

Groundwater Management Plan for the Katunga Water Supply Protection Area

2006

DRAFT AMENDED PLAN 2017

I, John Thwaites, Minister for Water, approve this management plan in accordance with section 32A(6) of the Water Act 1989.

JOHN THWAITES
Minister for Water
Date: 24/7/06

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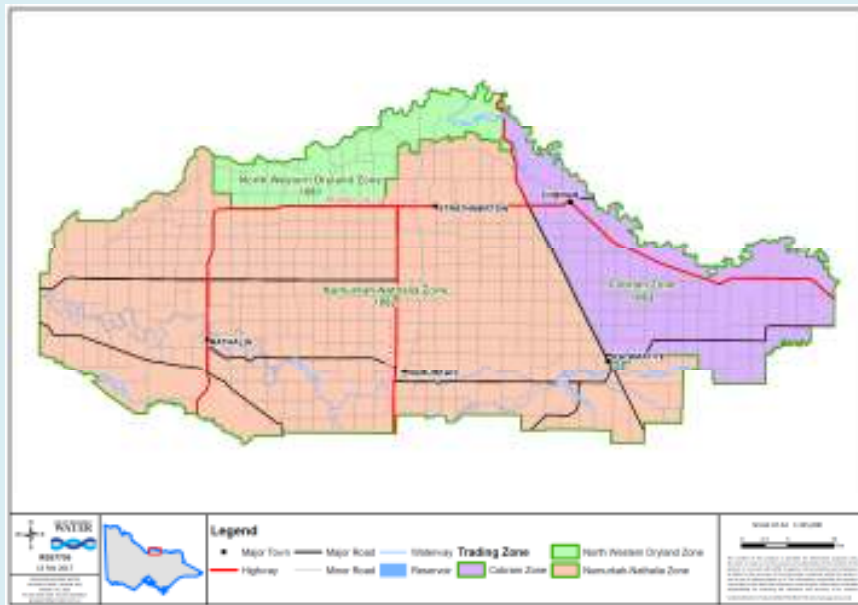
Quick Reference Guide to the Plan Rules

PRESCRIPTION 1: Limit on entitlement (*Page 12*)

GMW must not approve an application for a groundwater licence if the approval of the application would cause:

- The Permissible Consumptive Volume to be exceeded;
- The total groundwater entitlement within a 2 km radius of the proposed extraction site exceeding 3,700 ML/year; or
- The following zone limits to be exceeded.

Management zone	Zone limit (ML/year)
North Western Dryland Zone (1061)	6,500
Numurkah-Nathalia Zone (1062)	No limit
Cobram Zone (1063)	25,000



Katunga WSPA Management Zones

PRESCRIPTION 2: Restrictions on taking groundwater (*Page 14*)

By 1 July each year GMW will:

- Determine the rolling average of the maximum annual groundwater recovery levels from the preceding five irrigation seasons for bores listed in Schedule 1 (page 24) and announce a corresponding allocation for the subsequent irrigation season as detailed below:

Trigger level depth below natural surface (m)	Allocation
21.0 and above	100%
21.1 to 24.0	70%
Below 24.1	70% and review undertaken by GMW in consultation with Katunga Groundwater Reference Group

- Announce allocations by listing them on its website, sending letters to all licence holders and placing public notices in local newspapers.

PRESCRIPTION 3: Transfer of entitlement (page 15)

3.1 GMW may approve a permanent transfer of entitlement provided relevant matters have been considered and:

- a) Zone limits in Prescription 1 (page 12) will not be exceeded; and
- b) The total licensed volume within 2 km of an applicant's bore will be less than 3,700 ML/year; or
- c) Where the total licensed volume within 2 km of an applicant's bore is equal to or greater than 3,700 ML/year, the permanent transfer is from other licence holders within a 2 km radius of the applicant's bore.

3.2 GMW may approve a temporary transfer of entitlement provided relevant matters have been considered and:

- a) Zone limits in Prescription 1 (page 12) will not be exceeded; and
- b) The total licensed volume within 2 km of an applicant's bore will be less than 3,700 ML/year; or
- c) Where the total licensed volume within 2 km of an applicant's bore is equal to or greater than 3,700 ML/year –
 - i. The applicant's entitlement volume in one season will not exceed 125% of their permanent entitlement volume prior to any temporary trade occurring; or
 - ii. The temporary transfer is from other licence holders within a 2 km radius of the applicant's bore

PRESCRIPTION 4: Metering licensed use (page 18)

GMW will:

- a) Ensure that a meter is fitted to new licensed bores;
- b) Read each meter at least once a year and record use in appropriate database(s); and
- c) If GMW is unable to measure the volume of water taken through a meter it may:
 - i. make an estimate of use; or
 - ii. request the licence holder to provide a meter reading.

PRESCRIPTION 5: Groundwater level monitoring (page 19)

5.1 GMW will:

- a) Obtain groundwater levels from bores used for allocation assessments (listed in Schedule 1, page 24) on a monthly basis. If a bore used for allocation assessments becomes defective an alternative bore may be monitored and the defective bore should be decommissioned. The alternative bore will be selected by consensus between DELWP and GMW.
- b) Ensure that water level monitoring is carried out at appropriate locations throughout the Katunga WSPA to:
 - i. assess annual and long-term impact on water levels from groundwater pumping;
 - ii. monitor regional and local seasonal drawdown; and
 - iii. monitor the impacts of groundwater pumping generally across the Katunga WSPA and in areas of high intensity groundwater pumping.

5.2 DELWP must ensure that:

- a) Continuous regional baseline monitoring is maintained to provide sufficient information to identify changes in groundwater resource availability and condition;
- b) State observation bores are properly maintained; and
- c) Data collected from the bores is entered into the groundwater management system, within 30 days after it has been collected.

PRESCRIPTION 6: Groundwater salinity monitoring (page 20)

GMW must:

- a) Sample bores specified in Schedule 1 (page 24) and have the samples analysed at an accredited laboratory for salinity once a year;
- b) Upload salinity measured in bores referred to in Schedule 1 (page 24) to the State groundwater database; and
- c) Provide a sample bottle to any groundwater user in the Katunga WSPA who requests one, test the salinity level of returned samples and provide the results to the groundwater user.

PRESCRIPTION 7: Annual reporting (page 23)

By 30 September each year GMW will prepare an annual report on the enforcement and administration of the Plan. The report will be provided to the Minister for Water and the Goulburn Broken Catchment Management Authority and made publicly available on GMW's website.

DRAFT AMENDED PLAN 2011

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Glossary

Term/Acronym	Definition
The Act	<i>Water Act 1989</i>
Allocation	The percentage of the groundwater licence entitlement that is permitted to be used under a licence for the financial year in which the announcement under prescription 1 is made
Aquifer	Means a geological structure or formation permeated or capable of being permeated permanently or intermittently with water
Bore construction licence	A licence to construct a bore issued under section 67 of the Act
Drawdown	The difference between the observed water level in a bore before and after groundwater pumping occurs
DELWP	The Department of Environment, Land, Water and Planning
Entitlement	The total amount of groundwater authorised to be taken each year under a groundwater licence
GL	Gigalitre (one thousand megalitres)
GMA	Groundwater Management Area
GMW	Goulburn-Murray Rural Water Corporation
GMU	Groundwater Management Unit – Either a Groundwater Management Area or Water Supply Protection Area
Groundwater licence	A licence to take and use groundwater issued under section 51 of the Act
Katunga Groundwater Reference Group	A reference group comprising representative groundwater users and key stakeholder agencies
Licence holder	A person or entity that owns a groundwater licence
mDBNS	Metres depth below natural surface. A unit used to describe the level of groundwater in relation to the ground surface.
ML	Megalitre (one million litres)
Permanent transfer	A transfer/trade of entitlement from one entity to another on a permanent basis
Plan	Katunga water supply protection area groundwater management plan
Recovery level	The level groundwater rises to during winter/spring each year after the groundwater pumping during the irrigation season finishes

Season	A period of 12 months beginning 1 July and ending on 30 June the following year
State observation bore	A bore owned by the State and used to monitor groundwater levels and quality across Victoria
Temporary transfer	A transfer/trade of entitlement from one entity to another for a period of one to five years
Use	The volume of groundwater extracted from a bore or bores in a season measured by meters or estimated where a meter is not fitted
WSPA	Water Supply Protection Area
Zone	A defined part of the water supply protection area

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1 Introduction

The Katunga Water Supply Protection Area (WSPA) Groundwater Management Plan (the Plan) has been prepared under Division 3 of Part 3 of the Water Act 1989 (the Act) for the Katunga WSPA which was declared on 14 January 1999. The Plan was approved and enacted on 25 July 2006.

1.1 Katunga Water Supply Protection Area

The Katunga WSPA is located to the north of the Great Dividing Range. It incorporates parts of the flood plains of the River Murray, Broken Creek and the Goulburn River between Yarrowonga and Barmah. The Katunga WSPA includes the towns of Nathalia, Numurkah and Cobram and covers an area of approximately 2,100 km² (see Figure 1, page 2).

The Katunga WSPA applies to groundwater at depths from 25 m below ground surface to 50 m into bedrock or 200 m from surface, whichever is greater depth.

A large part of the Katunga WSPA is within the Murray Valley Irrigation Area, which is supplied with surface water from the River Murray through a network of channels.

Pasture production for the dairy industry is predominant in the Katunga WSPA and is flood irrigated. A mixture of flood and pressure (drip or micro-spray) irrigation occurs in the limited horticultural areas in the north-eastern part of the Katunga WSPA.

The Katunga WSPA abuts the Mid Goulburn Groundwater Management Area (GMA) in the south and is overlain by the Shepparton Irrigation Region GMA to a depth of 25 m as shown in Figure 2 (page 3) and Figure 3 (page 4). Groundwater resources that occur from the ground surface to 25 m below ground surface are managed under the Shepparton Irrigation Region GMA Local Management Plan.

1.2 Groundwater management

Groundwater resources in the Katunga WSPA provide a valuable source of water for irrigation supply, domestic and stock use, commercial and industrial purposes, urban supply and the environment. The Plan provides groundwater users with flexibility to manage their water use through simple trading rules.

The Plan outlines management arrangements for the resource including placing a cap on entitlement and when restrictions on groundwater extraction will be triggered.

Goulburn-Murray Water (GMW) is responsible for the administration and enforcement of the Plan under section 32A (5) of the Act.

1.3 Plan objectives

The Plan aims to manage groundwater resources in an equitable manner to support the long-term sustainability of those resources.

Equitable means that everyone is treated fairly. When annual allocations are made under the management plan all Katunga WSPA licence holders will be treated in the same manner.

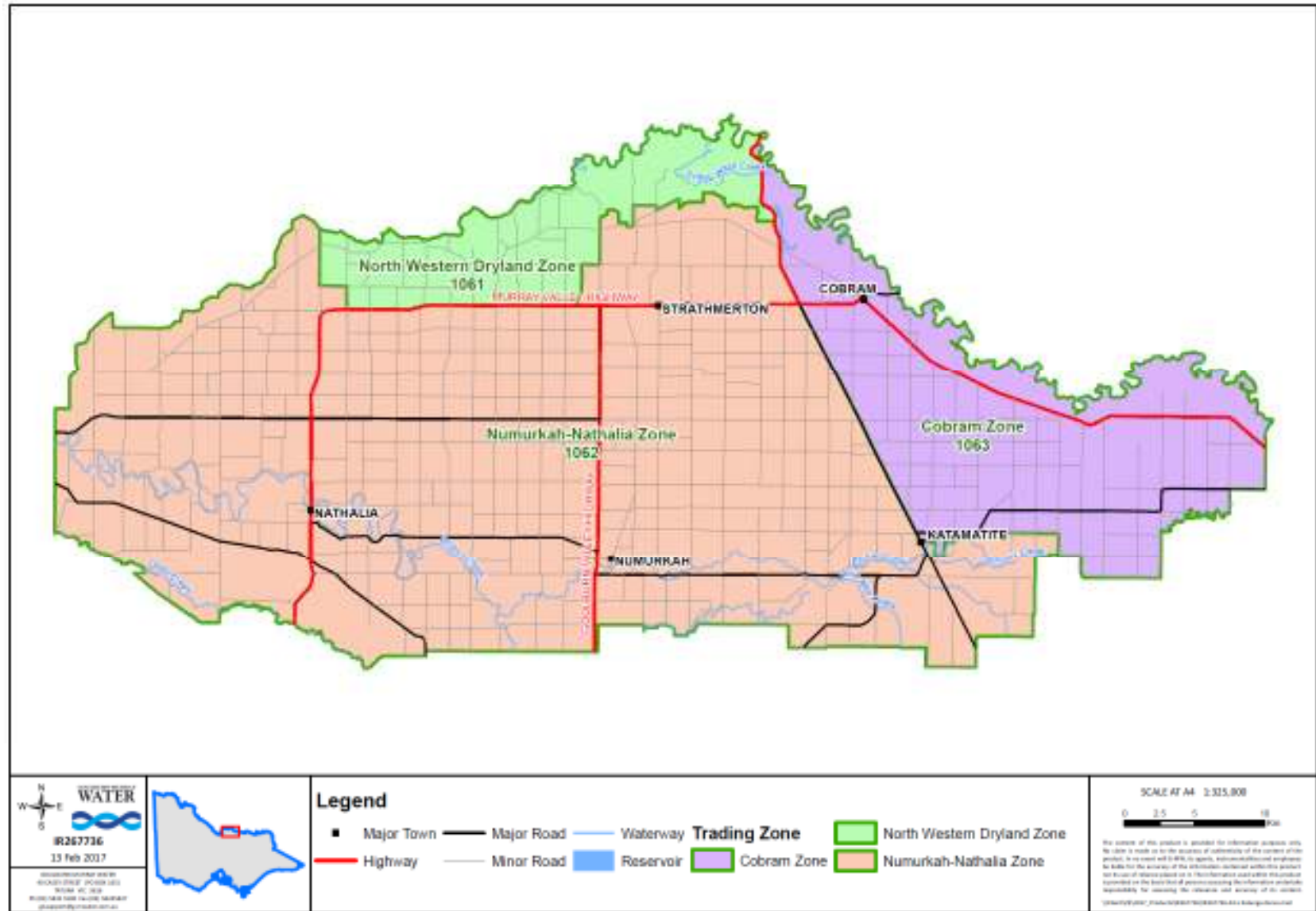


Figure 1 Katunga WSPA

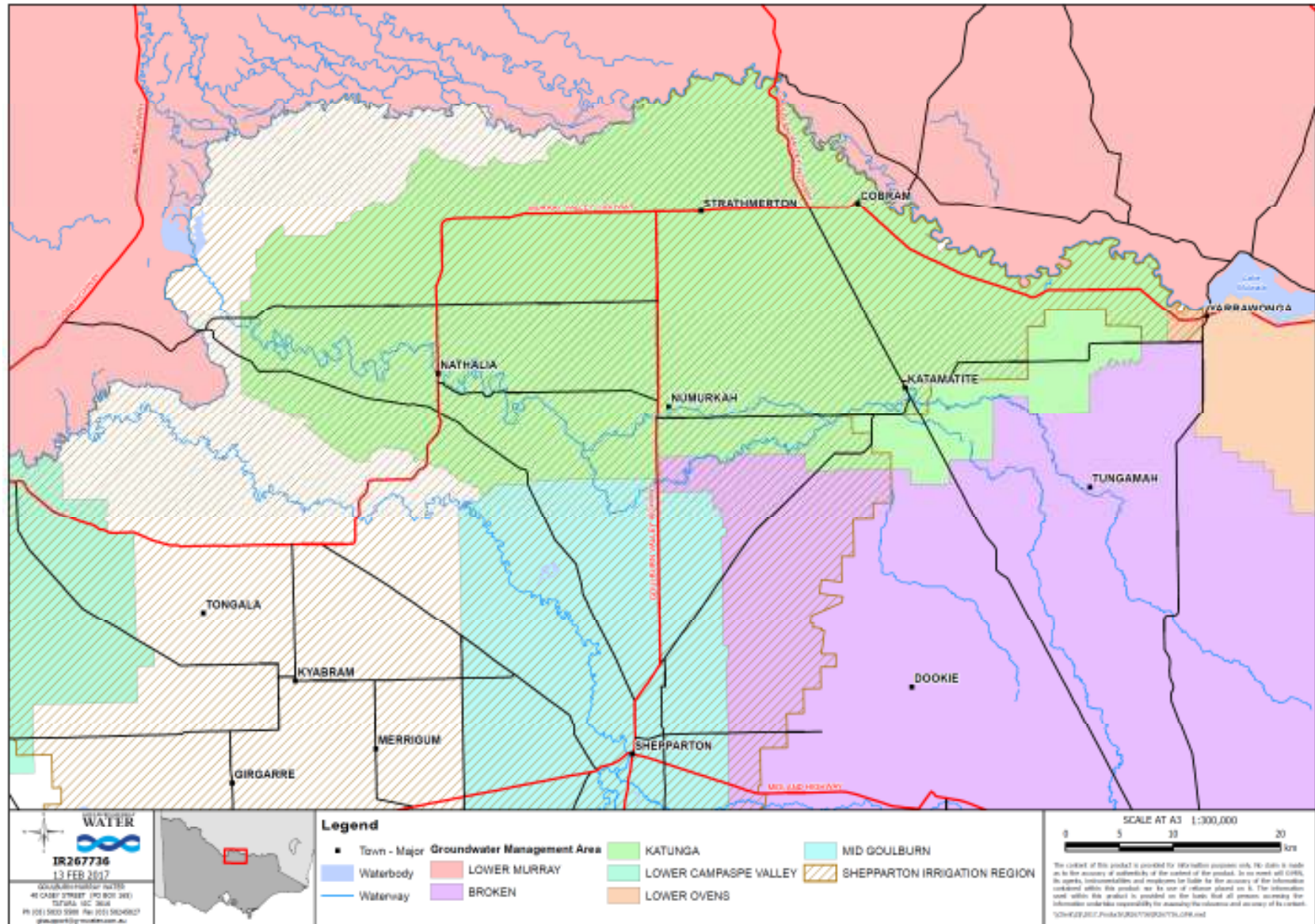


Figure 2 Katunga WSPA in relation to other Groundwater Management Units

2 Groundwater resources

There are three main aquifers in the Katunga WSPA, known as the Coonambidgal Formation, the Shepparton Formation and the Deep Lead aquifers (Figure 3, page 4 and Figure 4, page 5). The main aquifer utilised is the Deep Lead although relatively high yields can also be obtained from parts of the lower Shepparton Formation aquifers.

2.1 Coonambidgal Formation

The Coonambidgal Formation comprises silts, clays and coarse sand and gravel deposited by recent waterways. This formation occurs from the ground surface close to rivers and streams and is generally less than 10 m thick.

2.2 Shepparton Formation

The Shepparton Formation comprises layers of clays and silts interspersed with layers of sands and gravels, commonly referred to as shoestring sands. The Shepparton Formation occurs from ground surface across most of the Katunga WSPA to around 75 m in depth.

The Shepparton Formation is split into upper and lower Shepparton. The upper Shepparton refers to the top 25 m which is managed by the Shepparton Irrigation Region GMA Local Management Plan.

Groundwater yields in the Shepparton Formation can be highly variable as can salinity.

2.3 Deep Lead

The Deep Lead incorporates the unconsolidated Calivil Formation and the Renmark Group. The Deep Lead comprises coarse grained sands and gravels and underlies the Shepparton Formation across most of the Katunga WSPA.

The Deep Lead occurs at depths ranging from around 75 to 175 m and can be up to 80 m thick.

Groundwater yield and quality is generally good in the Deep Lead and salinity generally increases from east to west and northwest of the Katunga WSPA as shown in Figure 5 (page 6).

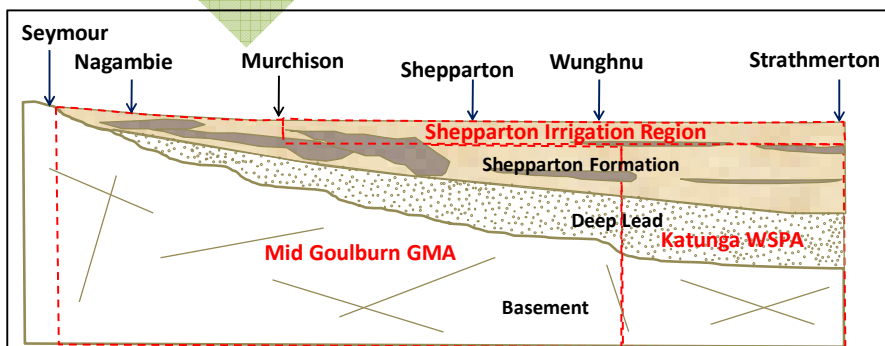


Figure 3 Cross section of Katunga WSPA in relation to adjoining Groundwater Management Units

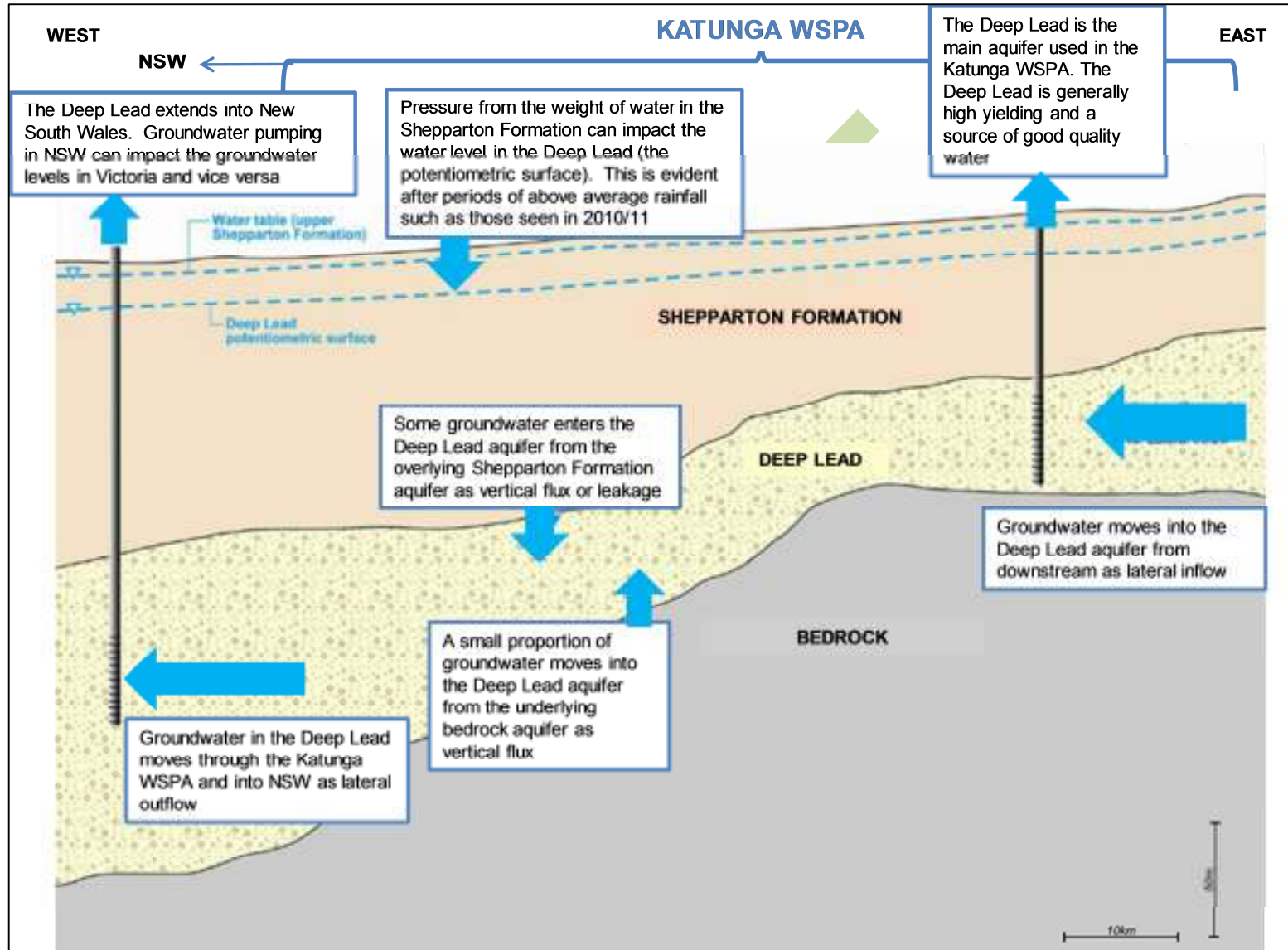


Figure 4 Cross section of aquifers in the Katunga WSPA (URS 2015)

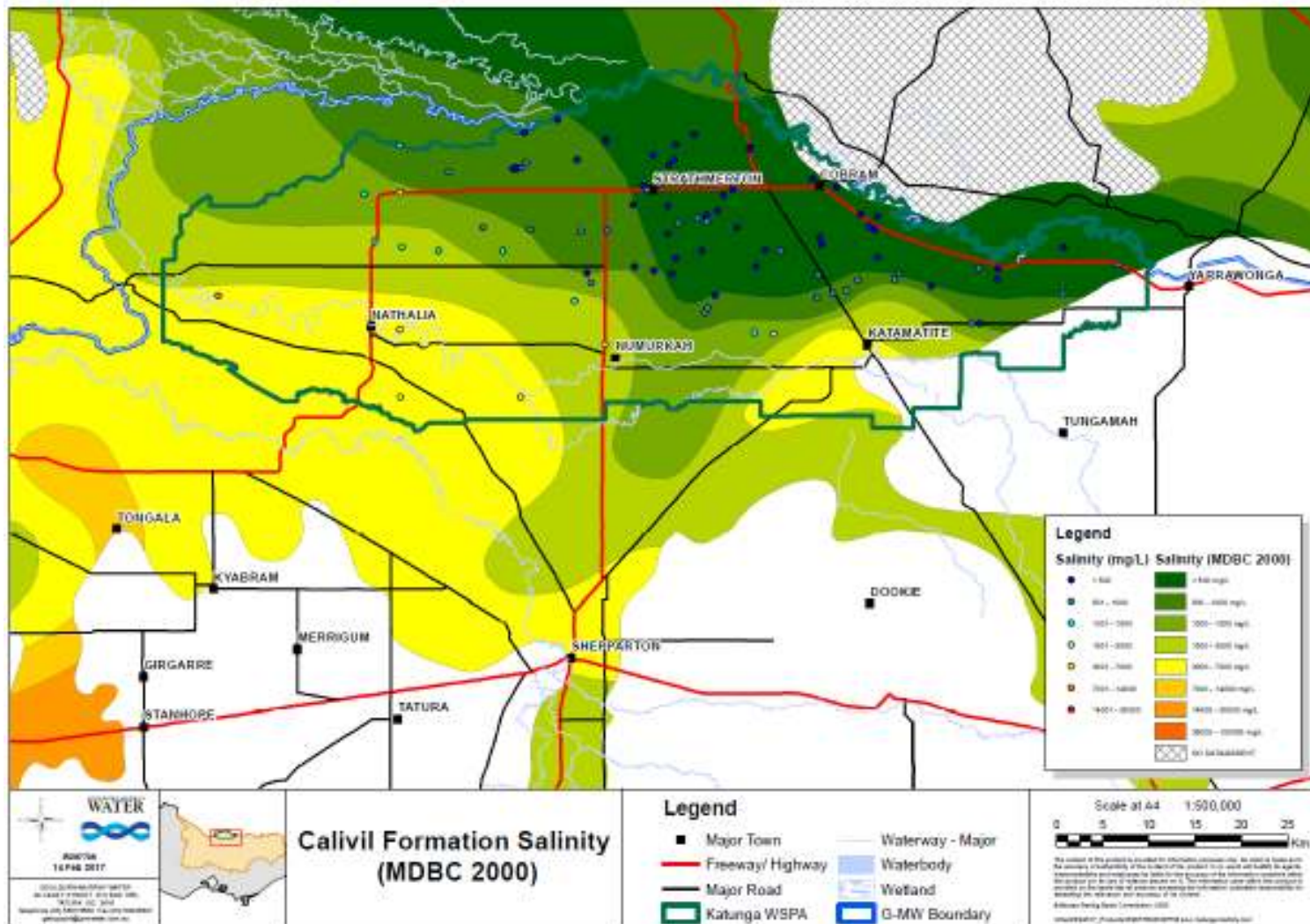


Figure 5 Salinity in the deep lead (Calivil Formation) in the Katunga WSPA

Notes:

- This is the most current reliable map at the time of Plan amendment. This will be reviewed as improved information becomes available.
- The bore points on this map show groundwater salinity records since the salinity contours were developed – these align with the salinity contours.

3 Groundwater use and licensing

Access to groundwater is managed through licensing and management plan requirements.

3.1 Bore construction licences

Prior to drilling and constructing a bore a works licence must be obtained from GMW under section 67 of the Act. Groundwater bores must be drilled by a licensed driller. The Australian Drilling Industry Association (www.adia.com.au) provides contact details of its members.

Applications for works are assessed by GMW in accordance with section 68 of the Act and must take into account potential impacts on existing users and the environment as well as any requirements of the relevant management plan.

3.2 Licensed use

A take and use licence is required from GMW to extract groundwater for purposes other than domestic and stock use under section 51 of the Act. Applications to take and use groundwater are assessed in accordance with section 53 of the Act and must take into account potential impacts to existing authorised groundwater users, the environment, stream flow and any requirements of the relevant management plan.

At the time of Plan amendment there are 248 groundwater licences in the Katunga WSPA that authorise a total of 60,334.9 ML to be taken and used each year. There are 240 licensed bores in the Katunga WSPA, shown in Figure 6 (page 8).

About 90% of the licensed groundwater in the Katunga WSPA is for irrigation purposes. The remaining 10% is used for cooling and wash down in dairies, commercial use, industrial use, and urban water supply.

Groundwater use, allocation volume and entitlement between 1995/96 and 2015/16 are shown in Figure 7 (page 9). It should be noted that not all licensed bores were metered prior to 2006/07.

Over the 5 years up until 2004/05, the average annual metered groundwater use was 28,320 ML/year. In 2002/03 groundwater use peaked at 40,470 ML/year.

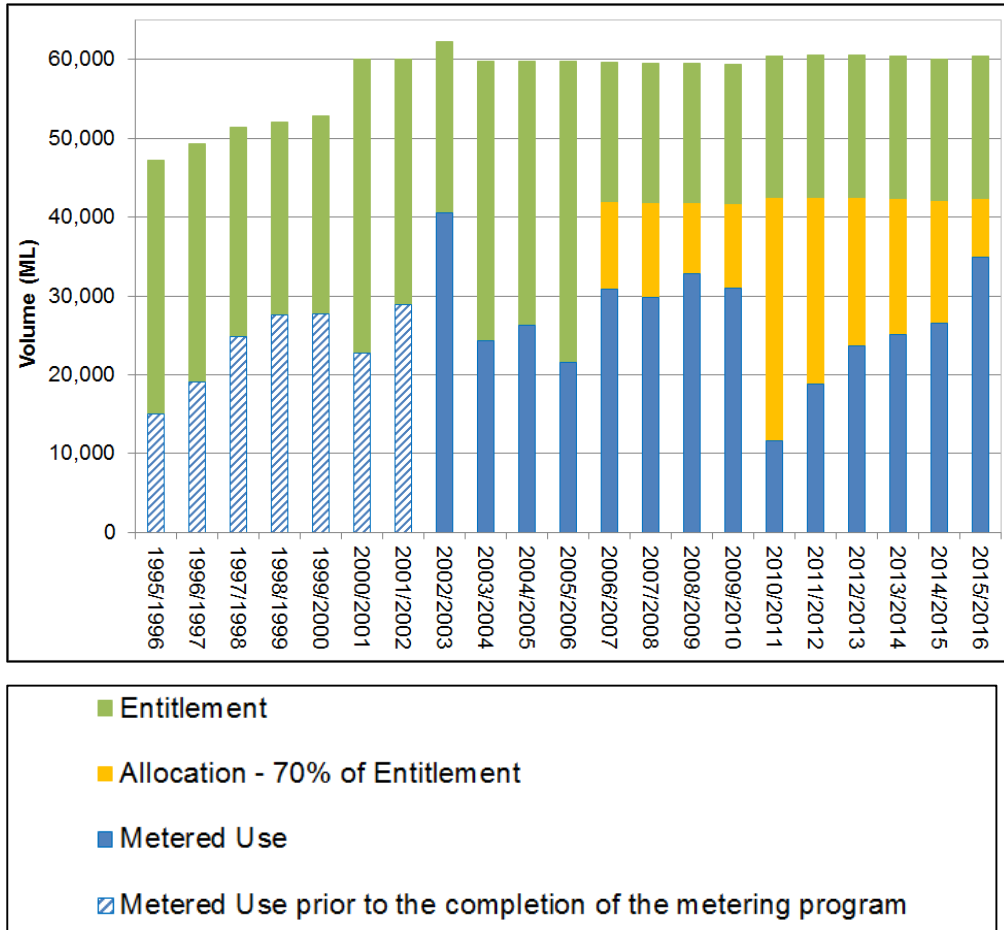


Figure 7 Groundwater entitlement and use in the Katunga WSPA

3.3 Domestic and stock use

Domestic and stock use of groundwater is a statutory right under the Act and is not required to be licensed or metered. Landholders can apply to GMW for a works licence to construct a bore for domestic and stock purposes. This management plan does not place any special requirements on the use of groundwater for domestic and stock purposes.

In the Katunga WSPA there are approximately 724 domestic and stock bores with an estimated use of 1,448 ML/year. This estimation is based on the number of bores drilled between 1984 and 2015 for domestic and stock purposes listed in the Victorian State groundwater database and the assumption that each bore is used to extract 2 ML/year.

During dry periods groundwater levels may fall. Therefore domestic and stock bores should be constructed to a depth that considers both seasonal and long term variations in groundwater levels. Further, pumping from nearby bores can result in groundwater level drawdown, particularly during the summer. Constructing the bore to an appropriate depth is the best way of improving security of access to groundwater.

GMW considers impacts on domestic and stock bores when making licensing decisions. For this reason domestic and stock users are encouraged to register their bore.

4 Limits on entitlement

4.1 Permissible Consumptive Volume

The Minister for Water has established a Permissible Consumptive Volume (PCV) for the Katunga WSPA. This is a limit on the volume of entitlement that can be issued in the Katunga WSPA. The PCV for Katunga WSPA is 60,577 ML/year. No new groundwater licence may be issued if it would result in the PCV being exceeded.

4.2 Management Zone Limits

To protect existing groundwater users three management zones have been established as shown in Figure 8 (page 11).

The Katunga WSPA Management Zones are the:

- North Western Dryland Zone (1061);
- Numurkah-Nathalia Zone (1062); and
- Cobram Zone (1063).

An entitlement limit of 6,500 ML/year has been set in the North Western Dryland Zone (1061) as many landholders in the area have no other source of water for domestic and stock purposes and their groundwater supply needs to be protected.

A limit of 25,000 ML/year has also been set for the Cobram Zone (1063) to minimise the risk of excessive increase in drawdown in this area. The western part of the Cobram Zone experiences the greatest seasonal drawdown in the Katunga WSPA.

No limit has been set for the Numurkah-Nathalia Zone (1062).

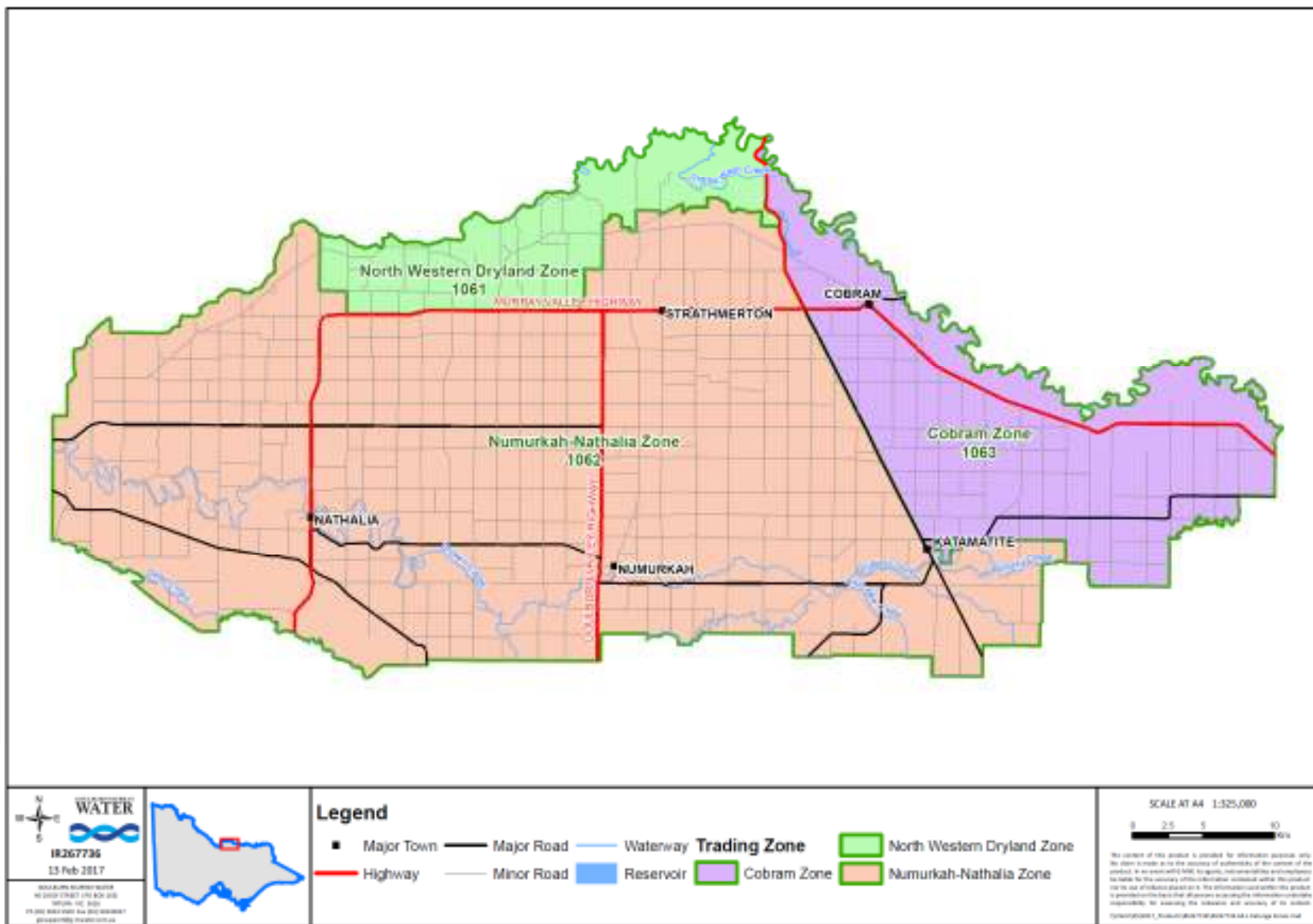


Figure 8 Management Zones in the Katunga WSPA

4.3 Intensity of entitlement

Groundwater pumping lowers the groundwater level around the bore being pumped. If this lowering of the groundwater level reaches nearby bores, it may interfere with other groundwater users' ability to access groundwater (Figure 9, page 12).

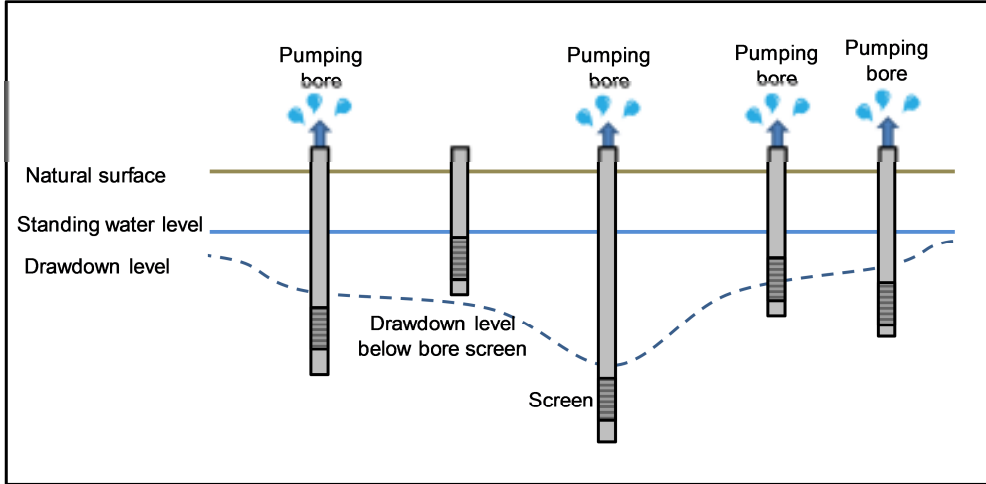


Figure 9 Intensive development of groundwater resources

When a number of bores located in close proximity are pumping from the same aquifer at the same time, the decline in groundwater level may accumulate resulting in unacceptable impacts on neighbouring groundwater users.

In order to protect existing groundwater users from potential impacts of intensive development, a limit on the volume of groundwater that may be extracted within a 2 km radius of a licensed bore has been set at 3,700 ML/year.

In Katunga WSPA new take and use licences will not be issued if it would result in the following limits being exceeded:

- the Permissible Consumptive Volume for the WSPA;
- the intensity rule; or
- the management zone limits.

PRESCRIPTION 1 Limit on entitlement

GMW must not approve an application for a groundwater licence if the approval of the application would cause:

- a) The Permissible Consumptive Volume to be exceeded;
- b) The total groundwater entitlement within a 2 km radius of the proposed extraction site exceeding 3,700 ML/year; or
- c) The following zone limits to be exceeded.

Management zone	Zone limit (ML/year)
North Western Dryland Zone (1061)	6,500
Numurkah-Nathalia Zone (1062)	No limit
Cobram Zone (1063)	25,000

5 Restrictions on taking groundwater

To minimise the potential impacts on the long-term sustainability of the groundwater resource for groundwater users, trigger levels for restrictions on groundwater extraction have been set.

Restrictions on licensed groundwater extraction will be introduced through the use of seasonal allocations announced at the start of each water season.

Seasonal allocations are a percentage of licence entitlement that may be extracted in a given season. For example, if a licence holder had an entitlement of 100 ML/year and a 70% allocation was announced, then that licence holder may extract up to 70 ML in that season.

In the Katunga WSPA, allocations are determined by comparing the rolling five year average of the maximum annual groundwater recovery levels (generally occurring between August and November) recorded in seven key monitoring bores against set groundwater trigger levels (key bores listed in Schedule 1, page 24 and shown in Figure 12, page 21).

Once the maximum annual groundwater recovery levels recorded in those seven bores has been averaged, the rolling average is calculated by summing the average maximum seasonal groundwater recovery levels, for the previous five seasons and dividing this number by five. An example of the rolling average method is provided below (Figure 10, page 13).

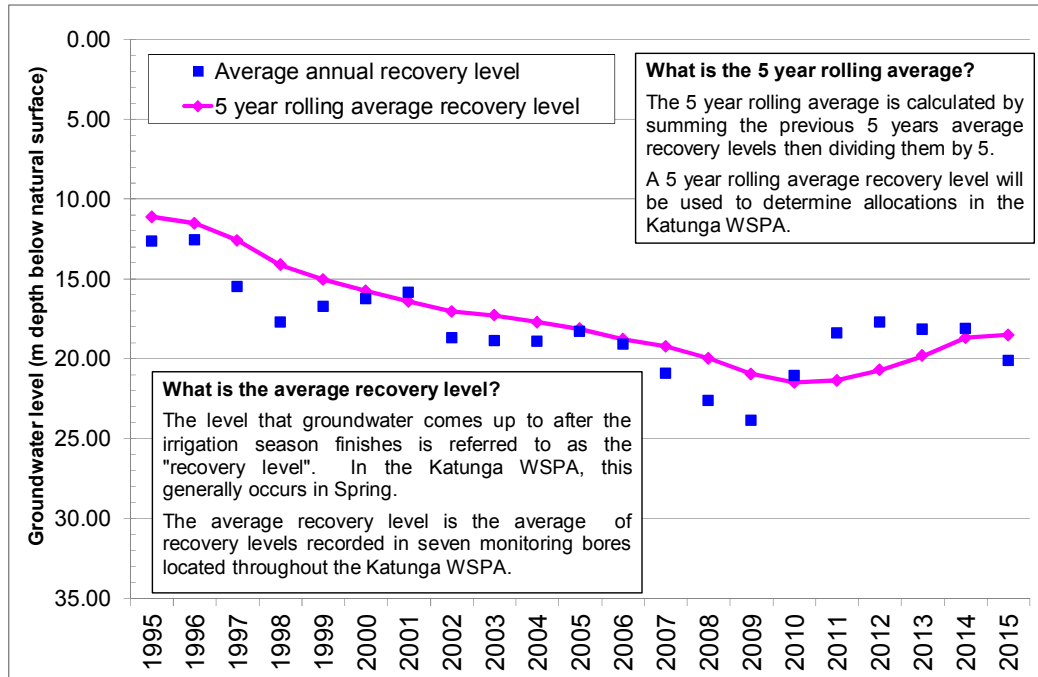


Figure 10 Explanation of five year rolling average recovery level

When the five year rolling average recovery level is above 21.0 metres depth below natural surface (mDBNS) the allocation will be 100%. If the five year rolling average recovery level is between 21.1 and 24.0 mDBNS the allocation will be 70%. If the five year rolling average recovery level drops below 24.1 mDBNS, allocations will remain at 70% and a review will be undertaken by GMW in consultation with a groundwater reference group.

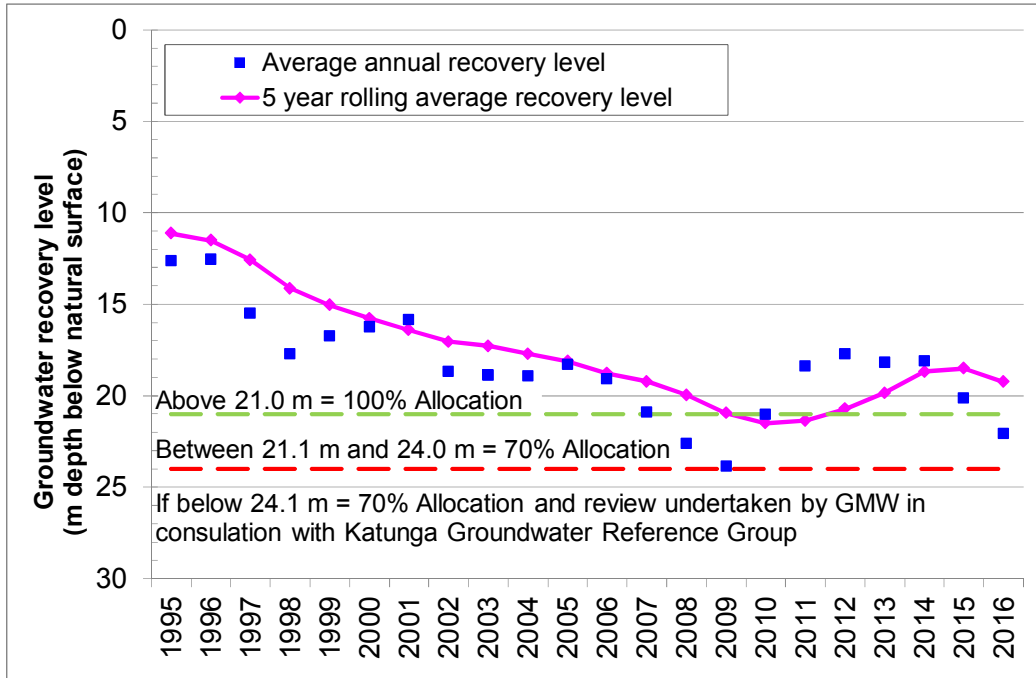


Figure 11 Trigger levels for groundwater allocations in the Katunga WSPA

PRESCRIPTION 2 Restrictions on taking groundwater

By 1 July each year GMW will:

- a) Determine the rolling average of the maximum annual groundwater recovery levels from the preceding five irrigation seasons for bores listed in Schedule 1 (page 24) and announce a corresponding allocation for the subsequent irrigation season as detailed below:

Trigger level depth below natural surface (m)	Allocation
21.0 and above	100%
21.1 to 24.0	70%
Below 24.1	70% and review undertaken by GMW in consultation with Katunga Groundwater Reference Group

- b) Announce allocations by listing them on its website, sending letters to all licence holders and placing public notices in local newspapers.

6 Licence transfers

Under the Act a licence holder may apply to transfer entitlement to another person or entity either temporarily or permanently. The ability to transfer entitlement can bring significant benefits to both individuals and the broader community. It allows water to move to the land and enterprises where the most value will be generated. It also allows individuals to adjust their enterprises depending on their individual circumstances and to be flexible when water from different sources is also available. The ability to transfer groundwater entitlement is also essential to enable demand for any future urban groundwater use to be met.

An application to temporarily or permanently transfer entitlement is not automatically approved.

GMW must take into account a range of matters specified in the Act including potential impacts on existing users, waterways, the aquifer and the environment. GMW must also assess any application to transfer groundwater against the rules in this Plan.

6.1 Management zones

Temporary and permanent transfers may occur within and between the management zones provided that the management zone limits in Prescription 1 (page 12) are not exceeded.

6.2 Intensity of entitlement

As discussed in section 4.3 (page 12) the maximum allowable entitlement within 2 km of a bore is 3,700 ML. In some areas, the entitlement already exceeds the intensity limit. In these cases a licence holder is limited to undertaking temporary transfers to enable use of up to 125% of their permanent licensed entitlement. This gives licence holders in these areas flexibility in managing their entitlement.

Where the intensity limit is exceeded, licence holders may undertake temporary or permanent transfers from other licence holders within that 2 km radius.

Intensity of entitlement is explained in detail in Example 1 (page 17).

PRESCRIPTION 3 Transfer of entitlement

3.1 GMW may approve a permanent transfer of entitlement provided relevant matters have been considered and:

- a) Zone limits in Prescription 1 (page 12) will not be exceeded; and
- b) The total licensed volume within 2 km of an applicant's bore will be less than 3,700 ML/year; or
- c) Where the total licensed volume within 2 km of an applicant's bore is equal to or greater than 3,700 ML/year, the permanent transfer is from other licence holders within a 2 km radius of the applicant's bore.

3.2 GMW may approve a temporary transfer of entitlement provided relevant matters have been considered and:

- a) Zone limits in Prescription 1 (page 12) will not be exceeded; and
- b) The total licensed volume within 2 km of an applicant's bore will be less than

- 3,700 ML/year; or
- c) Where the total licensed volume within 2 km of an applicant's bore is equal to or greater than 3,700 ML/year –
 - i. The applicant's entitlement volume in one season will not exceed 125% of their permanent entitlement volume prior to any temporary trade occurring; or
 - ii. The temporary transfer is from other licence holders within a 2 km radius of the applicant's bore

<p>Example 1 – Intensity explained</p> <p>Limit on entitlement of 3,700 ML within a 2 km radius of a bore</p>	
<p>There are three bores, Bore A, Bore B and Bore C.</p> <p>The bores are located on neighbouring properties and each bore is licensed to extract 1,500 ML/year.</p>	<p>A B C</p> <p>1,500 ML 1,500 ML 1,500 ML</p>
<p>Bore B is located within a 2 km radius of Bore A so the intensity of entitlement within 2 km of Bore A is 1,500 ML + 1,500 ML = 3,000 ML.</p> <p>The owner of Bore A could transfer in up to 700 ML without the total groundwater entitlement within 2 km of Bore A exceeding 3,700 ML (Prescription 3.1 (b) & Prescription 3.2 (b), page 15).</p>	<p>2 km</p> <p>A B C</p> <p>1,500 ML 1,500 ML 1,500 ML</p>
<p>Bore A and Bore C are located within a 2 km radius of Bore B so the intensity of entitlement within 2 km of Bore B is 1,500 ML + 1,500 ML + 1,500 ML = 4,500 ML.</p> <p>As the intensity within 2 km of Bore B exceeds 3,700 ML, the owner of Bore B would only be able to increase their entitlement by:</p> <ul style="list-style-type: none"> - Temporarily trading in an additional 25% of entitlement to use in a season from outside of the 2 km radius (Prescription 3.2 (c) ii, page 16). - Trading entitlement (temporarily or permanently) from inside the 2 km radius from either the owner of Bore A or Bore C (Prescription 3.2 (c) i, page 16). 	<p>2 km</p> <p>A B C</p> <p>1,500 ML 1,500 ML 1,500 ML</p>
<p>Bore B is located within a 2 km radius of Bore C so the intensity of entitlement within 2 km of Bore C is 1,500 ML + 1,500 ML = 3,000 ML.</p> <p>The owner of Bore C could transfer in up to 700 ML without the total groundwater entitlement within 2 km of Bore C exceeding 3,700 ML (Prescription 3.1 (b) & Prescription 3.2 (b), page 15).</p>	<p>A B C</p> <p>1,500 ML 1,500 ML 1,500 ML</p>

7 Metering

Metering water use enables better management of the water resource. The amount of water used and the location of where it is used provides vital information to improve sustainable management of the resource. Metering also ensures that the water is shared equitably and licensees stay within their annual allocation. Metering can also benefit farming operations and can lead to greater water use efficiencies.

Meters must be read at least once a year and the data must be maintained on a database. In some instances GMW may request the licensee to read the meter and provide the meter reading to GMW and the licensee must comply with the request.

PRESCRIPTION 4 Metering of licensed use

GMW will:

- a) Ensure that a meter is fitted to new licensed bores;
- b) Read each meter at least once a year and record use in appropriate database(s); and
- c) If GMW is unable to measure the volume of water taken through a meter it may:
 - i. make an estimate of use; or
 - ii. request the licence holder to provide a meter reading.

8 Groundwater monitoring

8.1 Groundwater levels

Monitoring of groundwater levels provides important information to improve sustainable management of the resource. Monitoring bores will be used to:

- assess annual and long-term impacts on water levels from groundwater pumping
- monitor regional and local seasonal drawdown
- assess yearly allocations
- provide information for future resource assessments
- assess potential management issues including evaluating potential interference between bores.

Monitoring is a key part of the management plan fulfilling its aim to effectively managing the groundwater resources of the Katunga WSPA. Monitoring is therefore critical to understanding groundwater resource responses to pumping over time.

At the time the Plan was amended there were 48 actively monitored observation bores. These bores are geographically distributed over the Katunga WSPA and installed in both the Deep Lead and Shepparton Formation aquifers.

Seven of the bores are vital to determine allocations each season; these bores will be read at least 12 times a year. If any of these bores fail, an alternative bore shall be used as close to the original bore site as is practical. The locations of these bores are shown in Figure 12 (page 21) and listed in Schedule 1 (page 24).

Monitoring of other bores in the Katunga WSPA and the surrounding area will be undertaken taking into account pumping intensity and general coverage of the Katunga WSPA and the surrounding area. These bores are shown in Figure 13 (page 22) and listed in Schedule 2 (page 25).

GMW in conjunction with the Department of Environment, Land Water and Planning (DELWP), regularly review the monitoring program. Details of the monitoring strategy will be presented in the annual report prepared by GMW.

It will be the responsibility of GMW and DELWP to ensure that an appropriate level of monitoring is carried out in the area and that bores are properly maintained. The data from the monitoring bores will be recorded in the publicly accessible state groundwater database.

PRESCRIPTION 5 Groundwater level monitoring

5.1 GMW will:

- a) Obtain groundwater levels from bores used for allocation assessments (listed in Schedule 1, page 24) on a monthly basis. If a bore used for allocation assessments becomes defective an alternative bore may be monitored and the defective bore should be decommissioned. The alternative bore will be selected by consensus between DELWP and GMW.
- b) Ensure that water level monitoring is carried out at appropriate locations throughout the Katunga WSPA to:

- iv. assess annual and long-term impact on water levels from groundwater pumping;
- v. monitor regional and local seasonal drawdown; and
- vi. monitor the impacts of groundwater pumping generally across the Katunga WSPA and in areas of high intensity groundwater pumping.

5.2 DELWP must ensure that:

- a) Continuous regional baseline monitoring is maintained to provide sufficient information to identify changes in groundwater resource availability and condition;
- b) State observation bores are properly maintained; and

Data collected from the bores is entered into the groundwater management system, within 30 days after it has been collected.

8.2 Groundwater salinity

Some of the groundwater pumped from the Deep Lead aquifer is sourced from the overlying Shepparton Formation aquifer. Within the Katunga WSPA groundwater in the overlying formation is generally more saline than that pumped from the Deep Lead.

Increased salinity may impact how groundwater can be used locally as different crops and animals have different salt tolerances. To monitor potential changes in groundwater salinity, GMW will sample groundwater from monitoring bores as identified in Figure 12 (page 21) and listed in Schedule 1 and have them analysed for groundwater salinity at an accredited laboratory once a year. The results from this analysis will be entered into the State groundwater database and presented in the annual report for the Katunga WSPA.

Groundwater users are encouraged to monitor changes in groundwater salinity in their own bores to identify potential risks to land management and potential issues in bore integrity. If groundwater users are unable to monitor salinity themselves, they can request a sample bottle from GMW and provide a water sample for GMW to test in house using a portable EC meter.

PRESCRIPTION 6 Groundwater salinity monitoring

GMW must:

- a) Sample bores specified in Schedule 1 (page 24) and have the samples analysed at an accredited laboratory for salinity once a year;
- b) Upload salinity measured in bores referred to in Schedule 1 (page 24) to the State groundwater database; and
- c) Provide a sample bottle to any groundwater user in the Katunga WSPA who requests one, test the salinity level of returned samples and provide the results to the groundwater user.

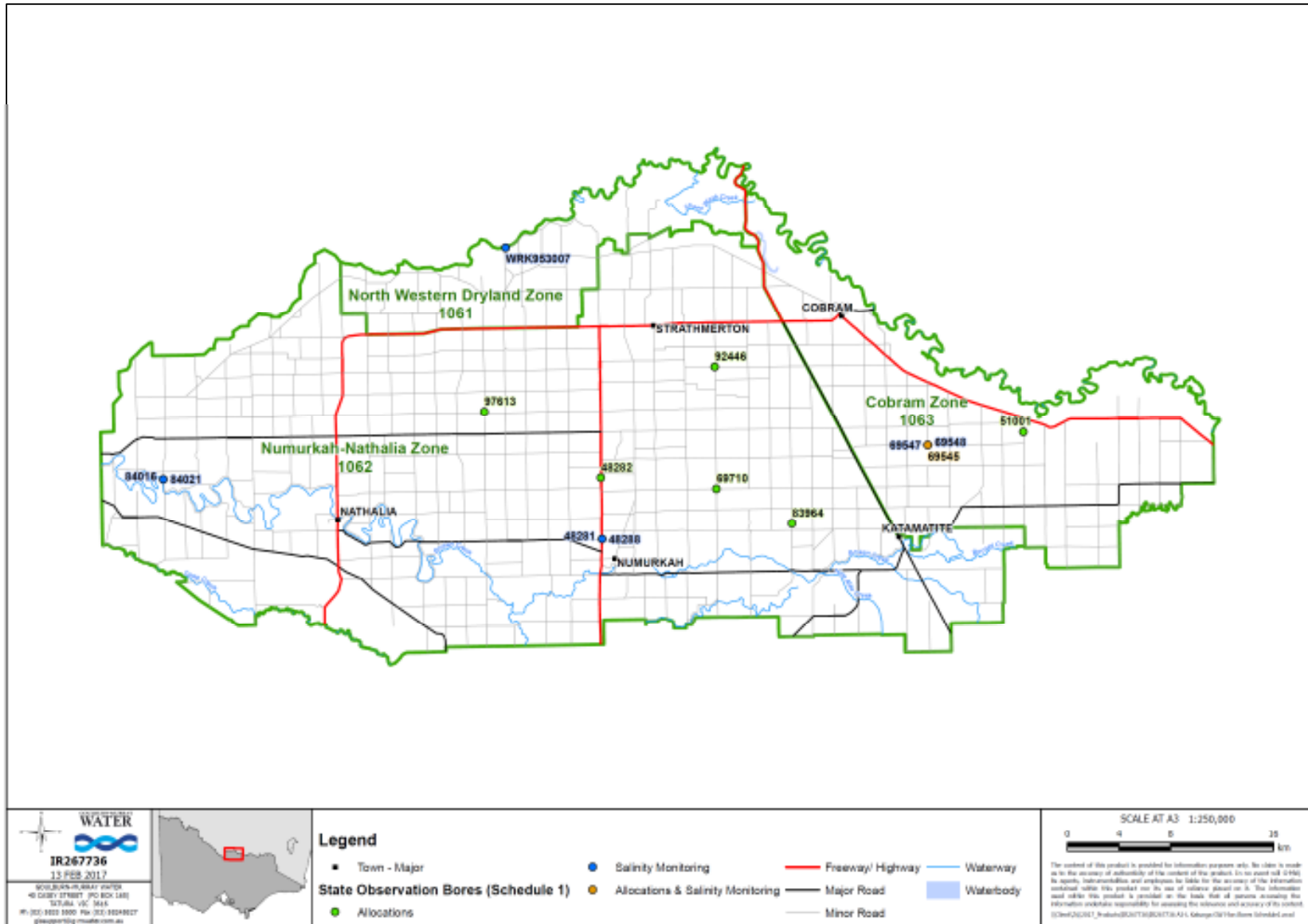


Figure 12 Bores to be monitored for determining allocations and to monitor groundwater salinity

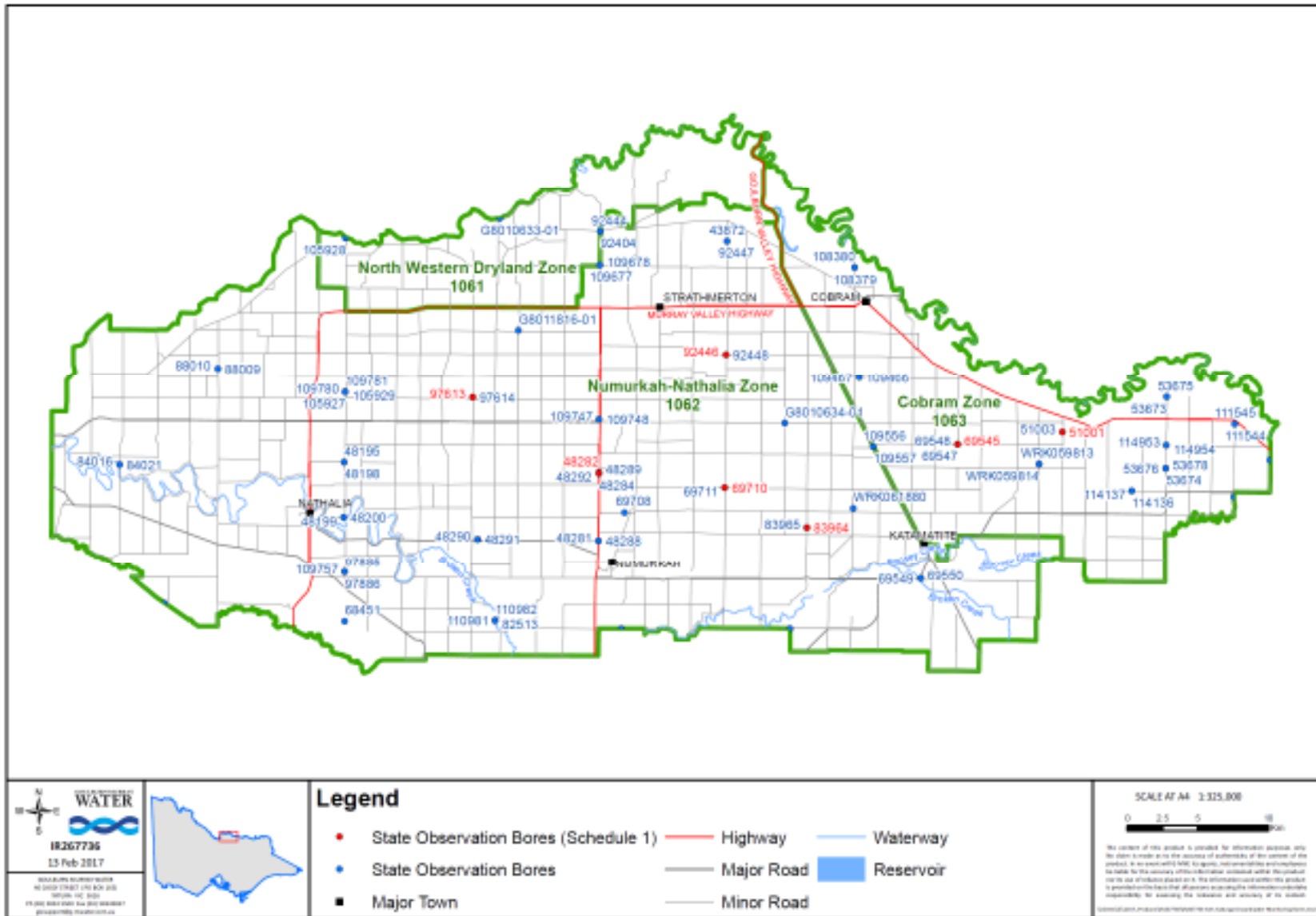


Figure 13 Monitoring bores in the Katunga WSPA at time of Plan amendment

9 Annual report

By 30 September each year GMW will prepare an annual report on the enforcement and administration of the Plan. The report will be given to the Minister for Water and the Goulburn Broken Catchment Management Authority and will be publicly available.

If GMW is of the opinion that the management plan is in need of review it will include recommendations to that effect in the annual report. In any event in each fifth annual report GMW will make comment on the need to review the management plan.

GMW will meet with the Katunga Groundwater Reference Group annually to present the report findings and discuss any need to review the Plan. The Reference Group will comprise key stakeholders including representative groundwater users and stakeholder agencies. If a review indicates that the Plan should be amended the Minister for Water may amend the Plan in accordance with the Act.

PRESCRIPTION 7 Annual reporting

By 30 September each year GMW will prepare an annual report on the enforcement and administration of the Plan. The report will be provided to the Minister for Water and the Goulburn Broken Catchment Management Authority and made publicly available on GMW's website.

SCHEDULE 1: Monitoring bores required to be monitored for implementation of the Katunga WSPA Groundwater Management Plan

Management Zone	Location	Bore ID	Monitoring purpose	
			Allocation assessment	Groundwater quality
North Western Dryland Zone - 1061	River Road, Barmah National Park	WRK953007		√
		WRK953008		√
Numurkah-Nathalia Zone 1062	Allerts Road, Katunga	69710	√	
	Boards Road, Strathmerton	92446	√	
	Goulburn Valley Highway, Katunga	48282	√	
	Goulburn Valley Highway, Numurkah	48281		√
		48288		√
	James Bridge Road, Picola	84016		√
		84021		√
	Larissa Road, Naring	83964	√	
Waaia-Bearii Road, Waaia	97613	√		
Cobram Zone - 1063	Grinter Road, Cobram East	51001	√	
	Langan Road, Katamatite	69545	√	√
		69547		√
		69548		√

SCHEDULE 2: Monitoring bores in the Katunga WSPA at time of Plan amendment

Management Zone	Location	Bore ID	Monitoring purpose				
			Allocation assessment	Water quality	Interaction	Pumping impacts	Regional levels
North Western Dryland Zone - 1061	Browns Bridge Road, Yielima	105928			√		√
		105936			√		√
		109777			√		√
		109778			√		√
		109779			√		√
	River Road, Barmah National Park	WRK953007			√		√
		WRK953008			√		√
WRK953010				√		√	
Numurkah-Nathalia Zone 1062	Allerts Road, Katunga	69710	√				√
	Benalla-Tocumwal Road, Muckatah	109556			√	√	√
		109557			√	√	√
	Boards Road, Strathmerton	92446	√		√		√
		92448			√		√
	Cranes Road, Yielima	105927			√		√
		105929			√		√
		109780			√		√
		109781			√		√
	Drumanure Road, Invergordon	61675					√
	Gilberts Road, Picola	88009			√		√
		88010			√		√
	Goulburn Valley Highway, Katunga	48282	√		√	√	√
		48289			√	√	√
		48292			√	√	√
	Goulburn Valley Highway, Numurkah	48281			√		√
		48288			√		√
	James Bridge Road, Picola	84016			√		√
		84021			√		√
	Katamatite-Nathalia Road, Katamatite	69549					√
	Katamatite-Nathalia Road, Waaia	48290					√
	Kotupna-Barmah Road, Kotupna	73405					√
	Larissa Road, Naring	83964	√				√
	Paynes Road, Nathalia	97885			√		√
		97886			√		√
	Paynes Road, Nathalia	109757			√		√
		109758			√		√
Sandmount Road, Katunga	WRK953012				√	√	
Waaia-Bearii Road, Waaia	97613	√			√	√	
Cobram Zone - 1063	Grinter Road, Cobram East	51001	√		√	√	√
		51003			√	√	√
	Langan Road, Katamatite	69545	√	√	√	√	√
		69547		√	√	√	√
		69548		√	√	√	√
	Tungamah Road, Burramine	53674			√		√
		53676			√		√
		53678			√		√
	Youarang Road, Katamatite East	WRK059813			√	√	√
		WRK059814			√	√	√
WRK059815				√	√	√	