

Mid-Loddon

Groundwater Management Area

Local Management Rules

June 2009

#2710295

## **Endorsement**

These local management rules have been endorsed by the Board of Goulburn-Murray Water. The rules provide the operational framework for the management of groundwater resources in the Mid-Loddon Groundwater Management Area.

The development of these local management rules reflect Goulburn-Murray Water's commitment to working with their customers and other agencies to manage groundwater resources in a sustainable manner for the benefit of all groundwater users and the environment.

***Signed by Stephen Mills 8/07/2009***

***Pdf copy of signed document #2687388***

Stephen Mills  
Chairperson  
Goulburn-Murray Rural Water Corporation

Date: 1 July 2009

***Signed by Shane McGrath 01/07/09***

Shane McGrath  
Acting Managing Director  
Goulburn-Murray Rural Water Corporation

Date: 1 July 2009

## **Foreword**

In March 2007 a public meeting was held in Bridgewater in response to falling groundwater levels and continued dry conditions. The meeting was attended by over 130 people and strong community support was given to G-MW's proposal to establish a community reference committee to assist with developing rules to manage groundwater resources.

The Mid-Loddon Groundwater Reference Committee was appointed by the Board of Goulburn-Murray Water to develop Local Management Rules for the Mid-Loddon Groundwater Management Area. The Committee consisted of groundwater users that represented all interest groups within the groundwater management area.

This has been a community lead process with a Groundwater Reference Committee committed to produce a document that serves to manage groundwater resources equitably and sustainably. The committee has set aside their personal interests and worked for the good of the community.

The Committee has been assisted with dedicated technical support from Goulburn-Murray Water and consultants Dr Phillip Macumber and Rob Rendell from RMCG Consulting. Significant technical work has led to a better understanding of the groundwater system to enable informed decision making.

The Local Management Rules have been widely consulted and well accepted by the Mid-Loddon community. The rules provide licence holders with greater flexibility to manage their entitlement and scope for future groundwater development; as well as offering security of access to domestic and stock users. The rules also provide environmental benefits by preserving the integrity of the aquifer and give consideration to the interaction between groundwater and surface water, groundwater dependant ecosystems, and land salinity issues.

The rapport between the community representatives and the staff has made this committee a pleasure to work with.

Jock Leishman

Chairman

Mid-Loddon Groundwater Reference Committee

## **Acknowledgements**

Goulburn-Murray Water (G-MW) would like to express its appreciation to the Groundwater Reference Committee including Jock Leishman (North Central Catchment Management Authority), Barry O'Donnell (G-MW) and landholders Garry Addlem, Max Blackmore, Diane Bunnett, Ian Connaughton, Chris Pollock, Frank Maher and Graham Morse, who were appointed to develop these local management rules. Through their leadership and dedication equitable management rules, which ensure the long-term sustainability of the resource in the region, have been developed.

The Groundwater Reference Committee has been supported by a Technical Working Group, consisting of Matt Barden, Brendan Cossens, Simon Cowan (G-MW), Simon Baker (Department of Sustainability and Environment), Rob Rendell (RMCG Consulting) and Dr Phillip Macumber (Phillip Macumber Consulting), who must be acknowledged for their commitment to providing the Groundwater Reference Committee with the best available data upon which to make informed decisions.

G-MW also recognises the valuable contributions from John Watson (Watson Drilling) and Nick Saunders (Farm ware) who provided insights into bore construction; pump settings and changes in groundwater levels and use in the region over time.

G-MW's gratitude is also extended to the entire Mid-Loddon community whose contributions through discussions at public meetings; responses to the groundwater user survey; and comments on the draft rules is greatly valued. These contributions have ensured that these rules truly are community driven and developed.

## Glossary

Term/Acronym	Description
Act	<i>Water Act 1989</i>
AHD	The Australian Height Datum is a geodetic datum for altitude measurement in Australia. It is the mean sea level for 1966-1968 and is assigned the value of zero.
Aquifer	an underground layer of rock or sand or other geological unit that contains water
Available drawdown	The depth of water in the bore minus 2 metres to account for pump depth setting.
Carryover	Carryover is unused allocation that may be used in subsequent years.
Corporation	Goulburn-Murray Water Rural Water Corporation acting as a delegate of the Minister
Drawdown	groundwater level fall from the standing water level due to groundwater pumping
Entitlement	Licensed volume of groundwater specified as megalitres per year
GDE	Groundwater dependant ecosystem
Groundwater licence	Licence issued to take and use groundwater under section 51 of the Act
GMA	Groundwater Management Area
GMS	Groundwater Management System is a data base of groundwater information managed by the Department of Sustainability and Environment Victoria
Groundwater Reference Committee	Committee appointed by Goulburn-Murray Water board to develop and be consulted on the implementation of local management rules
PCV	Permissible Consumptive Volume is the volume of groundwater that the Minister has declared may be extracted from a defined area in a season
Sustainable yield	Groundwater extraction regime, measured over a specified planning timeframe, that allows acceptable levels of stress and protects the higher value uses that have a dependency on water
Transfer	Transfer of licensed groundwater entitlement from one licence holder to another
ML	Megalitre or one million litres
Maximum groundwater level recovery	The highest level to which groundwater will return to after pumping has ceased
Season	Period of 12 months commencing 1 July
WSPA	Water Supply Protection Area
Zone	A part of the groundwater management area

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## 1 Introduction

The Mid-Loddon Groundwater Management Area (GMA) Local Management Rules have been prepared to provide groundwater users with a detailed, system-specific management framework. The rules have been developed by a Groundwater Reference Committee that was appointed by the Board of Goulburn-Murray Rural Water Corporation.

The development of the rules has been driven by groundwater users in the Mid-Loddon GMA who are committed to the sustainable management of the resource. The rules recognise the reliance upon groundwater by a range of stakeholders, including domestic and stock users and commercial and irrigation licence holders, as well as the natural environment.

The rules describe how groundwater resources will be managed and implications for users of the resource. The rules are underpinned by sound science that has considered a wide range of environmental issues.

### 1.1 Aim

The aim of these local management rules is to make sure that the groundwater resources in the Mid-Loddon GMA are managed in an equitable and sustainable manner.

### 1.2 Objectives

The objectives of the local management rules are to:

1. provide all groundwater users with access to the resource, including domestic and stock users;
2. enable development of the groundwater resources to realise the potential for its use in the region;
3. provide environmental benefits through management of groundwater resources and maintain the integrity of the aquifer system, including its structure and groundwater quality;
4. manage groundwater interference and intensively pumped areas to protect existing authorised users and the environment from unacceptable drawdown levels;
5. establish transparent trigger levels and restrictions;
6. provide mechanisms such as transfer of licence entitlement and carryover to allow flexible and adaptive management in response to changing demands, such as climatic conditions; and
7. establish an effective monitoring program and provide periodic communications that will inform groundwater users of the status of the resource.

### 1.3 Background

A significant amount of technical work has been undertaken, which underpins these local management rules. This work has been summarised in a report titled: *Development of Local Management Rules in the Mid-Loddon Groundwater Management Area* (Goulburn-Murray Water, 2009).

The work includes:

- a conceptual understanding of the groundwater system that describes aquifer extent, groundwater salinity and variability and groundwater level response to development of the resource;
- a groundwater user survey that identifies challenges of managing the resource and provides details on groundwater bores;
- a water balance to determine the sustainable yield for various climatic scenarios;
- an assessment of the interaction between groundwater and surface water;
- investigations to identify groundwater dependant ecosystems;
- consideration of land salinity and waterlogging problems that have been experienced in the past; and
- rationale for establishing trigger levels and restrictions.

These rules have been developed to be adaptive so they can be amended where necessary to incorporate new knowledge or policy changes as they emerge (refer to Rule 12). It is noted that in some cases there is currently insufficient information to be able to consider all issues comprehensively; for example, the existence of any groundwater dependant ecosystems. Work will be done to improve the level of understanding of these matters.

#### **1.4 Groundwater Management Area**

The Mid-Loddon GMA lies within the Loddon River Catchment. It covers an area of around 3000 km<sup>2</sup>, extending from Tullaroop Reservoir in the south to Mitiamo in the north.

The GMA includes all major aquifers in this region, including the Newer Volcanic basalts, Calivil Formation and Shepparton Formation sands. No depth limit has been specified for the GMA to ensure that all of these aquifers are included.

Three management zones have been established within the GMA:

1. Jarklin Zone (north of the Waranga Western Channel)
2. Laanecoorie-Serpentine Zone
3. Moolort Zone

These zones have been established based on the current conceptual understanding of the groundwater system; long-term average sustainable yield from the Laanecoorie-Serpentine Zone; and an understanding of managing for salinity benefits to the Jarklin Zone.

The GMA and zone boundaries are presented in Figure 1.



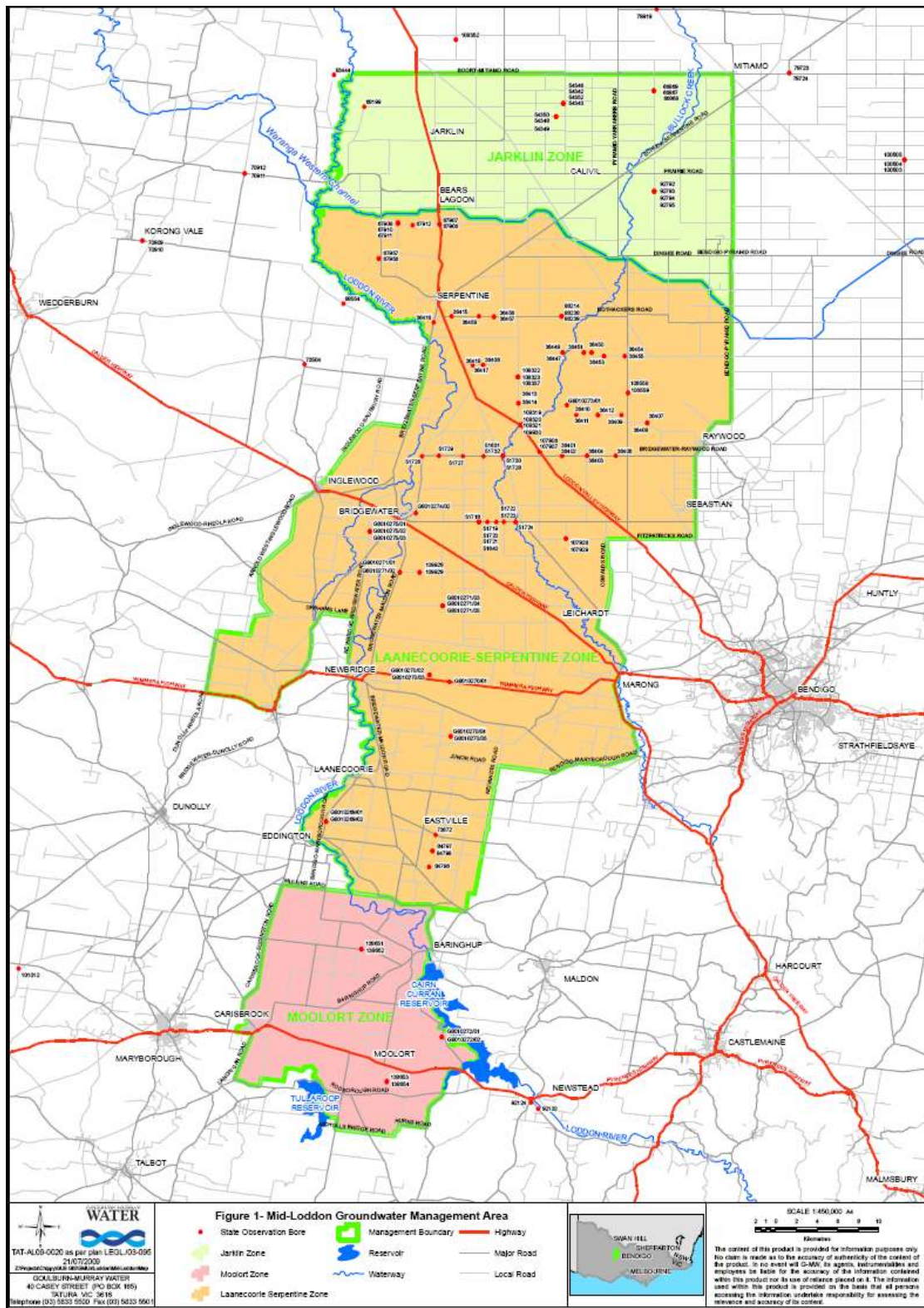


Figure 1 Mid-Loddon Groundwater Management Area

## 2 Groundwater use

### 2.1 Sustainable development

There are over 100 licensed groundwater bores in the Mid-Loddon GMA authorised to extract a total of 33,905 ML per year. A water balance has been undertaken for a large part of the GMA which indicates that licence entitlement approximates the sustainable yield.

There are around 100 bores registered for domestic and stock use in the Mid-Loddon GMA. However, the number of active domestic and stock bores is not accurately known as the operating status of bores is not monitored and there are a number of unregistered bores. Domestic and stock access to groundwater is a statutory right under section 8 of the Act and new bores may be developed for this purpose. The Corporation registers new bores that are drilled for domestic and stock use, and encourages registration of any unregistered bores.

To protect existing authorised groundwater users and preserve the integrity of the aquifer, licence entitlement for the GMA has been capped. The Permissible Consumptive Volume (PCV) is to be set at 33,905 ML per year. It has been revised down from 37,200 ML (Victorian Government Gazette G27) on the understanding that the PCV does not and will not include domestic and stock use.

The Corporation may issue a new groundwater licence provided that in doing so the total licence entitlement does not exceed the PCV.

The Corporation may seek to amend the PCV to overcome any administrative oversight, error or other anomaly which occurred prior to the approval of these rules.

New groundwater development may occur through the transfer of existing groundwater licence entitlement.

#### **Rule 1: Cap on licence entitlement**

The Corporation may issue a new groundwater licence provided that in doing so the total licensed entitlement does not exceed the Permissible Consumptive Volume established for the Mid-Loddon Groundwater Management Area (Plan LEGL./03-095) under section 22A of the *Water Act* 1989.

### 2.2 Groundwater level interference

Groundwater pumping results in a decline in groundwater levels surrounding the bore being pumped. The decline in groundwater level is referred to as the 'drawdown cone' or 'cone of depression'. The size and shape of the drawdown cone depends primarily on the nature of the aquifer as well as the pumping rate and duration.

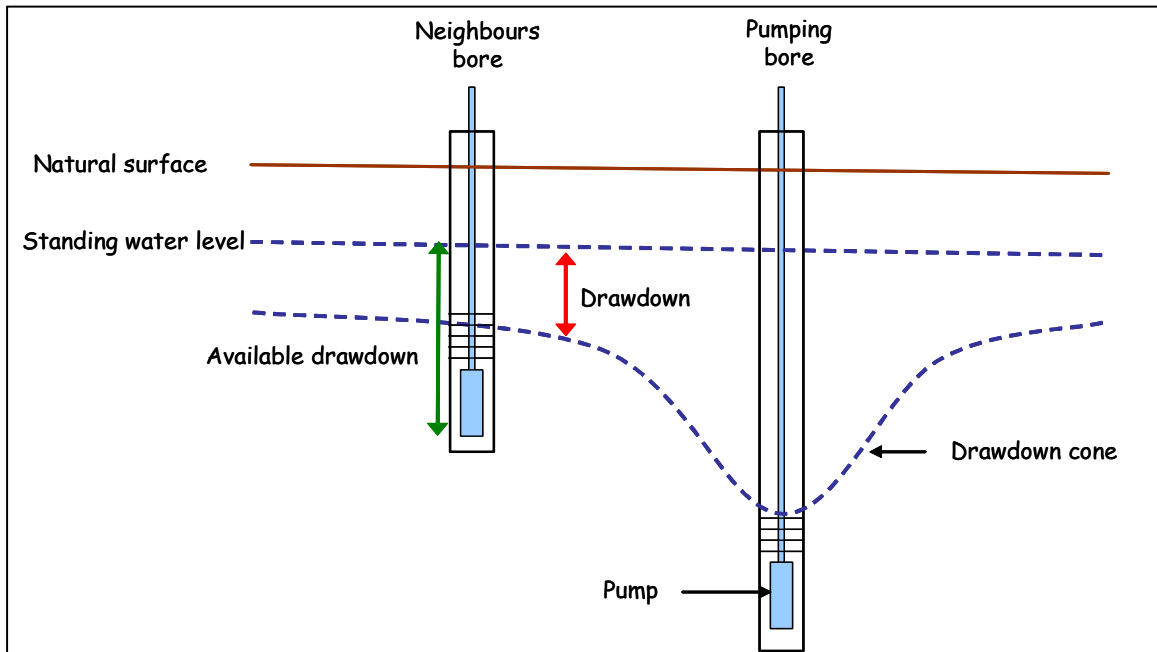
Groundwater level interference occurs when the drawdown cone intersects a neighbouring bore or an environmental feature such as a waterway (refer to Figure 2). The impacts from groundwater pumping are site specific as the aquifer characteristics can vary and the pumping requirements are likely to be different. The Corporation has well developed procedures and policies to assess the potential risk for groundwater level interference from new groundwater licence applications. These

procedures address matters to be considered in section 40 of the Act, which include impacts on surrounding groundwater users and the environment.

The Corporation considers that unacceptable interference occurs if:

- for neighbouring licensed bores the reduction in available drawdown is:
  - 10% where conservative aquifer characteristics have been applied from available literature; or
  - 20% if aquifer conditions have been derived from pumping test data at the site.
- for domestic and stock bores the reduction in available drawdown is:
  - 20% if available drawdown is less than 10 m;
  - 30% if available drawdown between 10 and 20 m; or
  - 40% if available drawdown is greater than 20 m.

If unacceptable interference is determined, the applicant may negotiate an outcome with potentially affected parties through the provisions under section 56 of the *Water Act 1989*.

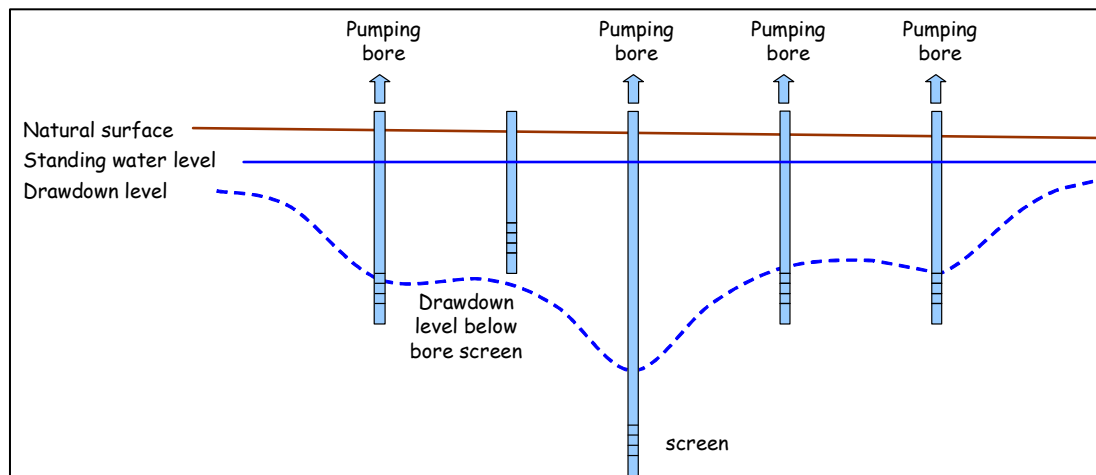


**Figure 2 Unacceptable interference caused by groundwater pumping**

**Rule 2: Managing groundwater interference**  
Groundwater level interference will be managed in accordance with section 40 of the *Water Act 1989*.

### 2.3 Intensity of licensed extraction

When bores located in close proximity to each other are extracting from the same aquifer it can result in intersecting drawdown cones as illustrated in Figure 3. Unacceptable drawdown levels could be a consequence of the cumulative impacts of a number of pumps operating in a local area (intensive groundwater pumping)



**Figure 3 Localised intensive groundwater pumping**

To manage the intensity of groundwater pumping, rules have been established to limit extractions within a given area. The rules recognise current entitlement and use, provide scope for future development and cap intensity of pumping in any developing areas.

Based on metered use and observed resulting drawdowns, extractions from an applicant's bore are to be limited by the groundwater to be pumped in a 5 km radial area.

To manage localised drawdowns, entitlement has been limited within a 5 km radius of an applicant's bore to the lesser of 5000 ML/year, or not more than 10% above licence entitlement as at 1 July 2009, where the total entitlement exceeds 5,000 ML/yr (refer Example 1 below).

If extractions in an area of intensive groundwater pumping result in any person whose existing authorised use of water is adversely and materially affected by the allocation or use of water under the licence, then the relationship between the annual volume of groundwater extracted in a given area and the observed impacts is to be reviewed by the Corporation in consultation with the Groundwater Reference Committee and affected parties.

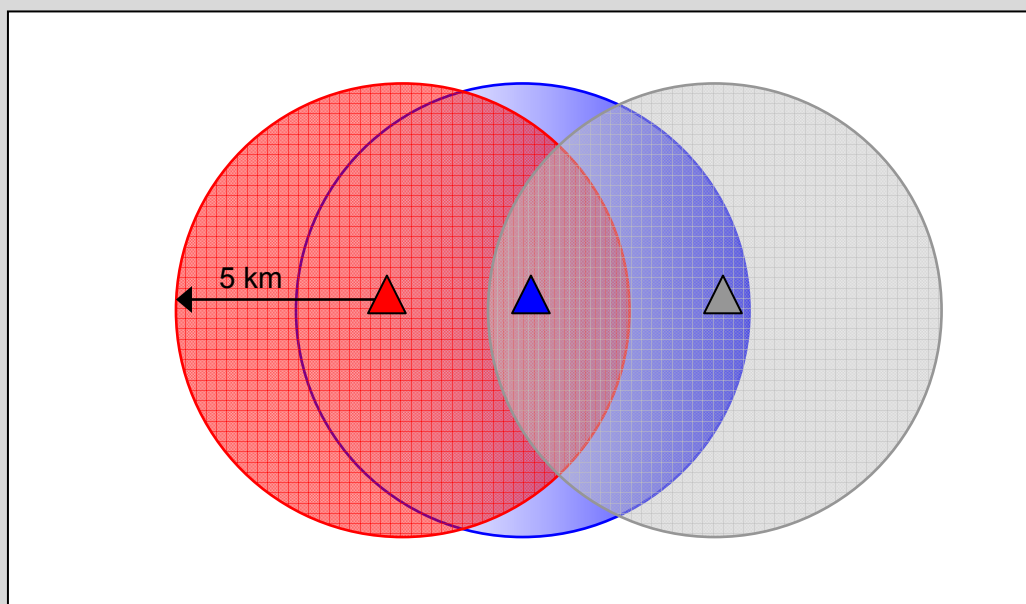
**Example 1**

The three triangles in the figure below represent bores each licensed to extract 2000 ML/year.

The sum of the licensed entitlement within a 5 km radius of both the red triangle and the grey triangle is 4000 ML/yr. That is, the red triangle and the blue triangle are within 5 km of each other. Similarly, the grey triangle and the blue triangle are both within a 5 km of each other.

The owners of the red triangle and the grey triangle may apply to extract up to an additional 1000 ML/year, either through a groundwater transfer (refer to section 2.5) or use of carryover (refer to section 2.6), as this is the difference between total summed licensed entitlement and the 5000 ML threshold within a 5 km radius of an applicant's bore.

The licensed entitlement within a 5 km radius of the blue triangle is 6000 ML/yr. That is, the red triangle and the grey triangle are both within 5 km of the blue triangle. As entitlement within a 5 km radius of the blue triangle exceeds the threshold of 5000 ML, the owner of the blue triangle is limited to applying to extract up to an additional 10% of their licence entitlement, which is 200 ML.



**Rule 3: Managing intensity of groundwater extraction**

The Corporation may approve an application to take and use groundwater under section 51 or section 62 of the *Water Act* 1989 provided that the total licence entitlement within a 5 km radius of the applicant's bore is limited to the lesser of:

- (i) 5,000 ML/yr; or
- (ii) 10% above licence entitlement as at 1 July 2009, where the total entitlement exceeds 5,000 ML/yr.



## 2.4 Trigger level and restrictions

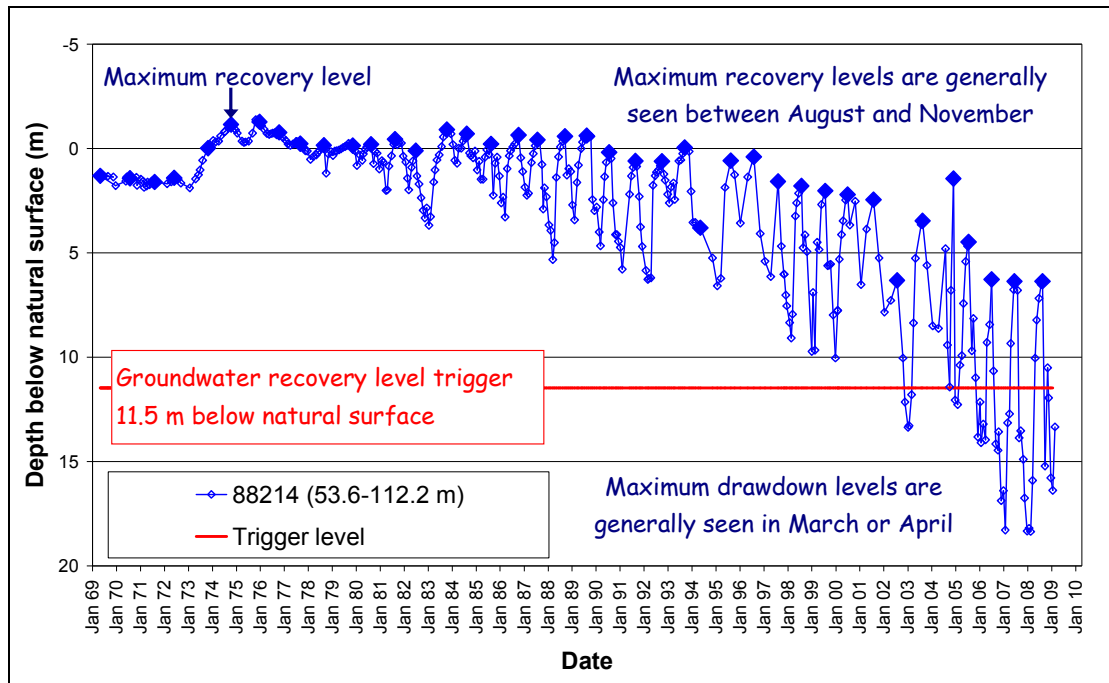
Groundwater levels have been declining in the Mid-Loddon GMA over the past decade in response to low recharge to the aquifer system and increased groundwater extractions.

A trigger level has been established for the introduction of restrictions if groundwater levels continue to fall. The trigger level has been established with consideration of the following:

- available drawdown for existing users, including domestic and stock bores;
- realisation of productive benefits of pumping groundwater before it passes through the system and it becomes more saline;
- potential watertable relief and land salinity benefits by minimising throughflow to the Jarklin Zone;
- the need to maintain groundwater quality and avoid the potential for saline groundwater intrusion from the north;
- groundwater dependent ecosystems; and
- the environment, including waterways.

The trigger level has been set at 11.5 m below the natural surface at State observation bore 88214 (102.5 metres above the Australian height datum). The intention is to use groundwater before it moves to the north and becomes more saline, and avoid the potential for intrusion of saline groundwater from the north.

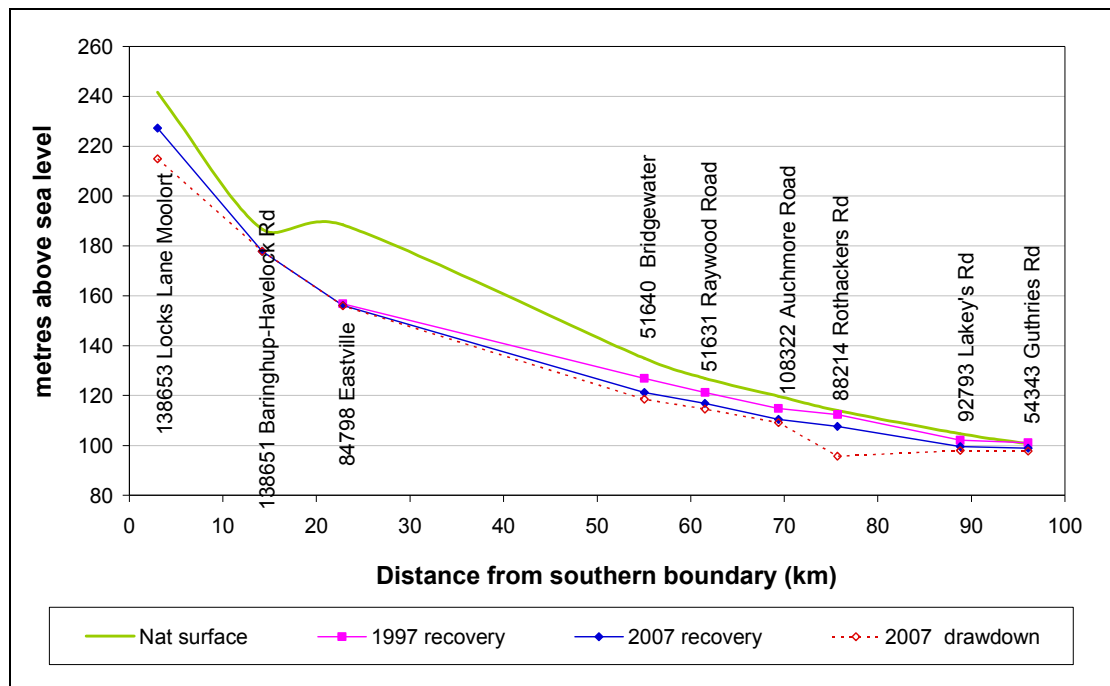
The hydrograph for bore 88214 is presented in Figure 4.



**Figure 4 Change in groundwater level over time at State observation bore 88214 on Rothackers Road.**

Bore 88214 is pivotal to monitoring the groundwater gradient to the north. Groundwater drawdown and rate of decline are greater at this bore than in other observation bores. This is because it is in the area of the GMA where there is the most intensive groundwater pumping and it is located near the northern boundary of the GMA.

The groundwater level fluctuation at bore 88214 will be compared each year with levels from nearby State observation bores, as well as against bores along the length of the Mid-Loddon GMA as shown in Figure 5 to verify that the aquifer recovery levels have a gradient to the north.



**Figure 5 South to north long section illustrating groundwater flow to the north, fall in groundwater between 1997 and 2007, and response to extractions during 2006/07**

To provide some flexibility, and avoid an overly reactive response to falling groundwater levels due to dry conditions, a rolling average will be applied based on measured groundwater recovery levels over a 3 year period. The maximum recovery level 3 year rolling average will be calculated from the measured maximum groundwater level recovery in bore 88214 from the current season, and from the two previous seasons (refer to Example 2 below).

**Example 2**

	Groundwater levels declining →					← Groundwater levels rising				
Season	1	2	3	4	5	6	7	8	9	10
Recovery level	10.1	10.6	11.1	11.6	12.1	12.1	11.6	11.1	10.6	10.1
Rolling average			10.6	11.1	11.6	11.9	11.9	11.6	11.1	10.6

Rolling average level calculated from recovery level that season and the two previous seasons

Years with restrictions

In this example there have been successive dry seasons and high groundwater extractions from season 1 to 6. From season 1 to 5 groundwater levels fell by 0.5 metres per season.

In season 5 restrictions were introduced (as the rolling average of 11.6 was greater than the trigger of 11.5 metres below the natural surface) to arrest groundwater level decline. This resulted in stabilisation of the groundwater level such that the recovery level in season 6 is the same as in season 5 (12.1 metres below the natural surface).

From season 6 to season 8 groundwater levels rose as a result of the restrictions and increased recharge.

In season 9 the rolling average recovered sufficiently to be less than the trigger and the restrictions are removed.

Groundwater levels continue to rise in seasons 9 and 10 in response to increased recharge and perhaps reduced extractions.

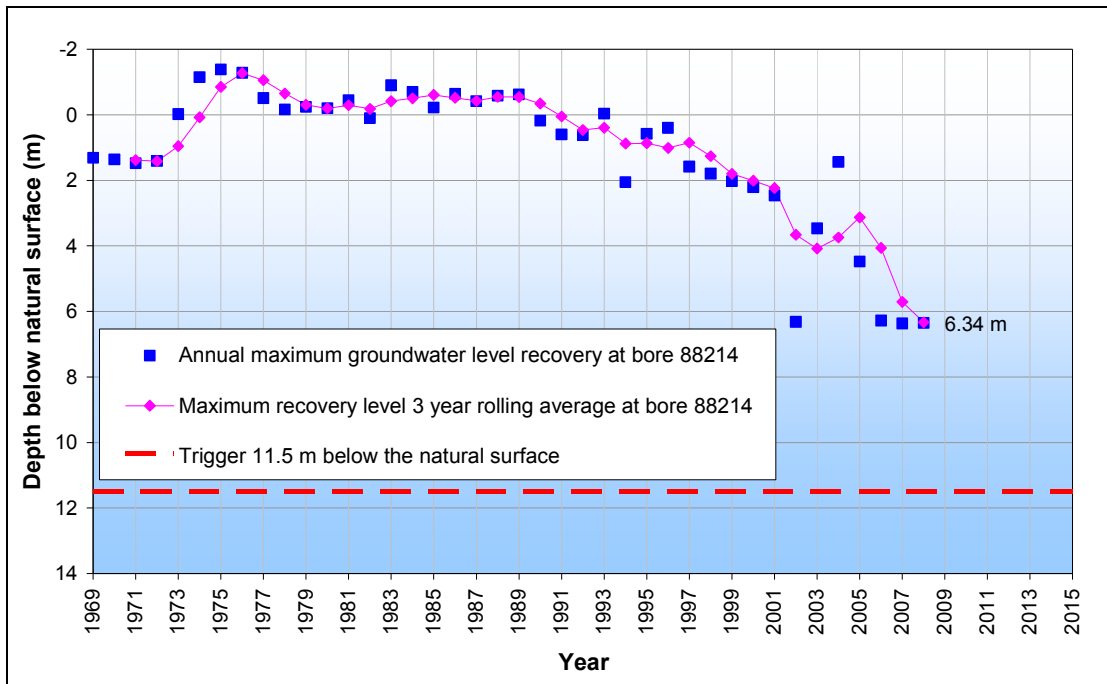
Note that in season 8 the actual groundwater level is less than 11.5 metres below the natural surface, but restrictions remain in force until the 3 year rolling average is less than 11.5 metres below the natural surface which is season 9.

If the maximum recovery level 3 year rolling average in bore 88214 falls beyond the trigger of 11.5 metres below the natural surface, a water shortage will be declared and restrictions will be imposed to arrest the groundwater level fall.

Restrictions will be imposed more promptly should groundwater recovery levels fall at a greater rate. Restrictions are to be imposed if the fall in measured maximum recovery level over two successive seasons in bore 88214 is greater than 2 metres, and the recovery level is below the trigger level. This option provides a mechanism to respond to any significant climate shift and reduces the potential for groundwater levels to fall far below the trigger level should they decline at a rapid rate.

The maximum recovery level 3 year rolling average for 2008 was around 6.3 metres below the natural surface, which indicates that recovery levels would need to fall by over 5 metres before restrictions are enforced (Figure 6).





**Figure 6 Maximum recovery level 3 year rolling average and trigger level**

Where a water shortage has been declared, restrictions under a qualification of rights on groundwater extraction will be introduced as an allocation of 70%. Allocations are a percentage of licence volume that may be permitted to be pumped that season. For example, for a groundwater licence with 100 ML/year entitlement and where a 70 % allocation is announced, only up to 70 ML may be extracted that season.

Allocations of 70% will reduce the licence volume available to be extracted to the calculated sustainable yield over a dry period. This will enable groundwater levels to be managed to arrest groundwater level decline during dry periods, and allow groundwater levels to recover during wetter periods. This provides access for existing users and takes into account environmental considerations, such as dewatering the aquifer, by arresting groundwater level decline.

Allocation announcements will be made by 15 September each year, based on the August groundwater level reading, to provide irrigators with necessary information to plan for the season ahead.

Groundwater levels will continue to be monitored monthly throughout the season to detect any further recovery in the groundwater level. If further recovery is observed, the rolling average will be recalculated. This could result in an allocation increase to 100% if the 3 year rolling average maximum recovery level rises above the trigger level of 11.5 metres below the natural surface in a season where restrictions have been applied.

Groundwater restrictions may present some challenges to licence holders. To meet these challenges there are increased opportunities for groundwater trading (refer to section 2.5) and carryover of groundwater has been introduced (refer to section 2.6).

#### **Rule 4: Managing groundwater levels**

- (a) By 15 September each year the Corporation will assess the maximum groundwater recovery level for bore 88214 and declare a water shortage under section 33AAA of the *Water Act 1989* if:
  - (i) the maximum recovery level 3 year rolling average in observation bore 88214 is beyond the trigger level of 11.5 metres below the natural surface; or
  - (ii) the measured maximum groundwater recovery level fall over two successive seasons is greater than 2 metres, and the maximum groundwater recovery level in bore 88214 is beyond 11.5 metres below the natural surface.
- (b) If a water shortage is declared the Corporation will announce a 70% allocation for that season
- (c) By 30 September, the Corporation will announce a seasonal allocation on its website and also provide advice via letters to licensed groundwater users; and public notices in the Loddon Times, Bendigo Advertiser and Maryborough Advertiser.
- (d) The Corporation will monitor groundwater levels throughout the season and announce an allocation increase to 100% of licence volume if the maximum recovery level 3 year rolling average rises above the trigger level of 11.5 metres below the natural surface.
- (e) If the 3 year rolling average is below the trigger level and continues to decline the Corporation will enact a review and, in consultation with the Groundwater Reference Committee, may impose a further reduction in the annual allocation.

## **2.5 Transfer of groundwater licence entitlement**

Transfers rules have been developed to increase opportunities for groundwater trading in the Mid-Loddon GMA. Groundwater trading provides:

- greater flexibility for licensed groundwater users to increase production;
- an opportunity to improve groundwater management through redistribution;
- market opportunities for sleeper licences; and
- drought management options.

The Mid-Loddon GMA has been divided into three management zones (refer to section 1.3 and Figure 1):

1. Jarklin Zone;
2. Laanecoorie-Serpentine Zone; and
3. Moolort Zone.

Temporary and permanent transfer of groundwater entitlement is permitted within and between zones subject to conditions that protect the integrity of the aquifer; provide environmental benefits and minimise the potential for unacceptable impacts on existing groundwater users.

A buffer has been applied to zone boundaries to provide an opportunity for licence holders with bores situated near these boundaries to temporarily transfer licence entitlement to neighbouring properties. The buffer enables groundwater licence entitlement to be transferred between bores within 5 km of each other across zone boundaries, provided that interference and intensity rules are satisfied.

Licence holders applying to temporarily transfer groundwater licence entitlement must receive written approval from the Corporation before pumping the water. Licence holders are encouraged to apply well in advance of requiring the water as it can take a number weeks to process applications.

In areas of intensive groundwater pumping (refer to section 2.3) only temporary transfer of water entitlement will be permitted. Applications for temporary transfer in areas of intensive groundwater pumping will be considered after 1 October each year to enable applications to use carryover to be considered first (refer to section 2.6).

**Rule 5: Transfer of groundwater licence entitlement**

- (a) The Corporation may approve a transfer of groundwater licence entitlement under section 62 of the Act provided the following conditions are also satisfied:
- (i) The buyer has a bore with a metered diversion point;
  - (ii) The approval of such a transfer would not cause the total licence entitlement in the Laanecoorie-Serpentine Zone to exceed 28,000 ML;
  - (iii) The approval of such a transfer would not cause the total licence entitlement in Jarklin Zone to be less than 3,000 ML;
  - (iv) The approval of a permanent transfer would not cause the licence entitlement within a 5 km radius of the buyer's bore to exceed 5,000 ML/yr;
  - (v) The approval of a temporary transfer would not cause the licence entitlement within a 5 km radius of the buyer's bore to exceed 5,500 ML/yr;
- (b) Despite Rule 5 (a) (ii) and (a) (iii) above, a temporary transfer of licence may be permitted between bores up to a maximum of 5 km apart across management zone boundaries;
- (c) Despite Rule 5 (iv) above a temporary transfer for up to 10 % of the applicant's licence entitlement may be permitted in accordance with Rule 3 (ii). Such applications will be processed after 1 October each year.
- (d) The Corporation will process temporary transfer applications in the order they are received. If there is more than one application received on the same day, and insufficient volume available (refer to Rule 5 (a) (v) and 5 (c)), then the remaining volume will be equally divided between the applicants.

## **2.6 Carryover**

Carryover is a licence holder's unused allocated entitlement that may be used in subsequent seasons. Limited carryover is permitted in the Mid-Loddon GMA to:

- provide increased security of supply when surface water or groundwater allocations are low;
- offer greater flexibility for licence holders to manage their entitlement;
- reduce the reliance upon finding someone from whom to transfer entitlement;
- increase opportunities for transfer of groundwater; and
- provide investment opportunities where licence holders might choose to carryover and transfer in dry seasons.

A maximum of 30% of a licence entitlement may be retained as carryover in any season. This becomes part of the total water available to a licence holder in the following season. Setting a maximum of 30% on carryover allows management of groundwater levels as it limits groundwater extractions in any season.

Carryover volume is not subject to allocation restrictions (refer to section 2.4) enabling licence holders to manage through periods when restrictions are enforced (refer to Example 3 below).

**Example 3**

A licence holder has an entitlement of 100 ML/yr.

The licence holder may carryover a maximum of 30%, which is 30 ML.

The licence holder may use up to 130 ML in a season.

The table below provides an example of water use.

Season	1	2	3	4	5	6	7	8	9	10
Entitlement (ML)	100	100	100	100	100	100	100	100	100	100
Allocation	100%	100%	100%	100%	70%	70%	70%	70%	100%	100%
Subtotal (ML)	100	100	100	100	70	70	70	70	100	100
Carryover (ML)	0	15	30	30	30	15	0	0	0	15
Balance (ML)	100	115	130	130	100	85	70	70	100	115
Usage (ML)	85	85	85	85	85	85	70	70	85	115
Transfer out (ML)	0	0	15	15	0	0	0	0	0	0

In this example the licence holder used 85 ML of their allocated 100 ML in season 1 and 2 and banked carryover of 15 ML in each season to provide security against possible future restrictions. At the end of season 2 they had reached their maximum allowable amount of carryover (30% of licence entitlement).

In both seasons 3 and 4 the licence holder used 85 ML traded out 15 ML and retained their maximum allowable carryover of 30 ML.

In seasons 5 and 6 restrictions were imposed with 70% allocations. The licence holder was able to take advantage of banked carryover to maintain production levels using 15 ML in each season.

In seasons 7 and 8 restrictions were still imposed and, as the licence holder did not have any carryover remaining, their usage was restricted to 70 ML in each season.

In season 9 restrictions were removed and the licence holder used 85 ML and banked carryover of 15 ML.

In season 10 the licence holder increased production and used all available water, 100 ML allocation plus 15 ML carryover.

Carryover makes up part of licence holders available water and entitlement can be transferred to another licence holder (refer to section 2.5).

A licence holder must apply to the Corporation before using any carryover volume. This will enable the Corporation to undertake a risk assessment to determine the impacts of additional extraction from a bore on surrounding groundwater users and the environment.

Limits have been established for extractions in areas of intensive groundwater pumping (refer to section 2.3) which may limit use of carryover in these areas. Applications to use carryover in areas of intensive groundwater pumping received prior to 1 October any year by the Corporation will be considered before any applications for temporary transfer of entitlement in that area (refer to section 2.5).

**Rule 6: Carryover**

- (a) The Corporation may permit a maximum of 30% of licence entitlement to be retained as carryover from one season to the next;
- (b) Restrictions in the form of seasonal allocations will not apply to carryover volume.
- (c) The licence holder must obtain approval from the Corporation before using any carryover volume that will result in usage exceeding licensed entitlement prior to extraction of the water.
- (d) Where Rule 3 (ii) applies, applications to use carryover must:
  - (i) be submitted to the Corporation annually;
  - (ii) accord with the entitlement volume permitted in Rule 3 (ii);
  - (iii) be considered by the Corporation before applications to temporarily transfer entitlement if received before 1 October in any year;
- (e) Carryover makes up part of licence holders available water and may be transferred.
- (f) Consideration must be given to Rule 2 when considering an application to use carryover.

### 3 Monitoring

Monitoring, evaluation and reporting is crucial to adaptive management. The results of monitoring and evaluation activities inform future management actions and planning.

#### 3.1 Groundwater levels

There are over 100 strategically located State observation bores in the Mid-Loddon GMA that are monitored quarterly in February, May, August and November to provide data relating to the availability of groundwater resources (refer Figure 1 and Schedule 1).

Continued monitoring of groundwater levels is required to improve our understanding of how the groundwater system responds to different stresses, such as groundwater trading, and enables responsible resource management decision making.

Sufficient bores will be monitored to confirm that groundwater levels from south to north as shown in the longitudinal section in Figure 5, including the trigger bore 88214, are representative of the aquifer response. Additionally, bores will be monitored that will provide evidence of any impacts on existing groundwater bores at the margins of the aquifer.

The Corporation will obtain monthly groundwater levels for key bores in the Mid-Loddon GMA to assist with assessing restrictions (refer to section 2.4).

#### **Rule 7: Monitor groundwater levels**

The Corporation will obtain monthly groundwater levels from key State observation bores in the Mid-Loddon Groundwater Management Area as identified in Schedule 1.

#### 3.2 Groundwater salinity

Minimising the potential for an increase in groundwater salinity is a key consideration in the development of groundwater management rules in the Mid Loddon GMA. Monitoring groundwater salinity over time enables any emerging trends to be identified.

Groundwater sampling is to be undertaken from selected State observation bores in the GMA to detect any increase in salinity.

Additionally, the Corporation will provide groundwater users with an opportunity to have the groundwater salinity tested from their private bores so that they can monitor any change in groundwater salinity over time.



**Rule 8: Monitor groundwater salinity**

- (a) The Corporation will, at least once every year, collect groundwater samples from State observation bores including 88214 and 53434, or their replacement, and send to a NATA accredited laboratory for salinity analysis.
- (b) The Corporation will enter NATA accredited laboratory results from State observation bores into the State Groundwater Management System within 60 days of receipt from the laboratory.
- (c) The Corporation will:
  - (i) at least once a year provide a sample bottle and a reply paid envelope to each groundwater licence holder and request that they to collect a groundwater sample from all their licensed bores and return them to the Corporation for salinity analysis;
  - (ii) provide a sample bottle and a reply paid envelope to any domestic and stock groundwater user upon their request for them to provide a sample for salinity analysis;
  - (iii) measure groundwater salinity in all returned sample bottles and provide the licence holder with the results.
  - (iv) maintain a database of all licensed bore groundwater salinity data.

**3.3 Meter readings**

Recording groundwater usage is critical in the management of groundwater resources in the Mid-Loddon GMA. Groundwater usage is a key component of the groundwater balance and the data collected can be used to confirm the understanding of the aquifer system response. All licensed bores will be metered. Meters will be read periodically and the information will be stored in a database to assist with reporting on usage and compliance.

**Rule 9: Record meter readings**

The Corporation will:

- (i) ensure that a meter is fitted to all licensed operational bores in the groundwater management area.
- (ii) read each meter at least three times each season on average; and
- (iii) maintain a database of all metered groundwater use.



## 4 Reporting

### 4.1 Reporting

The Corporation will prepare an annual report for the Mid-Loddon GMA. The report will provide recommendations for any changes to the local management rules.

#### **Rule 10: Annual reporting**

The Corporation will prepare an annual report to 30 June, by 1 October of the same year, on the Mid-Loddon GMA which will include reporting and analysis of:

- (i) groundwater level monitoring;
- (ii) groundwater quality and salinity monitoring;
- (iii) groundwater entitlement per zone, including trade and carryover;
- (iv) groundwater use per zone and any metering issues;
- (v) implications of any restrictions;
- (vi) compliance issues;
- (vii) any new technical information or change in policy;
- (viii) work undertaken on groundwater dependent ecosystems; and
- (ix) any need to amend the local management rules.

### 4.2 Consultation

To keep the community informed of the groundwater resource status and success of the local management rules a communications strategy has been developed. The strategy aims to provide groundwater users with information necessary to demonstrate that the aquifer is being managed sustainably, and provide an early warning for the possibility of restrictions.

The Corporation will provide an annual newsletter to provide an update on the status of groundwater resources in the Mid-Loddon GMA and summarise outcomes from the annual report.

The Corporation will post on its website at [www.g-mwater.com.au](http://www.g-mwater.com.au) these local management rules, annual reports and other information relating to the management of groundwater resources in the Mid-Loddon GMA, including groundwater levels from key bores.

Additionally, the Corporation will appoint a Groundwater Reference Committee which it will consult with at least annually in relation to the implementation of these Local Management Rules.

**Rule 11: Provide effective communication**

- (a) The Corporation will meet with the Groundwater Reference Committee in August each year to report on the groundwater resource status, and at any other time as considered necessary.
- (b) The Corporation will mail an annual newsletter in October to groundwater licence holders, and domestic and stock users upon request, in the Mid-Loddon GMA and relevant agencies stating the resource position and summarising outcomes from the annual report.
- (c) The Corporation will post on its website:
  - these local management rules and supporting reports;
  - annual newsletters;
  - the annual report;
  - other reports that relate to these local management rules.
- (d) The Corporation will show hydrographs for key bores in the Mid-Loddon GMA on its website and update these hydrographs each month with reference to the trigger point.

## 5 Review of local management rules

These local management rules may need to be adapted in response to institutional policy changes in groundwater resource management, or improved understanding of the aquifer system and its response to management arrangements.

Any proposed changes to the local management rules will be considered by the Corporation and the Groundwater Reference Committee at their annual meeting in August each year.

Any changes to the local management rules must be based on sound technical understanding of the issues, developed with the Groundwater Reference Committee and widely consulted.

A comprehensive review of the local management rules must be undertaken after an implementation period of 5 years.

### **Rule 12: Review of local management rules**

- (a) The Corporation will meet with the Groundwater Reference Committee in August each year, and at any other time as considered necessary, to review the local management rules and consider the need for any amendments.
- (b) Groundwater users in the Mid-Loddon GMA may be informed of any proposed amendments via a mail out to licence holders, a public meeting; and through advertisements placed in local newspapers.
- (c) The Corporation will consider submissions on proposed amendments in consultation with the Groundwater Reference Committee if such submissions are received by the Corporation within 28 days from the date proposed amendments are advertised.
- (d) The local management rules will be comprehensively reviewed after an implementation period of 5 years.

## Schedule 1

### State observation bores

36401	51724	106559
36402	51726	107906
36403	51727	107907
36404	51728*	107928
36406	51729	107929
36407	51730*	108319
36408	51732	108320
36409	54342*	108321
36410	54343*	108322*
36411	54346*	108323*
36412	54348	108337*
36413	54349	109928
36414	54350	109929
36415	54352	109930
36416	66867	138651*
36417	66868	138652*
36418	66869	138653*
36436	67906	138654*
36447	67907	G8010269/01
36448	67908	G8010269/02
36449	67910	G8010270/01
36450	67911	G8010270/02
36451	67912	G8010270/03
36452	67956	G8010270/04
36453	67957	G8010270/05
36454	68199	G8010271/01
36455	73672	G8010271/02
36456	84796	G8010271/03
36457	84797*	G8010271/04
36458	84798*	G8010271/05
51631*	88214*	G8010272/01
51640*	88238*	G8010272/02
51718*	88239*	G8010273/01
51719*	92792*	G8010274/02
51720	92793*	G8010275/01
51721	92794*	G8010275/02
51722	92795*	G8010275/03
51723	106558	

\* Key bores to be monitored monthly