

Eildon

Groundwater Management Area

Local Management Plan

September 2016

Cover images (Left to Right): Delatite River near Piries, looking east over the Mansfield basin, a pumping bore and vineyard.

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Quick reference guide to the Plan rules

This section lists the Plan rules for quick reference. The reader should refer to the relevant section of the Plan for more information about each rule.

Rule 1 Cap on groundwater entitlement *(Page 18)*

Goulburn-Murray Water may issue a groundwater licence provided that in doing so it does not exceed the Permissible Consumptive Volume established for Eildon Groundwater Management Area

Rule 2 Management Zone limits *(Page 19)*

Goulburn-Murray Water may issue a new groundwater licence under section 51 of the Act provided that the following management zone limits are not exceeded:

Management Zone	Management zone limit (ML/yr)
Eildon Northern Highlands	436
Alpine Southern Highlands	1,060
Total	**1,496**

Rule 3 Transfer of groundwater entitlement *(Page 20)*

Goulburn-Murray Water may approve a transfer of groundwater entitlement under section 62 of the Act provided that relevant matters under the Act have been considered and that the following conditions are satisfied:

a) Entitlement may be transferred on a temporary or permanent basis within or between management zones provided that:

   i. For a permanent transfer the management zone limits outlined in Rule 2 are not exceeded

   ii. The buyer has a bore with a metered diversion point

   iii. The seller's licensed bore/s is/are either metered or not equipped for use.

Rule 4 Record meter readings *(Page 22)*

Goulburn-Murray Water will read flow meters on licensed bores at least once annually and record use in the Victorian Water Register and consider data collected as part of a review of the Plan.

Rule 5 Annual newsletter *(Page 23)*

By 1 October each year GMW will post on its website a newsletter reporting on groundwater resource status, licensed groundwater use and trade activity for the previous season. The newsletter will also identify the need for any changes to the Plan.

Rule 6 Review of the Plan*(Page 23)*

Goulburn-Murray Water will consider the need for any amendments to the Plan on a yearly basis in conjunction with the release of the annual newsletter.

If amendments are proposed that directly impact rights of access to water, Goulburn-Murray Water will consult groundwater users in the Eildon GMA.

Endorsement

This local management plan (the Plan) has been developed to provide a clear operational framework for managing groundwater resources in the Eildon Groundwater Management Area (GMA), and provides specific information to Goulburn-Murray Water's customers about taking and using of groundwater in this area.

The Plan fulfils Sustainable Water Strategy obligations and relevant Ministerial guidelines by explaining to Goulburn-Murray Water's customers and the broader community the specific management arrangements governing the licensed extraction of groundwater in the Eildon GMA.

The development of the Plan has relied on valuable guidance and feedback from Goulburn-Murray Water's customers and key stakeholders.

The Plan seeks to find the right balance between recognising the benefit of using groundwater while supporting the protection of important environmental values such as stream baseflow and groundwater dependent ecosystems during critical dry periods. The Plan also aims to be proactive in its approach, by giving guidance about where groundwater development may occur in the future.

The Plan will require periodic review particularly as the Murray-Darling Basin Plan is implemented, as changes to Victoria's groundwater management framework take effect and as information about groundwater resources in the Eildon GMA improves.

Goulburn-Murray Water will continue to work with our customers, local communities and other stakeholders to ensure that the Plan is reviewed and updated as necessary.

Matthew Pethybridge

Acting Manager Groundwater and Streams

Goulburn-Murray Water Rural Water Corporation

Date: 28 September 2016

Cathy Wood

Customer Services Manager Diversions - Central

Goulburn-Murray Water Rural Water Corporation

Date: 28 September 2016

Acknowledgements

Goulburn-Murray Water (GMW) would like to express its appreciation to the Goulburn-Broken Regional Water Service Committee, the Goulburn-Broken Catchment Management Authority and the Taungurung Clans for their input to the Plan, and is grateful to groundwater customers who took the time to provide feedback on groundwater resource management values and issues. This feedback has been invaluable in helping to test and refine the information contained in the Plan.

This Plan acknowledges and pays its respect to the Taungurung people as the Traditional Owners of the Lake Eildon catchment. The Plan recognises and acknowledges that the Traditional Owners and their Nations have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters. The Plan understands the need for recognition of Traditional Owners' knowledge and cultural values during the implementation of actions set out in this Plan.

Glossary

Term/Acronym	Description
Act	Water Act 1989 (Victoria)
AHD	The reference level for groundwater levels is the Australian Height Datum (AHD), the geodetic datum for altitude measurement in Australia. It is the mean sea level for 1966-1968 and is assigned the value of zero.
Aquifer	A geological structure or formation or an artificial land fill permeated or capable of being permeated permanently or intermittently with water;
D&S	Domestic and Stock
GMA	Groundwater Management Area
GMW	Goulburn-Murray Water Rural Water Corporation acting as a delegate of the Minister
Groundwater entitlement	Licensed volume of groundwater specified as megalitres per year
Groundwater licence	Licence issued to take and use groundwater under section 51 of the Act
L/sec	Litres per second
m	metre
ML	Megalitre or one million litres
PCV	Permissible Consumptive Volume is the volume of groundwater that the Minister has declared may be extracted from a defined area in a season
The Plan	The Eildon Groundwater Management Area Local Management Plan
Season	Period of 12 months commencing 1 July
SOBN	State Observation Bore Network
Trade	Transfer of groundwater entitlement
Zone	A part of a Groundwater Management Area defined for management purposes

Contents

1 Introduction

1.1 Background

The aim of the Eildon Groundwater Management Area (GMA) Local Management Plan (the Plan) is to provide groundwater users with a system-specific management framework. The Plan has been developed by Goulburn-Murray Rural Water Corporation (GMW) using the best available technical information. Importantly the Plan has relied on information gathered from a customer survey, from discussions with Goulburn-Broken Water Service Committee representatives and via consultation with relevant stakeholder and agency groups.

Local management plans describe how GMW will manage the take and use of groundwater licensed under section 51 of the *Water Act 1989* (the Act), using powers delegated under the Act and in accordance with Victoria's *Policies for Managing Take and Use Licences*.

The formation of the Plan is a requirement of Action 4.6 in the Northern Region Sustainable Water Strategy (2009) and it has been developed by GMW as part of a wider programme to ensure that formal, adaptable, risk-based groundwater management rules are in place across its entire region. The Plan will also be an important building block to enable GMW to meet its obligations under the Murray-Darling Basin Plan.

In addition to meeting policy requirements, the Plan acknowledges community interest, particularly in the greater Mansfield area, about water resource management (both groundwater and surface water). This heightened community interest prompted a groundwater resource appraisal project commissioned by the Mansfield Shire Council for its Local Government Area (GHD, 2011). The study area of this project includes 95% of the Eildon GMA. The conceptual model and water balance completed as part of this project have been important inputs to the development of the Plan.

1.2 Guiding principles

The following guiding principles have been adopted in the development of this Plan:

- The rights of existing groundwater licence holders will not be changed.
- All licensed groundwater use has equal value (whether use is for irrigation, commercial, industrial or urban supply purposes).
- While the development of this Plan considered potential impacts on surface water values from groundwater use, it does not seek to manage groundwater and surface water together.
- Where there is uncertainty over the level of risk posed by groundwater use, a conservative approach has been taken to rules about limits to new groundwater licence entitlement.
- Groundwater management should be commensurate with the level of risk to social, environmental and economic values posed by groundwater use.

1.3 Groundwater management objectives

Management objectives have been developed by considering the groundwater values in the catchment and the potential risk to these values from groundwater use.

The management objectives for Eildon GMA are to:

- Provide a simple, proactive and adaptive management framework which supports the benefits of groundwater use in an equitable and sustainable manner;
- Ensure that future groundwater development does not unacceptably impact environmental assets (such as river flow, springs and groundwater dependent ecosystems);
- Improve community understanding of groundwater management through effective communication, consultation and engagement.

1.4 Eildon Groundwater Management Area

The Eildon GMA comprises the catchments which drain into Lake Eildon including the Upper Goulburn, Big, Jamieson, Howqua and Delatite River catchments, as well as the Ford and Brankeet Creek catchments. The Eildon GMA incorporates the towns of Eildon, Mansfield, Jamieson and Howqua (shown in Figure 1).

Groundwater resources in the Eildon GMA occur predominantly within the fractured rock basement aquifer however there are some resources which occur in continuous and isolated alluvial sediments that form the Quaternary aquifer.

The Plan applies to groundwater resources to a depth of 200m below ground surface in the Eildon GMA in line with the Victorian Groundwater Management Framework (DSE, 2012), as shown in Figure 2.

Bores screened at depths greater than 200 m below ground surface are not subject to the rules outlined in the Plan. Currently there are no licensed bores greater than 200 m in depth in the Eildon GMA. Future developments greater than 200 m will be managed and licensed in accordance with the Act on a case by case basis.

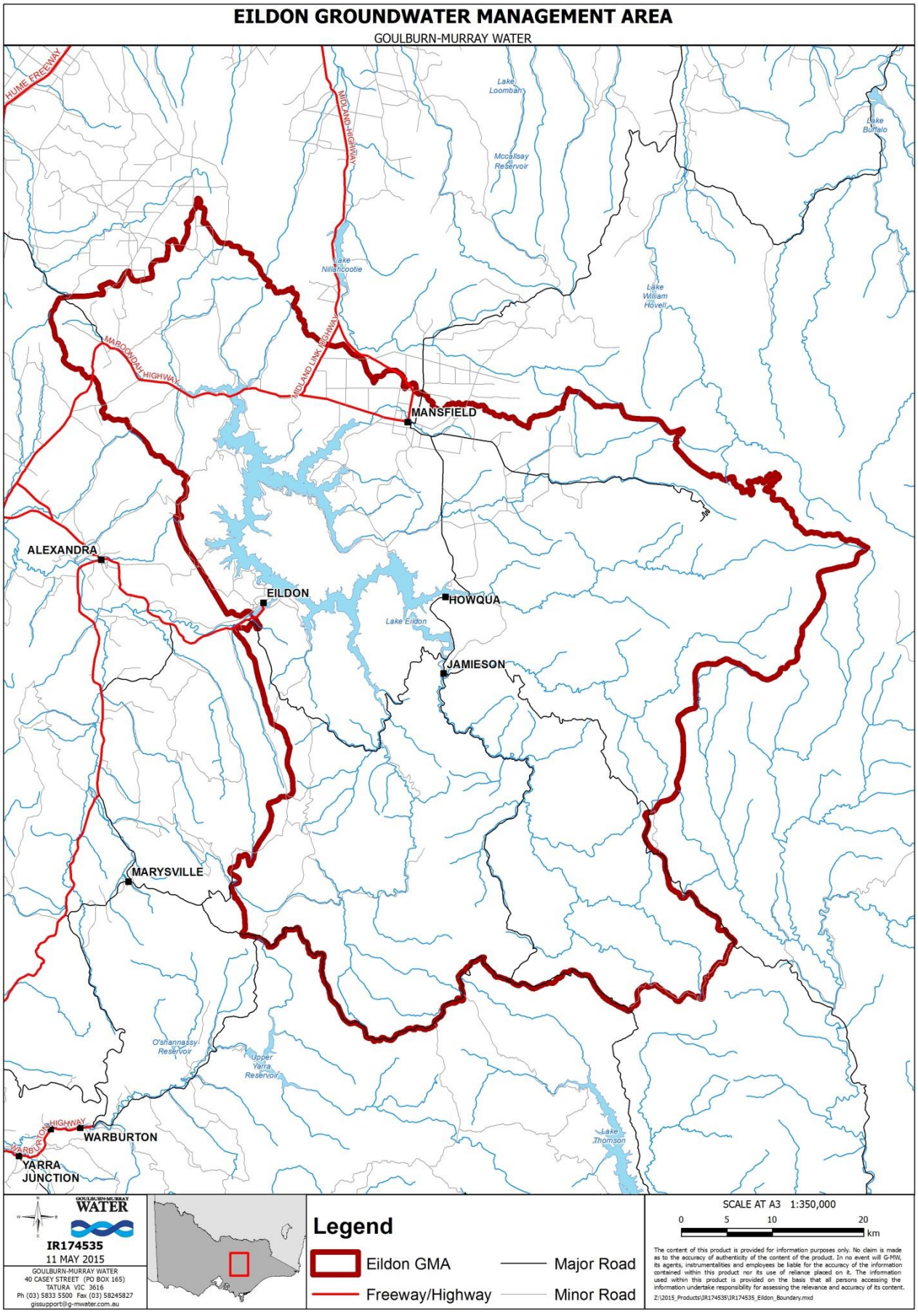

Figure 1 Eildon Groundwater Management Area

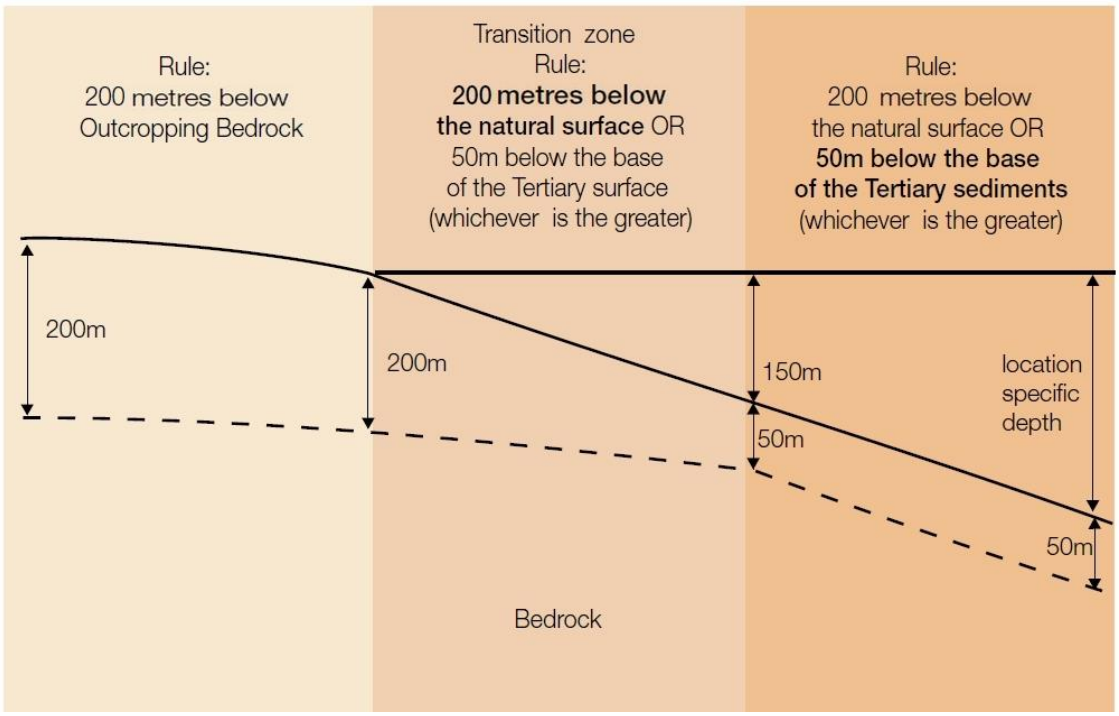

Figure 2 Groundwater management framework depth boundaries (DSE, 2012)

2 Groundwater System

2.1 Aquifers

Groundwater resources within the Eildon GMA broadly occur within two aquifer types:

- Fractured bedrock aquifers; and
- Alluvial aquifers.

2.1.1 Fractured bedrock aquifers

The major aquifer type in the Eildon GMA is the fractured bedrock aquifer. This includes Palaeozoic aged sedimentary (mudstone, siltstone and sandstone), metamorphic (schist and phyllite) and intrusive (granite) rocks. Metamorphic rock outcrops throughout most of the management area.

Groundwater is stored and moves through fractures and faults in the bedrock. The highest yields occur in fracture zones and along faults; particularly where these are enhanced by weathering.

Bore yields from the bedrock aquifer are generally low (typically less than 0.5 L/sec) but can vary significantly over short distances.

The bedrock aquifer is an important source of domestic water supply for residents without access to reticulated water, and it is also used to support industrial, commercial and agricultural industries.

2.1.2 Alluvial aquifers

The alluvial aquifers occur mostly along the lower reaches of the major waterways in the Eildon GMA. The alluvial aquifers comprise Quaternary aged river deposits of clay, silt, sand and gravel. Major alluvial deposits are shown on Figure 3.

Permeability of the finer sediments is poor, while the more permeable gravel lenses are discontinuous and have limited storage capacity.

The alluvial deposits are less than 5 m in thickness in most areas but increase to nearly 60 m in a small area near Mansfield.

Although the Quaternary aquifer does not provide significant storage or bore yields, it is capable of supporting groundwater extraction for stock and domestic, or small scale irrigation.

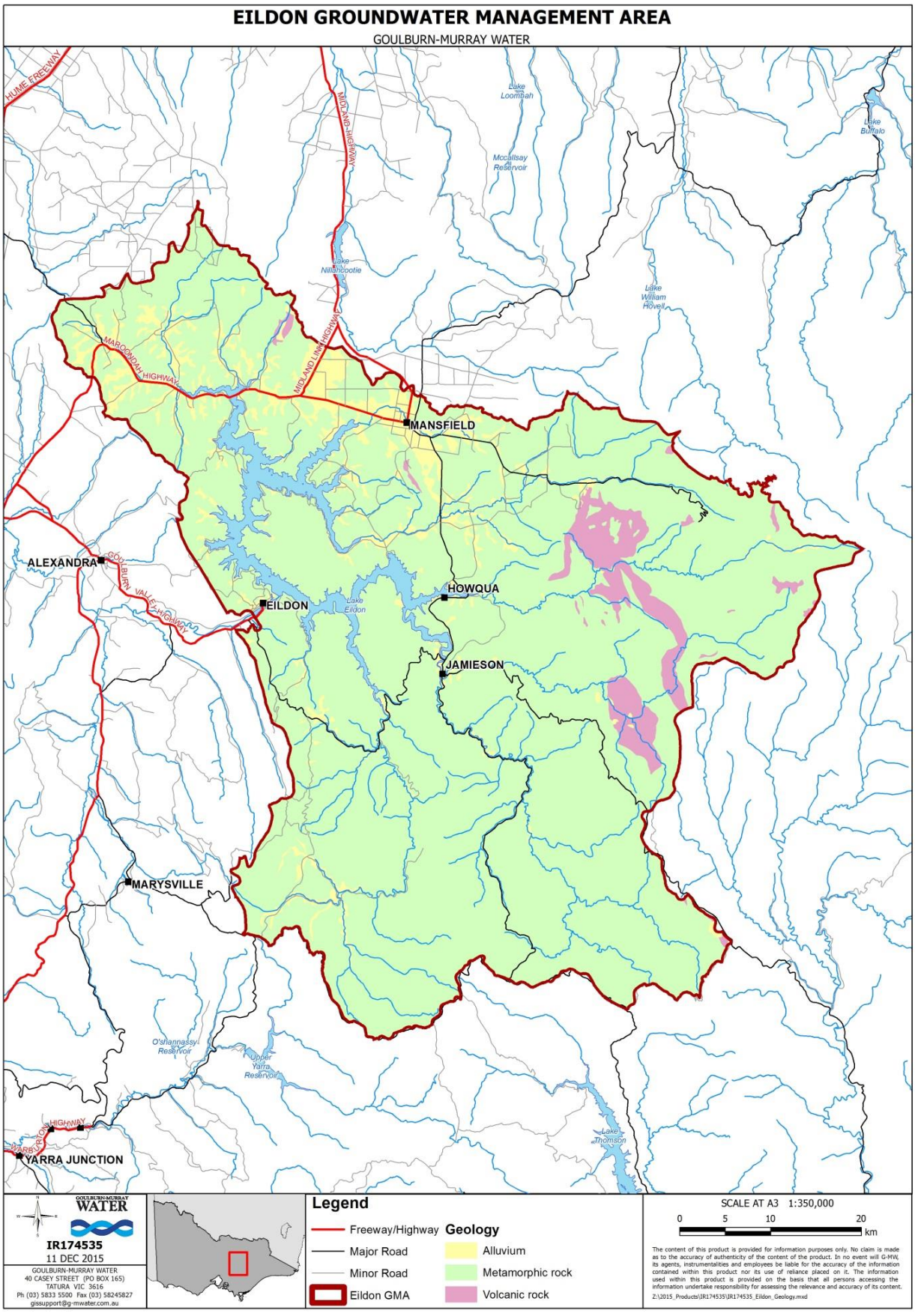

Figure 3 Surface geology in the Eildon GMA

2.2 Groundwater levels

Groundwater levels are monitored in 17 observation bores in the Eildon GMA, all located north of Howqua (Figure 6). The bores are monitored and maintained by the Department of Economic Development, Jobs, Transport and Resources (DEDJTR). Most of these bores are shallow, less than 20 m depth below natural surface (DBNS), and are constructed in the bedrock and the alluvial aquifers along waterways.

Groundwater levels within both aquifers are generally within 5 m of the ground surface. Groundwater levels in the alluvial aquifer at Mansfield and Maindample are shown in Figure 4 and Figure 5, respectively. Groundwater levels in these shallow alluvial aquifers fluctuate seasonally at both sites however fluctuations are greater at Maindample. Groundwater levels at both sites declined during the Millennium Drought, but recovered to pre-drought levels in the following years.

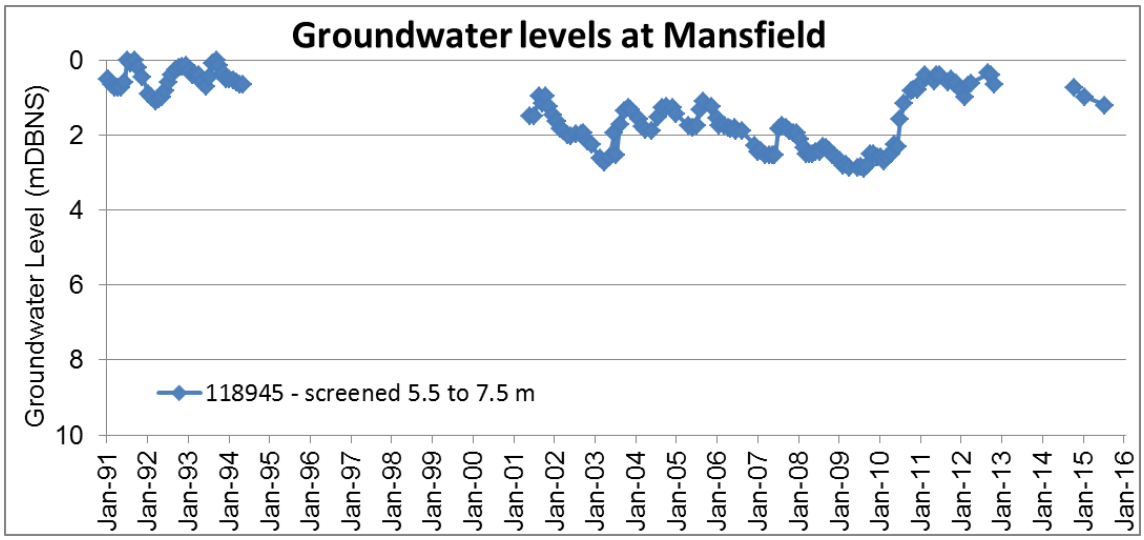

Figure 4 Mansfield groundwater levels

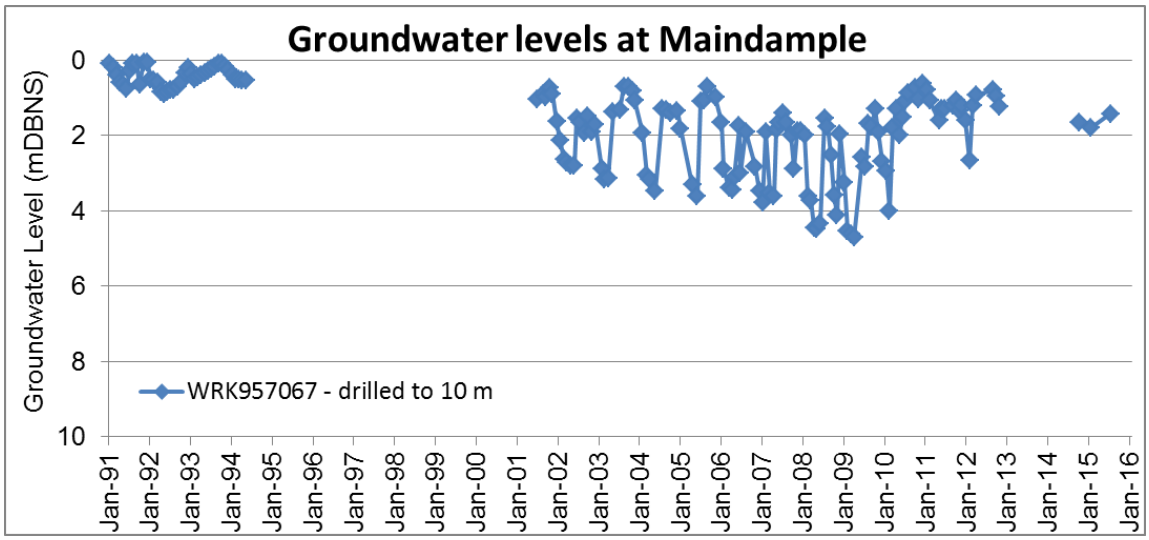

Figure 5 Maindample groundwater levels

Note: no groundwater level data available for monitoring bores WRK957067 and 118945 between 1995 and 2001 or 2013 and 2014

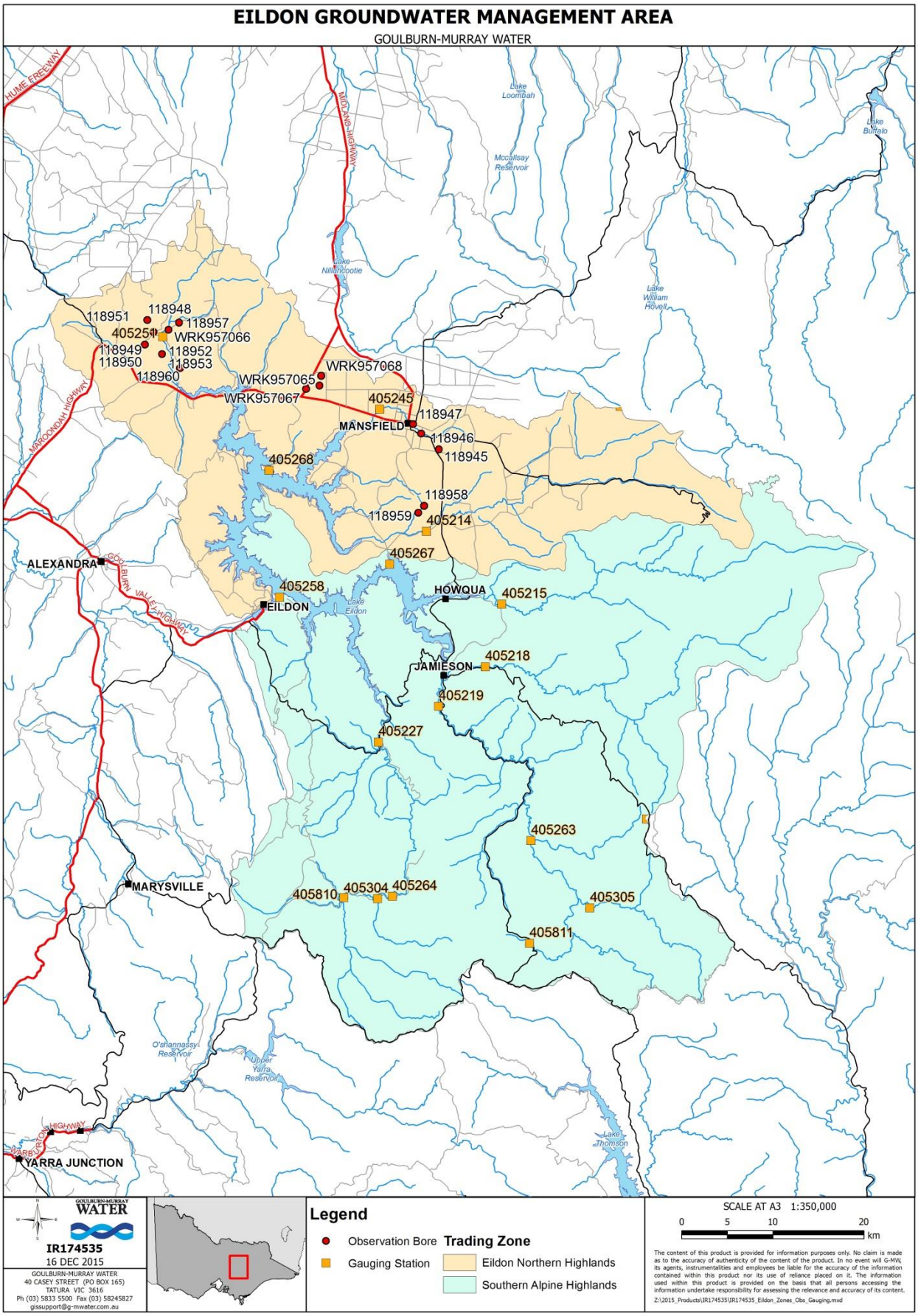

Figure 6 Groundwater and surface water monitoring sites in the Eildon GMA

2.3 Groundwater flow

Locally groundwater in the fractured rock aquifer flows from topographic high points and areas of highest rainfall to the valley floors, where it discharges into streams as baseflow. The majority of groundwater flow occurs in the weathered zones and fracture zones, in the uppermost 100 m of bedrock as illustrated in Figure 7.

Regionally groundwater flows through the fractured rock aquifer from elevated areas at the perimeter of the Mansfield basin towards lower lying areas around Fords Creek and Lake Eildon.

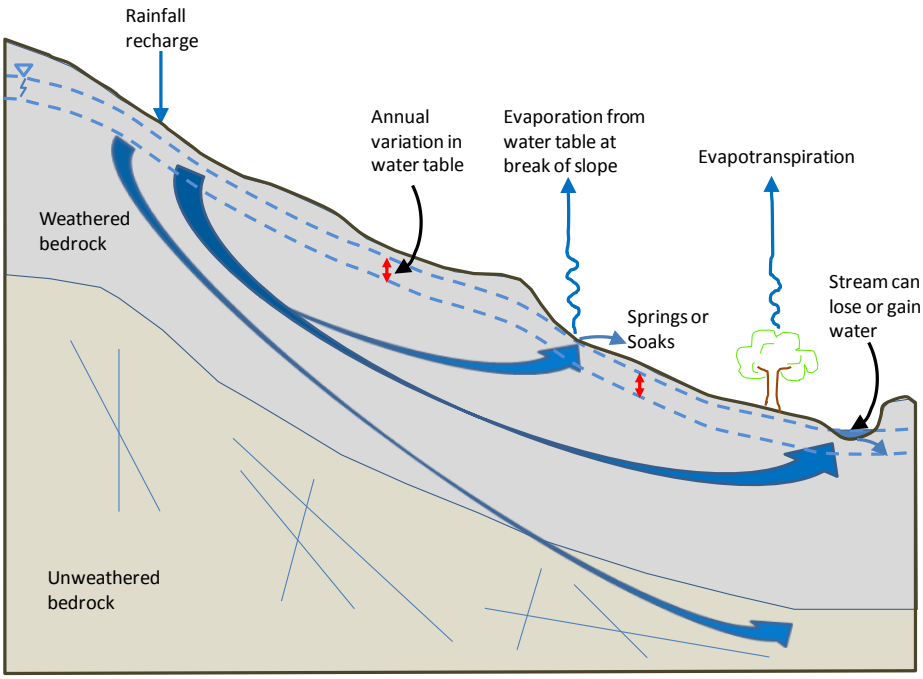

Figure 7 Groundwater flow through a bedrock aquifer

Groundwater flow in the alluvial aquifer is local and follows the gradient of the river valleys and discharges into waterways as illustrated in Figure

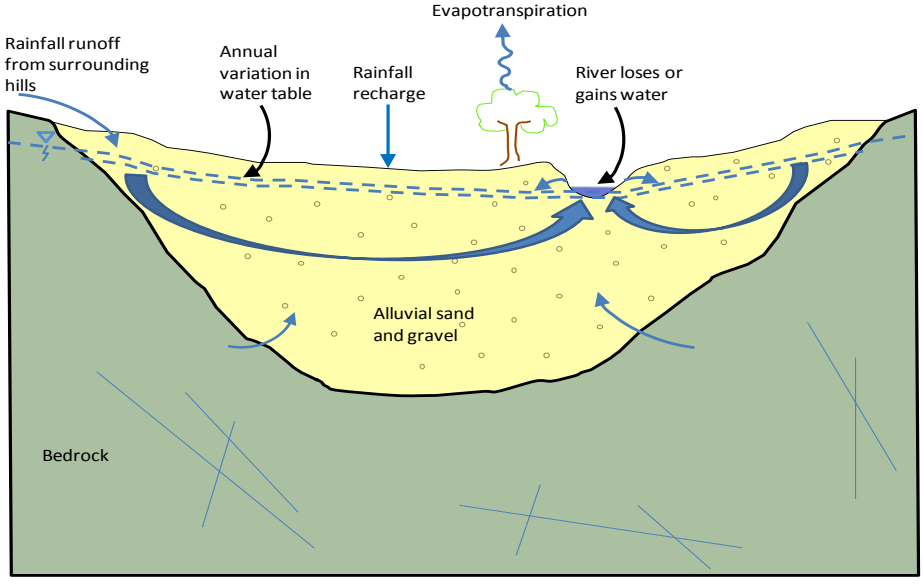

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Figure 8 Groundwater flow through an alluvial aquifer

2.4 Groundwater recharge

The majority of recharge to the bedrock aquifer in the Eildon GMA is from rainfall.

A significant proportion of rainfall runs over the ground directly into streams or is lost through evapotranspiration. The remaining water moves through the ground surface and reaches the local watertable. The highest proportion of recharge in the Eildon GMA occurs in the southern highlands which receives the most rainfall.

Recharge to the alluvial aquifer occurs predominantly through rainfall and runoff from the surrounding upland bedrock. However storage within the aquifer is limited due to the mostly fine-grained nature of the sediments. The alluvial aquifer also receives a small volume of water from the bedrock aquifer as throughflow.

Where the water level in a stream is higher than the surrounding groundwater level, some aquifer recharge is likely to occur as the stream loses water to the groundwater system. This is the dominant condition for the Fords Creek and the Delatite River, particularly evident during the millennium drought when groundwater levels declined.

2.5 Groundwater discharge

Groundwater in the fractured rock aquifer discharges to streams and springs in valley floors, or breaks of slope where the water table is close to the surface.

Groundwater discharge to waterways is greater in the highlands where short flow paths cause water to discharge quickly at local topographic lows.

In the low lying Mansfield Basin discharge from the fractured bedrock aquifer depends on local geology and flow paths. Local flow systems discharge to the alluvial aquifer where it overlies the bedrock or directly to the streams when no alluvial sediments are present.

Groundwater in the alluvial aquifer discharges into rivers and streams when the level of the watertable rises above the river level.

A small volume of groundwater is extracted by bores, estimated to be less than 1% of annual average recharge over the whole GMA (as described in Section 3.2).

2.6 Groundwater quality

Groundwater quality is relatively fresh across most of Eildon GMA, particularly in the highlands fractured rock aquifer where salinity is less than 1000 mg/L Total Dissolved Solids (TDS). Salinity increases in the fractured rock aquifer around Mansfield with samples ranging from 500 – 3500 mg/L TDS.

Groundwater salinity in the alluvial aquifer is generally good but can be variable, ranging from 1000 – 3500 mg/L TDS.

3 Groundwater dependent values and licensed use

3.1 Groundwater dependent values

After consulting with key stakeholders a number of environmental, economic and social values; that are dependent on groundwater, have been identified in the Eildon GMA (Table 1).

Table 1 Groundwater dependent values in the Eildon GMA

Environmental	Social	Economic
• Groundwater dependent ecosystems (riparian and terrestrial vegetation; aquatic pools; springs) • Waterways • Wetlands	• Stock and domestic groundwater use • Licensed groundwater use • Cultural and recreational values	• Economic development through use of water

Groundwater dependent values are discussed in greater detail below.

3.1.1 Groundwater dependent ecosystems

Groundwater dependent ecosystems are features that rely on groundwater to some degree for their survival.

In the Eildon GMA groundwater dependent ecosystems include:

- Ecosystems dependent on surface expression of groundwater (springs, wetlands, aquatic pools, baseflow); and
- Ecosystems dependent on subsurface expression of groundwater where roots tap into the groundwater system (e.g. riparian and terrestrial vegetation).

These features are considered to be important environmental and cultural features.

Information on the location and sensitivity to groundwater dependent ecosystems is currently limited in the Eildon GMA. Where present, these features may be susceptible to changes in climate and groundwater extraction, particularly where bores are located in close proximity to such features. Impacts on groundwater dependent ecosystems are considered by GMW when assessing groundwater licence applications.

General information on groundwater dependent ecosystems (GDEs) is available from the National GDE Atlas at www.bom.gov.au/water/groundwater/gde/ and GIS layers of Potential Groundwater Dependent Ecosystem Mapping for the Goulburn-Broken CMA are available through the Department of Environment, Land, Water and Planning.

3.1.2 Groundwater interaction with surface water

Groundwater discharge to surface water is variable in the Eildon GMA. Groundwater can make an important contribution to baseflow, particularly in the reaches of the upper Goulburn River.

Baseflow to rivers supports a wide range of fauna, including native fish, invertebrates and in-stream and riparian vegetation.

The value of the Eildon catchment is highlighted in the Goulburn-Broken Waterway Strategy (GBCMA, 2014). Streams in the Eildon GMA support a wide range of environmental social and economic values, and are of particular importance. Major streams in the GMA are shown in Figure 1.

The environmental values of waterways in the Eildon GMA are considered high due to the presence of a number of Environment Protection and Biodiversity Conservation Act 1999 listed fauna such as the Spotted Tree Frog in the Big, Howqua and Upper Goulburn Rivers. The upper Goulburn River catchment also provides habitat for Macquarie Perch and Barred Galaxias, while the Delatite River supports Murray Cod (Figure 9).

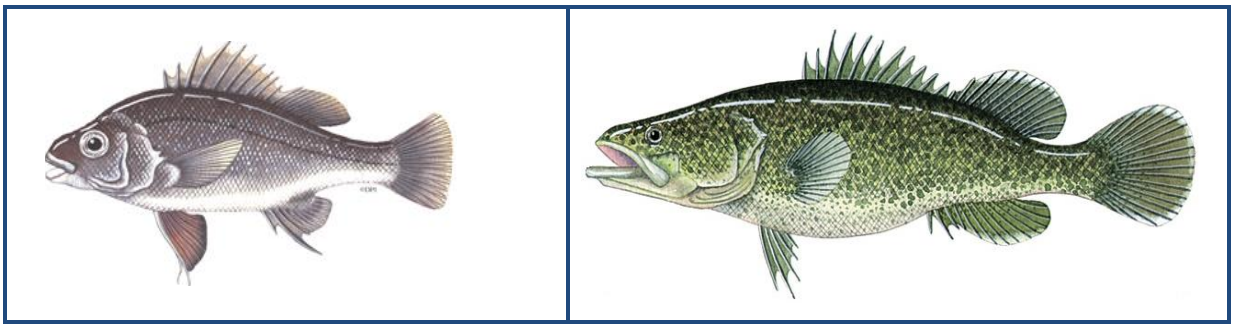

Figure 9 Macquarie Perch and Murray Cod[1]

The rivers and streams in the Eildon GMA also provide important social and cultural values, in particular the south and east highlands. These include values of the local indigenous community, the Taungurung clans. Activities such as fishing, swimming and camping are popular along most of the major rivers, with sections of the Big and Howqua rivers recognised as Heritage Rivers due to their value.

The waterways are used to provide vital water supplies for domestic and stock users, irrigators and other users through licensed diversions, supporting the local economy.

3.2 Licensed groundwater use

Groundwater has locally significant social and economic value in the Eildon GMA, particularly where groundwater resources have been developed for irrigation and commercial use.

There are currently 25 bores authorised to extract a total of 581.5 ML per year in the Eildon GMA.

Groundwater is licensed for irrigation, industrial, commercial and communal domestic and stock purposes. The distribution of licensed bores is shown in Figure 10, with most entitlement located around Mansfield.

A few licences hold a large proportion of entitlement in the upper Goulburn River catchment for industrial use, and in the Delatite catchment for agriculture.

Meters were installed between 2007 and 2009 on all licensed operational groundwater bores with an annual groundwater licence entitlement of 20 ML or more. Since 2009 all new bores have a meter installed. Currently not all bores in the Eildon GMA are metered as several bores are associated with small licence volumes (of less than 20 ML/year). Metered

[1] These images are © State of Victoria, Department of Primary Industries. Reproduced with permission. Creator of the Macquarie Perch image is Krystii Melaine

groundwater use data will continue to provide valuable information to support management decisions.

Groundwater use varies from season to season and is generally dependent on rainfall and availability of surface water. Annual metered use is generally less than 30% of the Eildon GMA's entitlement volume.

3.3 Domestic and stock use

Groundwater also holds significant social value as a resource for domestic and stock purposes, particularly in areas where there is no reticulated water supply available.

Domestic and stock use of groundwater is a statutory right under the Act and is not required to be licensed or metered. Landholders must apply to GMW for a works licence to construct a bore for domestic and stock purposes.

In the Eildon GMA there are approximately 270 domestic and stock bores with an estimated use of around 540 ML/yr. This is based on the number of bores recorded in the State groundwater database as constructed for solely domestic and stock purpose. A conservative estimate of 2 ML annual groundwater use is assumed for each stock and domestic bore.

Domestic and stock bores in the Eildon GMA are generally constructed in the fractured rock aquifer to a depth of less than 100 m below surface.

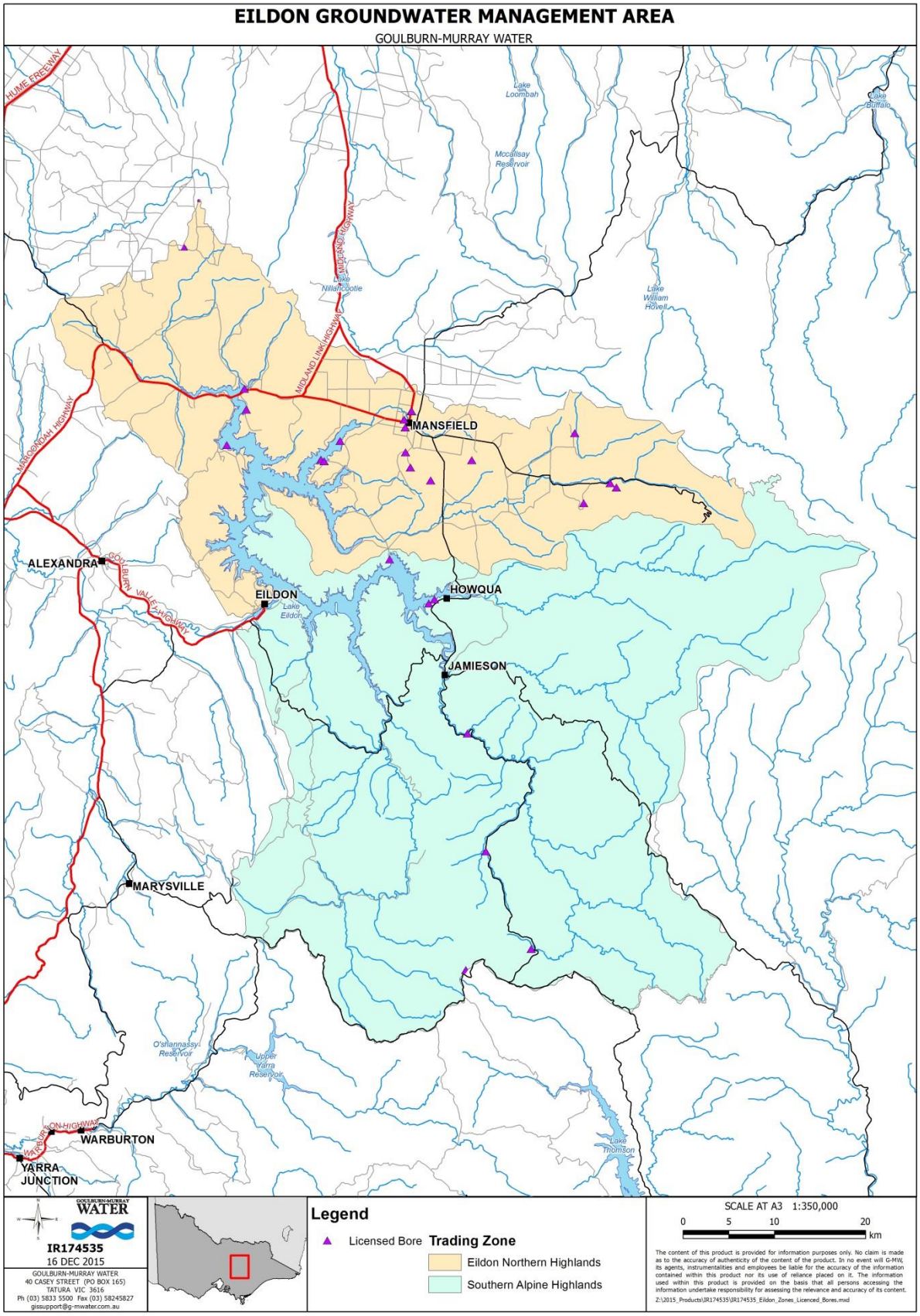

Figure 10 Licensed bores in the Eildon GMA

3.4 Groundwater pumping impacts

Groundwater pumping lowers the groundwater level around the bore being pumped. This decline in groundwater level is referred to as a drawdown cone (Figure 11). The size and shape of the drawdown cone depends primarily on the nature of the aquifer as well as the pumping rate and duration. Drawdown decreases with distance from the bore, and the cone expands in size whilst pumping continues. Drawdown decreases with distance from the bore, and the cone expands in size whilst pumping continues until steady-state conditions are reached (no further expansion of the drawdown).

Groundwater level interference can occur when the drawdown cone intersects a neighbouring bore or environmental feature such as a stream or a spring. The impacts from groundwater pumping are site specific as the pumping requirements are likely to be different and aquifer hydraulic characteristics can vary. The potential for interference is considered by GMW when assessing licence applications.

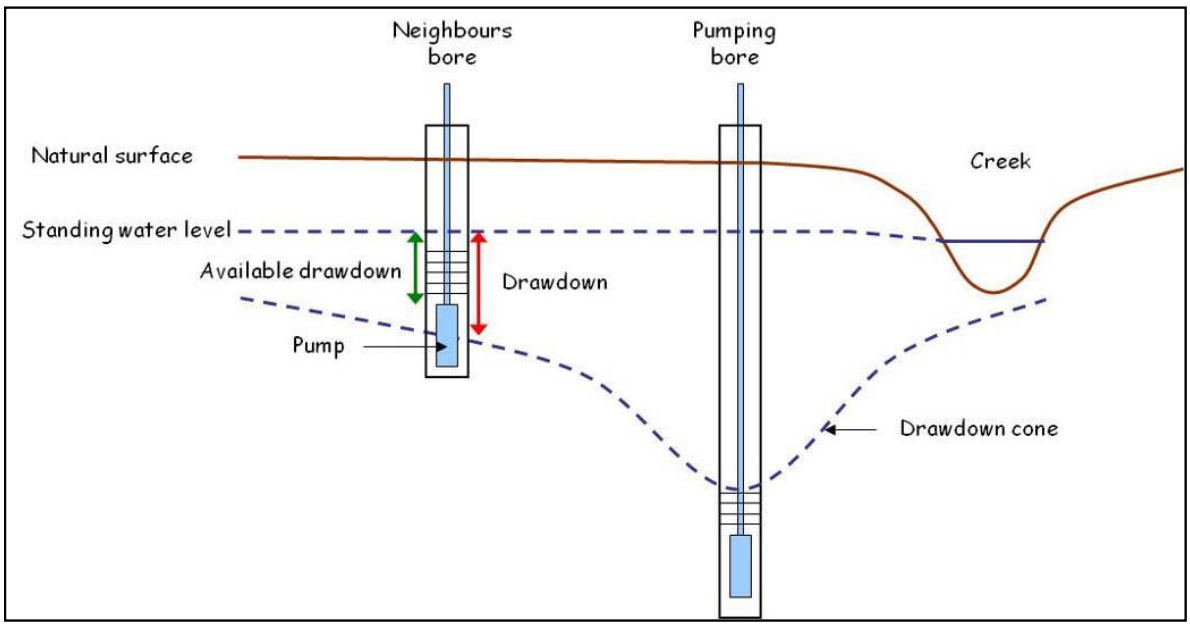

Figure 11 Drawdown cone caused by groundwater pumping

When bores located in close proximity are extracting from the same aquifer it can result in intersecting drawdown cones. Unacceptable drawdown levels can be a consequence of the cumulative impacts of a number of pumps operating in a local area (intensive groundwater pumping) (Figure 12).

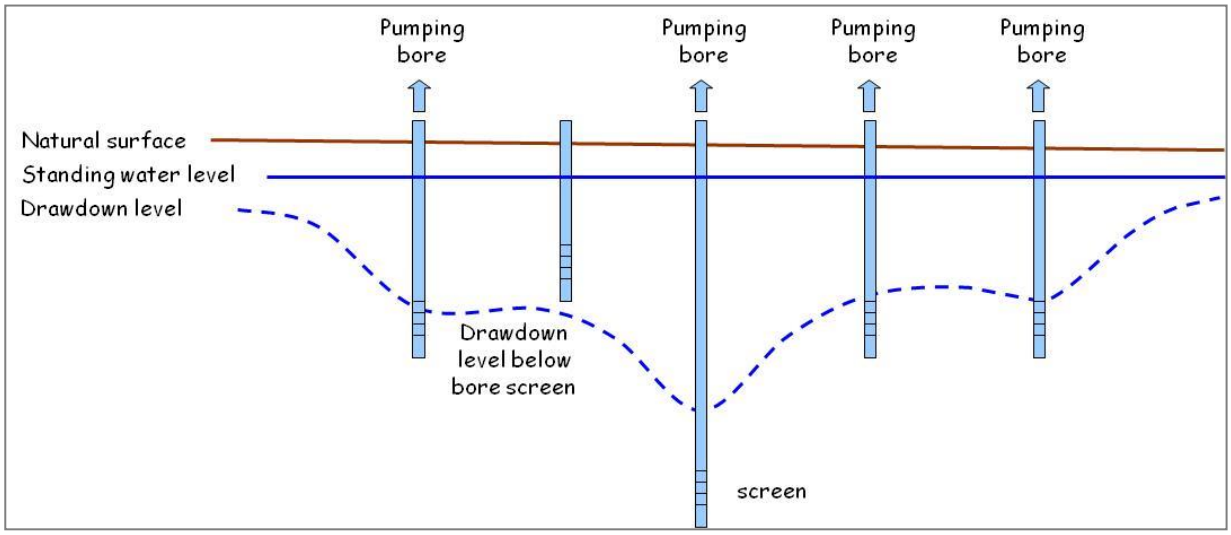

Figure 12 Interference caused by cumulative impacts of groundwater pumping

Where groundwater is extracted beyond sustainable limits at local or regional scales groundwater dependent values can be impacted. For example groundwater pumping may reduce the amount of groundwater that discharges into streams (baseflow), which can impact dry weather stream flow. It should be noted that there is generally a time lag between when groundwater is pumped and when the impacts on stream flow may occur.

4 Groundwater Management

4.1 Groundwater licensing

Bore construction and groundwater extraction are managed by GMW in accordance with the licensing provisions defined in the Act and associated Ministerial policies.

A works licence must be obtained from GMW to drill and construct a bore. Groundwater bores must be drilled by a licensed driller. The Australian Drilling Industry Association (www.adia.com.au) provides contact details of its members.

A take and use licence must be obtained from GMW to extract groundwater for irrigation, commercial, dewatering and urban use.

A range of matters will be considered by GMW when assessing both works and take and use licences, including the potential for unacceptable impacts to existing authorised users, stream flow and the environment.

If groundwater is used exclusively for domestic and stock purposes, a take and use licence is not required.

More information on groundwater licensing, including fees and charges, is available on GMW's website www.g-mwater.com.au.

4.2 Groundwater Management Zones

Eildon GMA includes two catchment based management zones. These are described in Table 2 and illustrated in Figure 10.

Table 2 Groundwater Management Zones

Zone	Description
Eildon Northern Highlands	Comprises the Delatite River, Fords Creek and Brankeet Creek catchments. The dominant geology is the Mansfield basin bedrock overlain by the Quaternary aquifers associated with the Delatite River. Major granite intrusions outcrop in the highlands to the east.
Alpine Southern Highlands	Comprises the Big, Upper Goulburn, Jamieson and Howqua River catchments. State forest covers most of the highlands, with steeply dipping and faulted bedrock forming the upland geology.

The groundwater management zones are based on the understanding of the hydrogeology and hydrology of the catchments in the Eildon GMA, particularly noting that groundwater flow and the impacts of groundwater pumping being largely contained within each surface water catchment. This enables the impact of groundwater extraction and the impact from other diversions to be examined (and for groundwater to be managed) consistent with local catchment values.

The number of licensed bores and volume of entitlement in each management zone in the Eildon GMA at time of Plan development is provided in Table 3.

Table 3 Groundwater licence entitlement by zone

Management Zone	Number of Licensed Bores	Current Licence Volume (ML/yr)*
Eildon Northern Highlands	20	399.5
Alpine Southern Highlands	5	182.0
Total	**25**	**581.5**

4.3 Groundwater entitlement availability

An assessment of the potential impacts of groundwater development on social, environmental and economic groundwater dependent values in the Eildon GMA has been undertaken to inform limits on groundwater use.

A new approach was utilised to define acceptable limits on groundwater entitlement set in the Eildon Plan (GMW, 2013). The approach focusses on assessing the impact of a range of groundwater and surface water diversion scenarios on stream flows during periods of low flow.

A range of diversions can reduce stream flow, including extraction from licensed bores, domestic and stock bores, direct extraction from streams, and water harvested from farm dams. In developing this Plan consideration has been given to the potential impact of existing levels of diversions on stream flow, particularly during periods of low flow when catchment values are most at risk. Existing groundwater impacts and future groundwater extraction scenarios have been assessed against these baseline low flow conditions (GMW, 2015b).

The assessment indicated that the potential impacts from groundwater extraction are low, as streams in the Eildon GMA continue to flow even during dry periods. Nevertheless a conservative approach has been taken in this Plan which recognises the potential for impact. Groundwater pumping impacts on stream flow are assumed to occur on a 1:1 ratio, and impacts are assumed to be spread evenly across the year. As more information becomes available and our knowledge of the groundwater systems improves this approach can be updated if necessary.

In order to protect existing authorised groundwater users, allow development of groundwater to sustainable levels, while at the same time considering uncertainties associated with the understanding of groundwater resources, groundwater licence entitlement for the GMA will be capped through the declaration of the Permissible Consumptive Volume (PCV). GMW will make an application to the Minister for Water to declare a PCV of 1,496 ML/year for the Eildon GMA (Rule 1).

The PCV does not include domestic and stock use and GMW may seek to amend the PCV to overcome any administrative oversight, error or other anomaly which occurred prior to the approval of this Plan.

Rule 1 Cap on groundwater entitlement

Goulburn-Murray Water may issue a groundwater licence provided that in doing so it does not exceed the Permissible Consumptive Volume established for Eildon Groundwater Management Area

Groundwater entitlement limits have been set for each management zone based on a consideration of local catchment values (Rule 2). The sum of these management zone limits is equivalent to the proposed PCV.

It is recognised that the management zone limits used in the Plan may be seen as conservative and this may be viewed as a barrier to further groundwater development (and the economic values that this may support). However in the last 10 years there has been very little demand for new groundwater entitlement in the Eildon GMA, and historic use is less than 30% of groundwater entitlement. In the areas where new licensed bores are most likely to be developed (Mansfield basin from Brankeet creek to the lower Delatite), new development can occur through transfer of groundwater entitlement.

Rule 2 Management Zone limits

Goulburn-Murray Water may issue a new groundwater licence under section 51 of the Act provided that the following management zone limits are not exceeded:

Management Zone	Management zone limit (ML/yr)
Eildon Northern Highlands	436
Alpine Southern Highlands	1,060
Total	**1,496**

4.4 Transferring groundwater licence entitlement

Transferring groundwater licence entitlement can support new business opportunities, or enable existing businesses to grow. Establishing licence transfer rules can:

- Enable access to groundwater in zones where groundwater licence entitlement is capped;
- Increase flexibility for licensed groundwater users to manage production in response to changes in seasonal or climatic conditions; and
- Allow groundwater licence holders to better realise the value of their licence.

Rule 3 relates to groundwater licence transfers in the Eildon GMA.

Entitlement may be transferred temporarily within zones or between zones for a period of up to five years. This recognises present low use and provides greater opportunity for groundwater trading.

Licence entitlement may be permanently transferred within or between zones provided that zone caps are not exceeded. Entitlement within each zone is capped to avoid large volumes being transferred into any one zone which could result in unacceptable impacts. The caps currently provide for further development of groundwater resources in both management zones.

Permanent or temporary transfer may occur into or out of Eildon GMA provided that the PCV is not exceeded.

Licence holders should apply well in advance of requiring the water as it can take a number of weeks to process an application. The trade must be approved in writing by GMW before the water may be taken. Penalties apply for unauthorised take and use.

When assessing temporary and permanent transfer of groundwater entitlement GMW must consider a range of relevant matters identified in the Act. These matters include the need to consider potential impacts on local environmental values and nearby groundwater users.

Rule 3 Transfer of groundwater entitlement

Goulburn-Murray Water may approve a transfer of groundwater entitlement under section 62 of the Act provided that relevant matters under the Act have been considered and that the following conditions are satisfied:

a) Entitlement may be transferred on a temporary or permanent basis within or between management zones provided that:

   i. For a permanent transfer the management zone limits outlined in Rule 2 are not exceeded

   ii. The buyer has a bore with a metered diversion point

   iii. The seller's licensed bore/s is/are either metered or not equipped for use.

4.5 Carryover

Carryover is the ability for licence holders to bank some of their unused allocation from one year and use it in the following year.

Carryover can be introduced to areas where there is a good understanding of the hydrogeology, there is a desire for it amongst groundwater users and all licensed bores are metered.

In the Eildon GMA not all licensed bores are currently metered, groundwater use is low and the response of aquifers to pumping is not well enough understood. It is therefore not proposed to introduce carryover at this stage.

5 Monitoring program

Monitoring, evaluation and reporting are vital to enabling adaptive and improved resource management to occur. The results of groundwater and surface water monitoring and evaluation activities directly shape future management actions and planning.

5.1 Groundwater levels

Groundwater levels are currently observed through a network of 20 bores monitored by the State Government (Agriculture Division of the DEDJTR). The data collected from these bores provides information on groundwater level variation within both the bedrock and alluvial aquifers within the Mansfield Basin.

The Department of Environment, Land, Water and Planning (DELWP) manages the State Observation Bore Network (SOBN) which monitors groundwater levels and quality throughout the State. There are no State observation bores in the Eildon GMA, however considering groundwater entitlement is small, use low, and salinity is not a major concern, groundwater monitoring in the area has not been a high priority.

There is no evidence, from available data, that groundwater extraction is causing any significant reduction in groundwater levels, or causing unacceptable impacts on water resources in the GMA. A recommendation, supported by GMW, was made by GHD (2011), for the installation of a nested observation bore site in the area of the thickest alluvium and greatest groundwater use west of Mansfield near the racecourse. This nested site would be situated near an active surface water monitoring station (Site No. 405245 Fords Creek at Mansfield) which would allow evaluation of surface water/groundwater interaction.

5.2 Surface Water Flows

Data from a number of surface water flow gauges were used in determining acceptable groundwater entitlement limits in the Plan. These gauges, shown in Figure 6, are used by different stakeholders including the Bureau of Meteorology, Goulburn-Valley Water and GMW to support a range of surface water management objectives.

From a groundwater resource management perspective this data also enables estimates of groundwater discharge to be made and it provides information on the risk posed to a range of environmental, social and economic values from new groundwater licences and from groundwater licence transfers.

Surface water gauging data is available online from DELWP (currently via the Water Measurement Information System). GMW will continue to use this data to estimate groundwater discharge and to assess the status of groundwater and surface water resources across the area. This data will be used to assist in any future reviews of the Plan.

5.3 Groundwater use

Recording groundwater use is an important part of resource management. Under average and wet conditions groundwater use is a small component of the total water balance of Eildon GMA and it is only slightly more significant during extended dry periods.

Recording groundwater use will help to better understand the relationship between groundwater use and climate and gain a clearer indication of the volumes of groundwater pumped in dry periods. This will help GMW to assess the potential risk of pumping on surface water resources in future plan reviews.

All existing licensed and operational bores, with a licence volume equal to or greater than 20 ML are fitted with a flow meter. For any operational bore with licence volume less than 20 ML, use is estimated and recorded within the Victorian Water Register.

Meters will be read at least once annually and non-metered operational licences will be deemed. The information will be stored in the Victorian Water Register database to assist with reporting on use and compliance as well as assisting in improving groundwater knowledge and management over time.

Rule 4 Record meter readings

Goulburn-Murray Water will read flow meters on licensed bores at least once annually and record use in the Victorian Water Register and consider data collected as part of a review of the Plan.

6 Implementation

6.1 Annual newsletter

GMW will prepare an annual newsletter for the Plan. This newsletter will summarise groundwater entitlement, use, and transfers in each management zone, and the overall resource position based on available monitoring data. The newsletter will help GMW to keep customers and stakeholders informed. The newsletter will be made available on the GMW website www.g-mwater.com.au

Rule 5 Annual newsletter

By 1 October each year GMW will post on its website a newsletter reporting on groundwater resource status, licensed groundwater use and trade activity for the previous season. The newsletter will also identify the need for any changes to the Plan.

6.2 Review of the Plan

Over time this Plan will need to be adapted in response to policy changes in groundwater resource management, as our understanding of the aquifer system increases and as management improvements are identified.

At the time of the development of this Plan, implementation of the Basin Plan had commenced. This Plan may need to be reviewed to ensure it is kept up to date and reflects the requirements of the Basin Plan.

Each year during the preparation of the annual newsletter GMW will consider the need to make amendments to the Plan.

Any significant changes to the Plan must be based on sound technical understanding of the issues and will require consultation.

Rule 6 Review of the Plan

Goulburn-Murray Water will consider the need for any amendments to the Plan on a yearly basis in conjunction with the release of the annual newsletter.

If amendments are proposed that directly impact rights of access to water, Goulburn-Murray Water will consult groundwater users in the Eildon GMA.

7 References

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