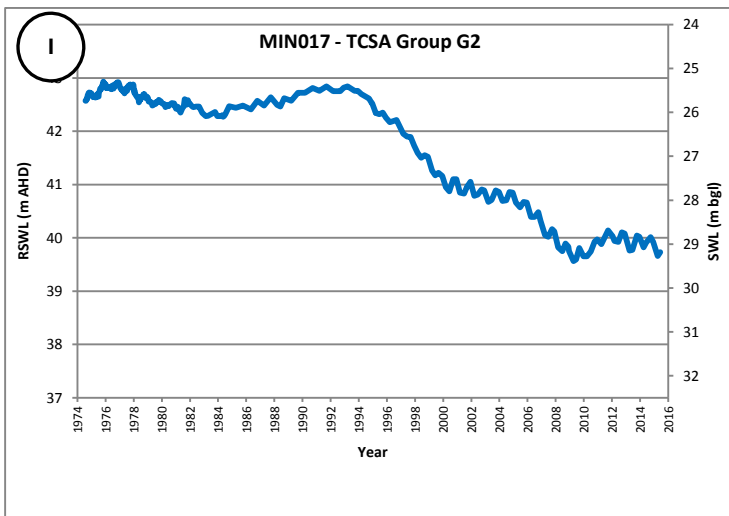
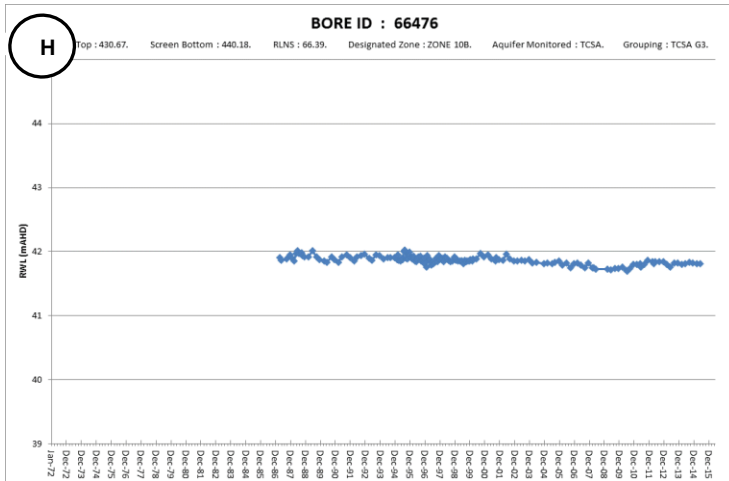
Sample of groundwater level hydrographs as located in opposite map (Fig. 7)



**Figure 8: Groundwater-level trends for the Tertiary Confined Sand Aquifer with some representative hydrographs**



Sample of groundwater level hydrographs as located in opposite map (Fig. 8)



## GLOSSARY

**Aquifer** – A geological structure or formation or an artificial landfill permeated or capable of being permeated permanently or intermittently with water.

**Allowable Annual Volume** – The allowable volume of extraction specified for a particular sub-zone or aquifer within a sub-zone as has been determined by the Review Committee under clause 28(7) of the Agreement.

**Designated Area** – The area comprising part of the state of South Australia and part of the state of Victoria as specified in the First Schedule of the Act. This is an area 40 km wide and centred on the South Australia–Victoria Border and is the area to which the *Groundwater (Border Agreement) Act 1985* applies.

**EC (ECU)** – Electrical conductivity; 1 EC unit = 1 micro-Siemen per centimetre ( $\mu\text{S}/\text{cm}$ ) measured at 25°C; commonly used as a measure of water salinity as it is quicker and easier than measurement by TDS.

**Permissible Annual Volume** – The Permissible Annual Volume of extraction specified for a particular zone or aquifer in a particular zone in the Designated Area.

**Permissible distance** – The distance from the border in which all applications for licences must be referred to the Review Committee to determine whether the licence should be issued.

**Permissible potentiometric surface lowering** – An average annual rate of potentiometric surface lowering (drawdown) within a zone as prescribed under the Agreement or has been agreed by the minister for each Contracting Government.

**Permissible salinity** – A certain level of salinity within a zone as has been agreed by the minister for each Contracting Government.

**Prescribed Wells Area** – An area declared to be prescribed under the South Australian *Natural Resources Management Act 2004*. Prescription of a water resource requires that future management of the resource be regulated via an approved water allocation plan and extraction of water be licensed.

**TDS** – Total dissolved solids, measured in milligrams per litre (mg/L); a measure of water salinity.

**Tertiary Limestone Aquifer** – Comprises aquifers in the Murray Group, Heytesbury Group, Coomandook Formation, Bridgewater Formation and Padthaway Formation, called collectively the Tertiary Limestone Aquifer, the base of which is identified as marl or black carbonaceous silt, sand or clay.

**Tertiary Confined Sand Aquifer** – Comprise aquifers in the Wangerrip Group and Renmark Group, below the Tertiary Limestone Aquifer.

**Water Supply Protection Area** – An area declared under the Victorian *Water Act 1989* to protect the area's groundwater or surface water resources through the development of a management plan, which aims for equitable management and long-term sustainability.

## REFERENCES

Border Groundwaters Agreement Review Committee (2001). *Five Year Management Review Report 1996 – 2000*. September 2001.

Border Groundwaters Agreement Review Committee (2007). *Management Review of the Tertiary Limestone Aquifer in Province 2 of the Designated Area*. December 2007.

Border Groundwaters Agreement Review Committee (2008). *Management Review Tertiary Limestone Aquifer and Tertiary Confined Sand Aquifer in Province 1 of the Designated Area*. May 2008.

Border Groundwaters Agreement Review Committee (2010). *Management Review Tertiary Limestone Aquifer in Province 3 of the Designated Area*. January 2010.

SKM (2012). Review of groundwater level trends in the SA-Vic Designated Area.

## APPENDIX

### Notices in Government Gazette relating to the current amendments to the prescriptions

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The Agreement requires that notices of the amendments be made in papers circulating in the area and the Government Gazette. The amendments took effect from the date nominated in the notice. The list of the notices in Government Gazette relating to the current amendments to the prescriptions is provided below.

#### South Australia

<b>Publish date of Gazette</b>	<b>Notice</b>
22 May 2008	Alteration of Permissible Annual Volumes for Zone 11A (sets a Permissible Annual Volume for the Parilla Sands Aquifer, Tertiary Limestone Aquifer and Tertiary Confined Sands Aquifer) (Note the Permissible Annual Volume for Tertiary Limestone Aquifer was superseded by the notice on 1 July 2010)
15 October 2009	Alteration of Permissible Annual Volume – Zone 6A
15 October 2009	Alteration of permissible distance – Zones 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A and 11A
15 October 2009	Notice of the alteration of Permissible Annual Volume – Zones 7A, 8A and 9A. (Note the Permissible Annual Volume for Zone 7A was superseded by the 1 July 2010 notice and Permissible Annual Volume for Zone 8A was superseded by 2 December 2010 notice)
1 July 2010	Sub-zoning of the Tertiary Limestone Aquifer in Zone 1A (also sets an Allowable Annual Volume for Sub-zone 1A South)
1 July 2010	Sub-zoning of Tertiary Limestone Aquifer in Zone 6A (also sets an Allowable Annual Volume Sub-zone 6A South and sets a permissible rate of potentiometric surface lowering for Sub-zones 6A South and 6A North)
1 July 2010	Sub-zoning of the Tertiary Limestone Aquifer in Zone 9A (also sets an Allowable Annual Volume Sub-zone 9A South and Sub-zone 9A North)
1 July 2010	Alteration of permissible rate of potentiometric surface lowering-Zone 5A
1 July 2010	Alteration of Permissible Annual Volume for the Tertiary Limestone Aquifer-Zones 1A, 3A, 4A, 5A, 7A, 10A and 11A
2 December 2010	Alteration of Permissible Annual Volume for the Tertiary Limestone Aquifer-Zone 8A
30 January 2014	Temporary alteration of Permissible Annual Volume for the Tertiary Limestone Aquifer-Zone 7A (until 31 January 2015)

#### Victoria

<b>Publish date of Gazette</b>	<b>Notice</b>
15 October 2009	Alteration of Permissible Annual Volume – Zones 7B and 8B
15 October 2009	Alteration of permissible distance – Zones 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B, 9B, 10B and 11B
15 July 2010	Alteration of Permissible Annual Volume for the Tertiary Limestone Aquifer-Zone 8A
15 July 2010	Alteration of permissible rate of potentiometric surface lowering-Zones 5B and 6B

#### BGARC Decision

16 June 2014	Alteration of Permissible Annual Volume for the Tertiary Limestone Aquifer-Zones 5B and 6B
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