



**Groundwater Management Plan**  
**Koo Wee Rup Water Supply Protection Area**



## Approval

I, Tim Holding, Minister for Water, under section 32A(6)(a) of the Water Act 1989 approve the Groundwater Management Plan set out herein.



**Tim Holding, MP**

Minister for Water

Date: 4/08/2010

## Preface

Throughout Victoria, regional Sustainable Water Strategies consider actions to balance water supply and water demand and ensure sharing of water resources between consumptive users and the environment. The Koo Wee Rup Groundwater Management Plan is an action to better manage the groundwater resources of the Protection Area. It is an adaptive tool that integrates, over time, the recommendations of the Central Region Sustainable Water Strategy to manage the Protection Area's groundwater supply, demand and environmental health.

A consultative committee, as listed below, has had input into the development of this Plan via extensive discussions and considerations of technical work. The committee recognises that its guidelines are set by the Minister, specifically on the management issues to be considered.

The Koo Wee Rup Groundwater Management Plan consultative committee members:

<b>Mr Ron Chatfield (Chair)</b>	<b>Landholder</b>
<b>Mr Tom Schreurs</b>	<b>Landholder</b>
<b>Mr Andrew (Bill) Giles</b>	<b>Landholder</b>
<b>Mr Peter Marson</b>	<b>Landholder</b>
<b>Cr Stuart Halligan</b>	<b>Cardinia Shire Council</b>
<b>Mr Jon Theobald</b>	<b>South East Water Ltd</b>
<b>Ms Elissa McNamara</b>	<b>Southern Rural Water</b>

These members were appointed by the Minister for Water under section 29 of the Water Act 1989. These appointments were made in consultation with Southern Rural Water, the Department of Sustainability & Environment and the Victorian Farmers' Federation.

The Koo Wee Rup Groundwater Management Plan ex officio observer:

<b>Mr Chris McAuley</b>	<b>Department of Sustainability and Environment</b>
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The contributions of the previous Consultative Committee are also acknowledged:

<b>Mr Ron Chatfield (Chairperson)</b>	<b>Landowner/Licence holder</b>
<b>Mr Bill Giles</b>	<b>Landowner/Licence holder</b>
<b>Mr Tom Schreurs</b>	<b>Landowner/Licence holder</b>
<b>Mr Geoff Corrigan</b>	<b>Landowner/Licence holder</b>
<b>Mr Peter Marson</b>	<b>Landowner/Licence holder</b>
<b>Mr Ian McFarlane</b>	<b>Landowner/Licence holder</b>
<b>Mr Kevin Hope</b>	<b>Landowner/Licence holder</b>
<b>Ms Lorraine Campbell</b>	<b>Landowner/Licence holder</b>
<b>Mr Michael Stamos/Mr David Norman</b>	<b>South East Water</b>
<b>Mr Romando Grande</b>	<b>Australian Drilling Industry Association</b>
<b>Mr Deric Liddelow</b>	<b>Southern Rural Water</b>
<b>Cr Graham Osborn/Cr Doug Hamilton</b>	<b>Cardinia Shire Council</b>
<b>Mr Peter Rankin</b>	<b>Melbourne Water</b>
<b>Mr Martin Hartigan</b>	<b>Port Phillip &amp; Westernport Catchment Management Authority</b>

# Glossary

Term/Acronym	Description
<b>Act</b>	<b>Water Act 1989</b>
<b>AHD</b>	<b>Australian Height Datum or mean sea level.</b>
<b>Aquifer</b>	<b>Geological structure or formation permeated or capable of being permeated permanently or intermittently with water</b>
<b>Corporation</b>	<b>Southern Rural Water Corporation</b>
<b>BCL</b>	<b>Bore Construction Licence is issued under section 67 of the Act and is required for construction or alteration of a bore</b>
<b>Department</b>	<b>The Department of Sustainability and Environment</b>
<b>Groundwater Licence</b>	<b>Licence issued under section 51 of the Act to allow the take and use of groundwater</b>
<b>GMS</b>	<b>Groundwater Management System is a database of groundwater information managed by the Corporation and the Department</b>
<b>GDE</b>	<b>Groundwater Dependant Ecosystem</b>
<b>Protection Area</b>	<b>The Koo Wee Rup Water Supply Protection Area</b>
<b>WSPA</b>	<b>Water Supply Protection Area</b>
<b>PCV</b>	<b>Permissible Consumptive Volume</b>
<b>ML</b>	<b>Megalitre (One million litres)</b>
<b>Entitlement</b>	<b>The total amount of groundwater authorised to be taken each year under a groundwater licence</b>
<b>Management Plan</b>	<b>The Koo Wee Rup WSPA Groundwater Management Plan</b>
<b>KWR</b>	<b>Koo Wee Rup</b>

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# Introduction

This management plan has been prepared under Division 3 of Part 3 of the Water Act 1989 for the Koo Wee Rup Water Supply Protection Area and relates to the groundwater resources of the protection area. The Koo Wee Rup WSPA was declared by the Minister in January 2002.

The KWR WSPA covers part of the Westernport Basin and extends from Berwick to Drouin along the Princes Highway in the north, down to Tooradin and Granville in the south (see Figure 1). Below is a brief history of the Protection Area:

- The area was developed for agriculture by draining the existing swampland from the 1890s;
- The first groundwater bore was sunk to obtain water for irrigation in 1922. At that time, groundwater pressure in the aquifer was high and groundwater was artesian (free-flowing);
- Rapid development of groundwater occurred throughout the 1950s and 1960s, resulting in significant loss of groundwater pressure (ie bores were no longer free-flowing);
- In the drought of 1967-68, groundwater levels fell below pump levels in some bores;
- The Victorian Groundwater Act was introduced in 1969 and the State Rivers and Water Supply Commission took control of groundwater extraction;
- KWR Groundwater Conservation Area (GCA) was declared in 1971 after investigations revealed the large concentration of bores and groundwater extraction;
- From 1971 to 1985 licence entitlements and fees were based on intended use;
- Licensed bores were metered in 1973;
- By June 1981 allocation of groundwater was nearly 22,000 ML/yr and usage 11,500 ML/yr;
- First estimate of recharge to the Westernport Basin was 11,000 ML/yr in 1984;
- Concerns about seawater intrusion due to over-extraction led to reductions in license volumes of up to 40%;
- The 1985 allocation reductions led to a major shift in land use away from high water use crops;
- Monitoring since 1985 has not shown evidence of saline water intrusion to the aquifer;
- KWR GCA and Lang Lang Groundwater Management Area (GMA) were amalgamated as the KWR GMA as the result of a study of their hydraulic connection (SKM, March 2000);
- An estimate of the aquifer's "sustainable yield" of 14,920 ML/year, known as the Permissible Annual Volume (PAV), was established for the area in 2002 (SKM, March 2002) but it was acknowledged that there was very low confidence in this estimate;
- The KWR GMA was declared a WSPA in January 2002 by the Minister, a Consultative Committee was appointed and a Management Plan was drafted in 2003 and submitted to the Department for technical review. However, the management plan process was put on hold by the Department in 2005 and no public consultation was conducted;
- A total Permissible Consumptive Volume (PCV) of 12,915ML/year was declared for the WSPA in December 2006; and
- The Minister re-appointed the Consultative Committee in 2009 to complete the Management Plan.

In general, groundwater levels within the Protection Area have risen and stabilised over the last 40 years; however, observation bores in some areas have indicated a recent downward trend.

Metered groundwater usage is presently well below total groundwater licence entitlements. Under this management plan, no restrictions are placed on current licence holders' ability to access their full entitlement. However, if the Corporation deems it necessary, it may restrict extraction in the future to ensure the sustainability of the resource.

No new licences will be issued, with the exception of those specified within the prescriptions of this Plan. To ensure current licence holders have the flexibility to adjust operations to changing circumstances and encourage new enterprises, both temporary and permanent trading will be allowed.

The ongoing metering program provides information on the location and volume of groundwater used in the area, and in conjunction with the continued monitoring program will inform future management decisions.

An annual report will be produced by 30 September each year on the implementation of the management plan. This report will be submitted to the Minister and made publicly available so that the community will be aware of how the groundwater resource in the area is being managed. The report will alert groundwater users and the wider community to any emerging issues.

## 1 Objective of the Management Plan

The objective of the management plan, as set out in the Water Act 1989, is to make sure that the water resources of the area are managed in an equitable manner so as to ensure the long-term sustainability of those resources.

“Long term sustainability” is the continued availability and security of supply of suitable quality water for all consumptive users (domestic, stock, irrigation, dairy and urban supply), and for the needs of the environment.

## 2 Environmental Objective

An objective of the Water Act 1989 is to preserve the environmental values and health of water ecosystems, including their biodiversity, ecosystem functioning, quality of water and other uses that depend on environmental condition.

In this management plan the objective will be achieved by:

- Prohibiting the issue of new groundwater licences that would result in the current level of groundwater allocations increasing;
- Protecting groundwater discharges to Westernport Bay by ensuring that groundwater allocations remain stable or decrease in coastal zones;
- Establishing a program that monitors water levels in bores adjacent to surface water bodies to assess the level of interaction (if any); and
- Monitoring the salinity of groundwater across the protection area to identify potential degradation of the groundwater resource by intrusion of saline water from the ocean or saltier parts of the Westernport Basin.

In addition to the rules within this management plan, the Act requires the Corporation to consider the maintenance of the environmental objective when determining an extraction licence renewal or transfer. However, any changes to groundwater allocation across the WSPA would require amendments to this Groundwater Management Plan through a consultative committee process.

## 3 Physical Characteristics of the Protection Area

### 3.1 Geology

Information included in this section is adapted from Sinclair Knight Merz, March 2000 and Sinclair Knight Merz, June 2002. Further geological and hydrogeological information is shown in the 1:100,000 scale Western Port Hydrogeological Map (DME, 1980) and described in Geological Survey of Victoria, report # 75/1, Hydrogeology of Western Port (J.J. Carillo-Rivera, 1975).

The Koo Wee Rup WSPA covers part of the Tertiary-age Western Port Basin, which is a structurally controlled sedimentary basin. The main features controlling the basin structure are the Tyabb Fault, which lies on the eastern side of the Mornington Peninsula, and the Heath Hill Fault further to the west (see Figure 1). In geological terms, a fault is an underground line along which movement of the earth has occurred, causing the soil and rocks on either side of it to have moved up, down or sideways relative to each other. The trough between the two faults was filled with 70m to over 250m of sediments and volcanic flows.

The western side of the Western Port basin coincides with the Clyde Monocline-Tyabb Fault system, and to the north the basin wedges out against uplifted basement rocks.

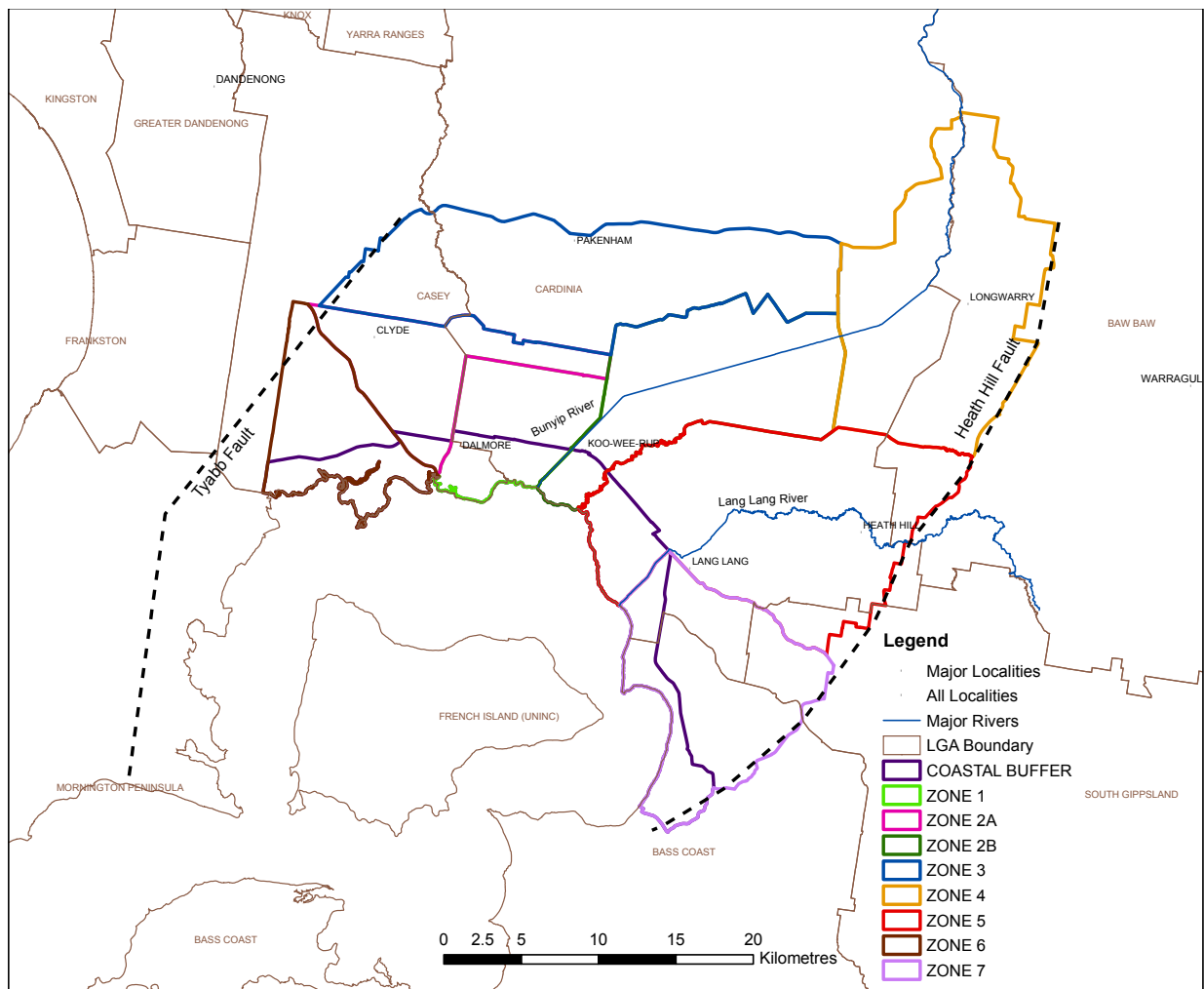
The Tertiary sequence within the Basin consists of a base unit, the Childers Formation, which is overlain successively by the Older



Volcanics and the Westernport Group, consisting of the Yallock, Sherwood and Baxter Formations. The entire sequence is in excess of 250m thick in some areas. Overlying the Tertiary deposits are undifferentiated Quaternary sediments consisting of clay, shoe-string sands and dune sands. Up to 2m of peat occurs in the former swamp areas around Koo Wee Rup. The Quaternary sediments are up to 75m thick to the west of Lang Lang.

The geological summary table presented below is taken from Geology of Victoria, Geological Society of Australia (Victoria Division), Special Publication No. 23, WD Birch (Ed.), 2003.

**Figure 1 – Location of WSPA boundaries and features**



**Table 1 – Geological Summary of the Westernport Basin**

Geological unit	Main occurrence	Depth to aquifer	Thickness	Rock types	Aquifer type and form	Salinity (mg/L TDS)	Yield (L/s)	Groundwater uses
Dune deposits	Small occurrences in the Cranbourne and Lang Lang areas	Outcropping	Thin, mostly less than 6m	Sand, medium to coarse quartz	Unconfined sand aquifer, sheet-like form	Less than 1,000	Up to 2.5	Stock & domestic supply
Alluvial deposits	Longwarry to Dalmore	Outcropping	Less than 7m	Clay, sand and gravel	Unconfined porous media aquifer of shoe-string form interbedded in clay	Highly variable 500 to 5,000	Up to 10	Stock & domestic supply
Western Port Group (Baxter, Sherwood & Yallock formations)	Throughout Basin	Outcropping to subcropping over most of the eastern part of the basin; covered by up to 75m clay in western portion	20 to 175m	Sand, gravel, limestone, clay, silt & lignite	Combined aquifer system of sheet-like form; generally confined except on edges of Basin	300 to 3,000	10 to 40	Mainly used for irrigation particularly in the Dalmore-Cora Lynn area; elsewhere used for stock & domestic; supplies more than 80% of groundwater extracted from basin.
Older Volcanics	Throughout Basin	Outcrops in Cranbourne area and along Heath Hill Fault, covered by up to 250m in central part of basin	10 to 75m	Basalt, basaltic clay	Fractured basalt aquifer confined by basaltic clay and overlying sediments	Less than 2,000 in western portion of basin; 1,000 to 2,000 in eastern portion	2 to 25	Irrigation of market gardens in the Cranbourne-Clyde area and stock supplies in area northwest of Cora Lynn
Childers Formation	Main occurrence is in Yallock-Yannathan-Lang Lang area	50 to 250m (underlies Older Volcanics)	5 to 50m	Sand and gravel with lignite beds	Confined aquifer	500 to 2,000	2.5 to 25	Generally not utilised except to provide water for the Lang Lang town supply

### 3.2 Hydrogeology

The WSPA comprises the groundwater resource, mainly in the Westernport sequence (Baxter, Sherwood and Yallock formations). The Westernport sequence is generally considered as a single aquifer system, as there is a hydraulic connection between each individual formation. Taking this into consideration, there has been no vertical limits placed on the depth of the WSPA. However, basaltic clay of the Older Volcanics is considered to form a semi-confining to confining layer between the Westernport sequence and the underlying Older Volcanics/Childers formations.

The hydraulic conductivity of the aquifer system is highly variable and individual bore yields are extremely variable as a result.

### 3.3 Flow and Quality

The natural groundwater flow direction in the Westernport basin is radial, from the basin edges towards Westernport Bay (i.e. generally southward). However, seasonal cones of depression develop each year in the central area of the WSPA and affect groundwater flow patterns.

The salinity of the aquifer system has been recorded at generally less than 2,000mg/L TDS, and, in the southern half of the WSPA is less than 1,000 mg/L TDS. The groundwater resource is extensively used for irrigation purposes as well as domestic and stock purposes (refer Section 7).

### 3.4 Recharge and Discharge

The Westernport aquifer system is considered to be confined to semi-confined. Groundwater recharge occurs vertically to the Tertiary aquifers through the overlying Quaternary sediments, as well as through areas where the Tertiary sediments outcrop along the edges of the Basin. Discharge is generally into Westernport Bay.

### 3.5 Groundwater/Surface Water Interaction

There is little evidence of surface water/groundwater interaction; which is to be expected given that the area has been progressively drained over the last 120 years. However, it is possible that there is some hydraulic connection between the shallow Quaternary sediments and the lower reaches of the Lang Lang and Bunyip Rivers.

### 3.6 Groundwater Use and Local Industry

Water use in the Koo Wee Rup WSPA is primarily for irrigation of potato and other vegetable crops. Domestic and stock (D&S) usage is also believed to be significant, based on the current registration of 2,500 to 3,000 bores for this use (see Section 7 for additional detail). Licensed groundwater extraction bores in and adjacent to the WSPA are shown on Figure 3.

### 3.7 Rainfall

Long-term rainfall data from Koo Wee Rup indicates that the average annual rainfall between 1927 and 1999 was over 860 mm/year. However, the average rainfall since 1997 is less than 700 mm/year. Figure 2 illustrates the relationship between rainfall and groundwater level in observation bore 71183.

### 3.8 Potential Acid Sulphate Soils

Potential acid sulphate soils (PASS) underlie large areas of Australia's coastline, riverine, lakeside and other inland environments. These soils were formed long ago, underwater, when the ocean and/or lake levels were much higher. As the water levels receded, these soils remained and today can be found under low-lying areas like coastal plains, wetlands and mangroves. In an undisturbed and waterlogged state these soils are relatively harmless, but when disturbed and exposed to oxygen through drainage or excavation, these soils may produce sulphuric acid in volumes sufficient to degrade waterways, vegetation and infrastructure. After rain and particularly following prolonged dry periods, the built up sulphuric acid in these soils may be released. As the acid moves through the soil profile it may mobilise concentrations of metals in the soil. This combined acid and dissolved metal mix may eventually flow into surrounding waterways. "Slugs" of concentrated acid runoff can flow into estuaries impacting water quality and the ecosystems that are within them.

CSIRO completed mapping of coastal PASS around Australia in 2006-07. PASS were identified in the shallow waters and coastal land all the way around Westernport Bay; however, no field sampling has yet been undertaken in the area to verify whether or not these conditions actually exist.

As the PASS are expected to exist primarily in the shallow aquifer and groundwater extraction is predominantly from the deeper confined aquifer, acid impacts would be more likely in any areas around the coastline where the shallow aquifer is well connected to the deeper aquifer. SRW is not aware of any areas of strong hydraulic connection between the shallow and deep aquifers around the coast (although further investigation of the lower Bunyip and Lang Lang Rivers is proposed), or incidents of acid impacts within or around the WSPA. As the waterway and catchment managers, Melbourne Water and/or Port Phillip Catchment Management Authority (PPWCMA) were consulted but were not aware of any acid impacts within the WSPA.

Figure 2 - Rainfall and groundwater level in bore 71183

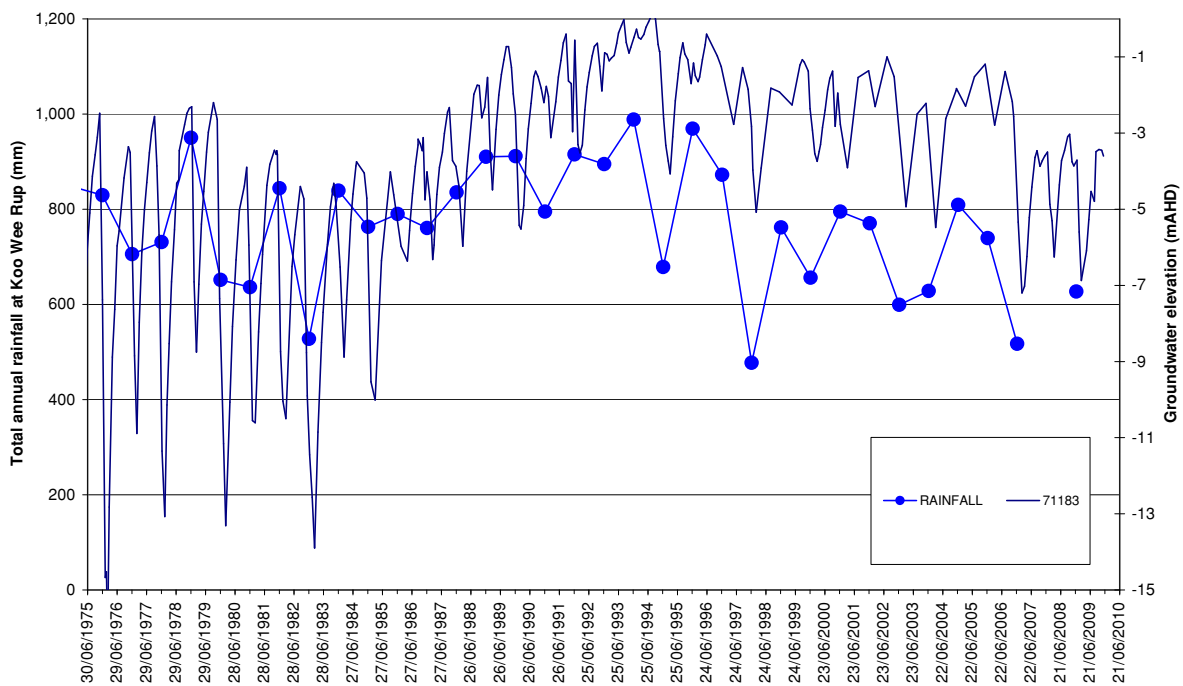
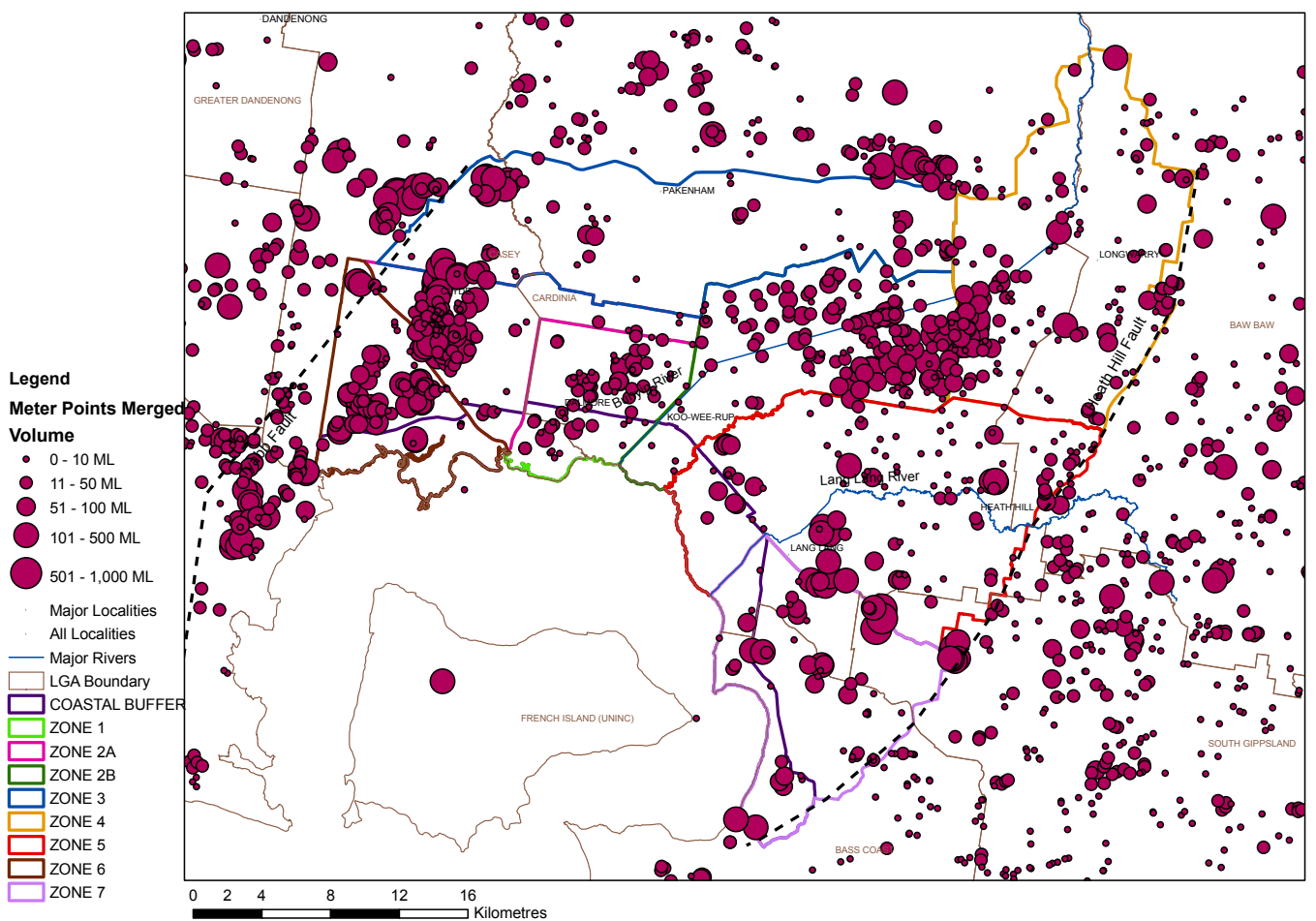


Figure 3 – Groundwater allocation across and adjacent to KWR WSPA by volume

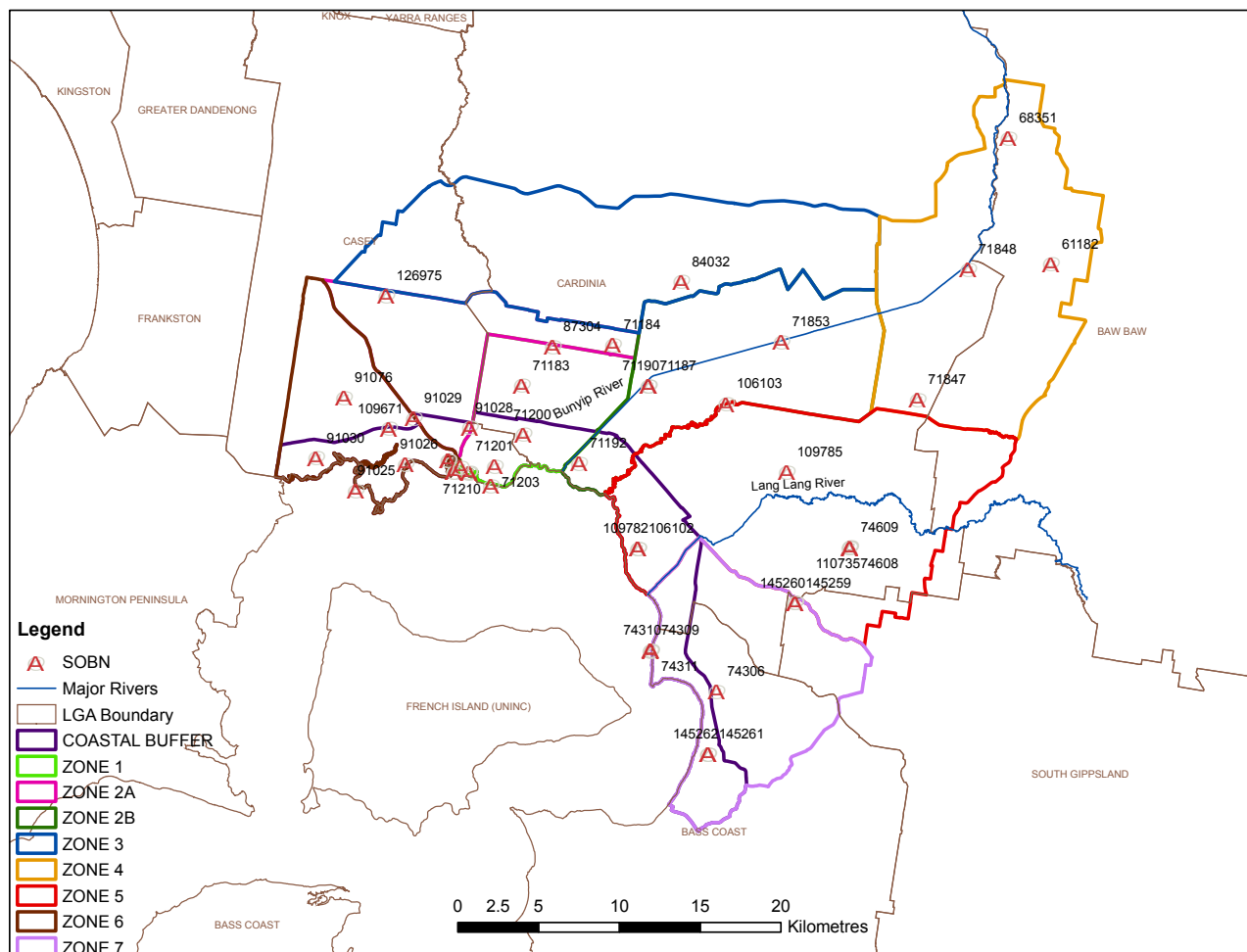


## 4 Groundwater Level Trends

Groundwater levels are monitored using observation bores in the State Observation Bore Network (see Figure 4). Groundwater levels vary depending on seasonal conditions and the extent of pumping. In the irrigation season groundwater levels typically drop by 2.0m to 5.0m in high usage areas, but generally recover rapidly in wetter months.

Groundwater levels within the Protection Area remained relatively static between approximately 1985 and 2005, following a general increase in groundwater levels between 1975 and 1985.

**Figure 4 – State Observation Bore Network (SOBN) locations**



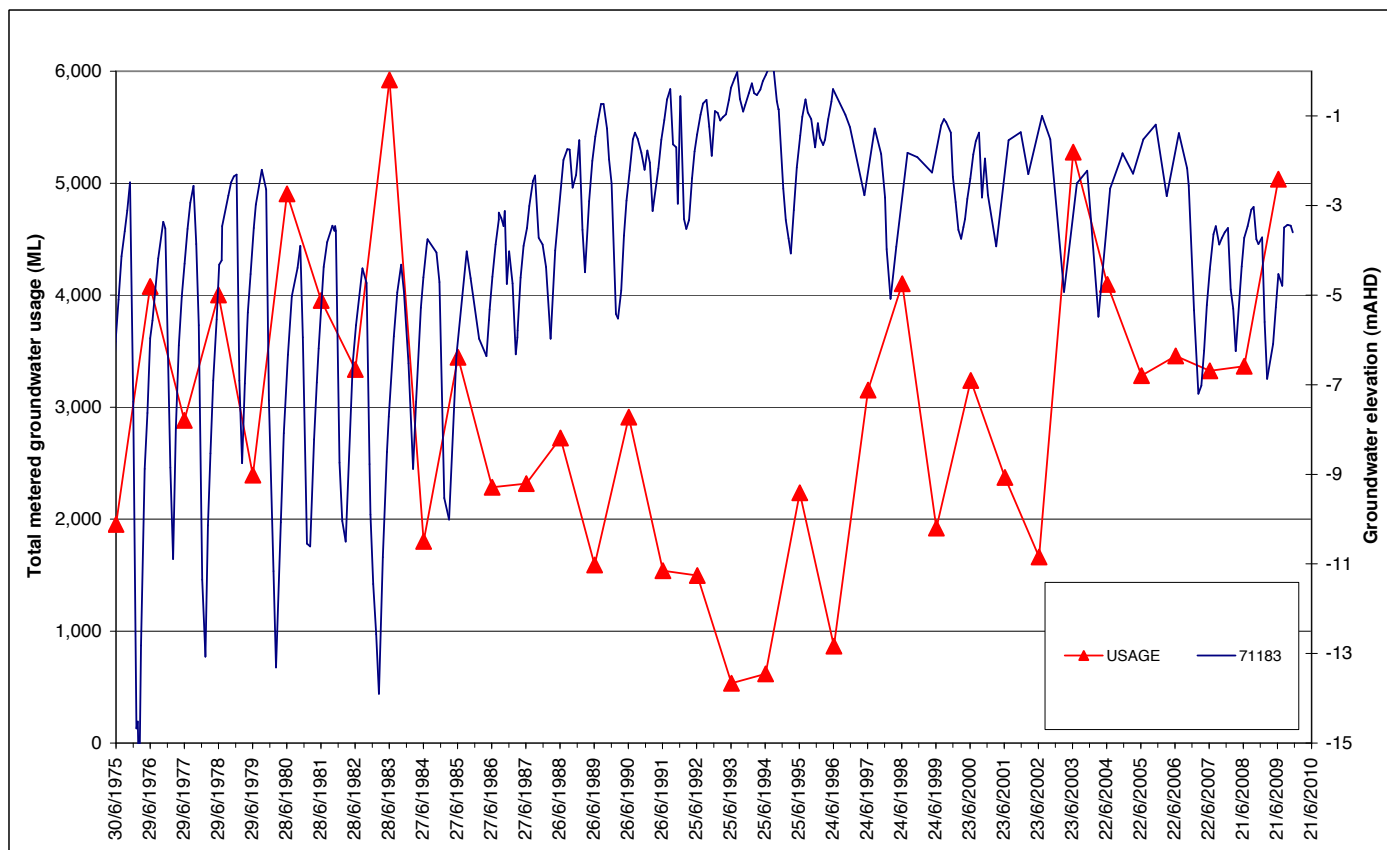
Since 2005 however, groundwater levels have declined in some groundwater monitoring bores, particularly along the coast and in the higher usage zones (eg Zones 1 & 2, not Zones 4 or 6). While groundwater levels are generally still well above those measured in the 1970s in Zones 1 and 2 of the Westernport aquifer, groundwater level decline can be seen in some newer monitoring bores (constructed in the late 1980s, 1990s and 2000s) along the edges of the basin and in the overlying alluvial and underlying Childers/Older Volcanics aquifers, which are not heavily used for groundwater extraction; these declines outside of high usage areas are indicative of the prolonged low rainfall, rather than changes to groundwater use.

Groundwater levels may be further affected if groundwater usage continues to increase above historic levels while rainfall remains low. The main risks associated with groundwater level decline are:

- Reduction of consumptive user access to groundwater; and
- Intrusion of saline water (due to changing groundwater flow directions and gradients) from Westernport Bay and/or saltier parts of the Westernport aquifer.

Water level monitoring and ongoing data review, together with metering information, will continue to identify any trends and will be reported on as part of the annual report. Figure 5 illustrates the relationship between metered groundwater usage and groundwater level.

Figure 5 - Metered groundwater usage and groundwater level in bore 71183



## 5 Groundwater Salinity

Technical work conducted up to 2003 indicated the following risks (due to changing groundwater flow directions and gradients):

- Intrusion of sea water from Westernport Bay via slow vertical leakage through the Quaternary sediments into the confined target aquifer; and/or
- Intrusion of lower quality groundwater from saltier parts of the Westernport aquifer due to changing flow directions and gradients.

Salinity monitoring has occurred across the WSPA but there has been no evidence of saline intrusion (via either mechanism listed above) to date. Therefore, this groundwater management plan focuses on continuing to monitor for saline intrusion and further developing our understanding of the potential for this to occur, rather than on restrictions.

Water quality monitoring and data review is ongoing and will continue throughout the area. The Corporation will observe any changes in the salinity of the groundwater resource and design appropriate management actions.

## 6 Surface Water – Groundwater Interaction

Originally, the Koo Wee Rup area was dominated by a large swamp but channels were constructed and the landscape was drained between around 1890 and 1960 for agricultural purposes; the Koo Wee Rup WSPA therefore sits within a highly modified landscape. Although significant groundwater-surface water interaction and groundwater-dependent ecosystems may have existed in the past, the swamp ecosystems have disappeared from the area.

Some hydraulic connection may exist between the lower reaches of the Bunyip and Lang Lang Rivers and the Quaternary (shallow, unconfined, non-target) aquifer. Review of the available monitoring network and any suitable data will be conducted to improve understanding of the issue prior to review of the GMP.

Potential interaction between Westernport Bay and the WSPA is discussed in Section 5.

## 7 Groundwater Entitlements and Use

Irrigation is the dominant water dependent farming enterprise within the Koo Wee Rup WSPA, however groundwater is also used for dairying, commercial/industrial and domestic & stock purposes.

There are 390 chargeable groundwater licences (this does not include temporary trades) in the Protection Area that entitles licence holders to extract 12,824.4 ML each year. There are 255 licences for irrigation use, 33 for industrial/commercial use, 1 for urban water supply, 1 for dewatering, 100 dairy use licences and an estimated 3,000 bores which are registered for domestic and stock use where a licence to use the water is not required.

However, the total number of registered D&S bores may be an over-estimate. It is likely that many of the bores registered are no longer in use due to their age/condition but no official notification of any change of bore status has been received. Conversely, it is possible that unregistered D&S bores also exist. SRW consider both the number of D&S bores and the D&S groundwater usage to be highly uncertain.

Figure 3 shows the location of licensed bores in the Protection Area. Figure 6 illustrates the distribution of groundwater allocation and metered usage by management zone.

Table 2 shows groundwater usage over the last 10 years; while groundwater extraction volumes vary from year to year it has not exceeded 40% of total current licensed entitlement in the last decade. The table also includes estimates of domestic and stock use and dairy use.

**Table 2 - Groundwater Use in the Koo Wee Rup WSPA**

Purpose	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Irrigation & Commercial <sup>1</sup>	3,238	2,372	1,662	5,278	4,095	3,282	3,458	3,325	3,366	5,036
Dairy use <sup>2</sup>	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Domestic & Stock <sup>3</sup>	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Total	10,538	9,672	8,962	12,578	11,395	10,582	10,758	10,625	10,666	12,336

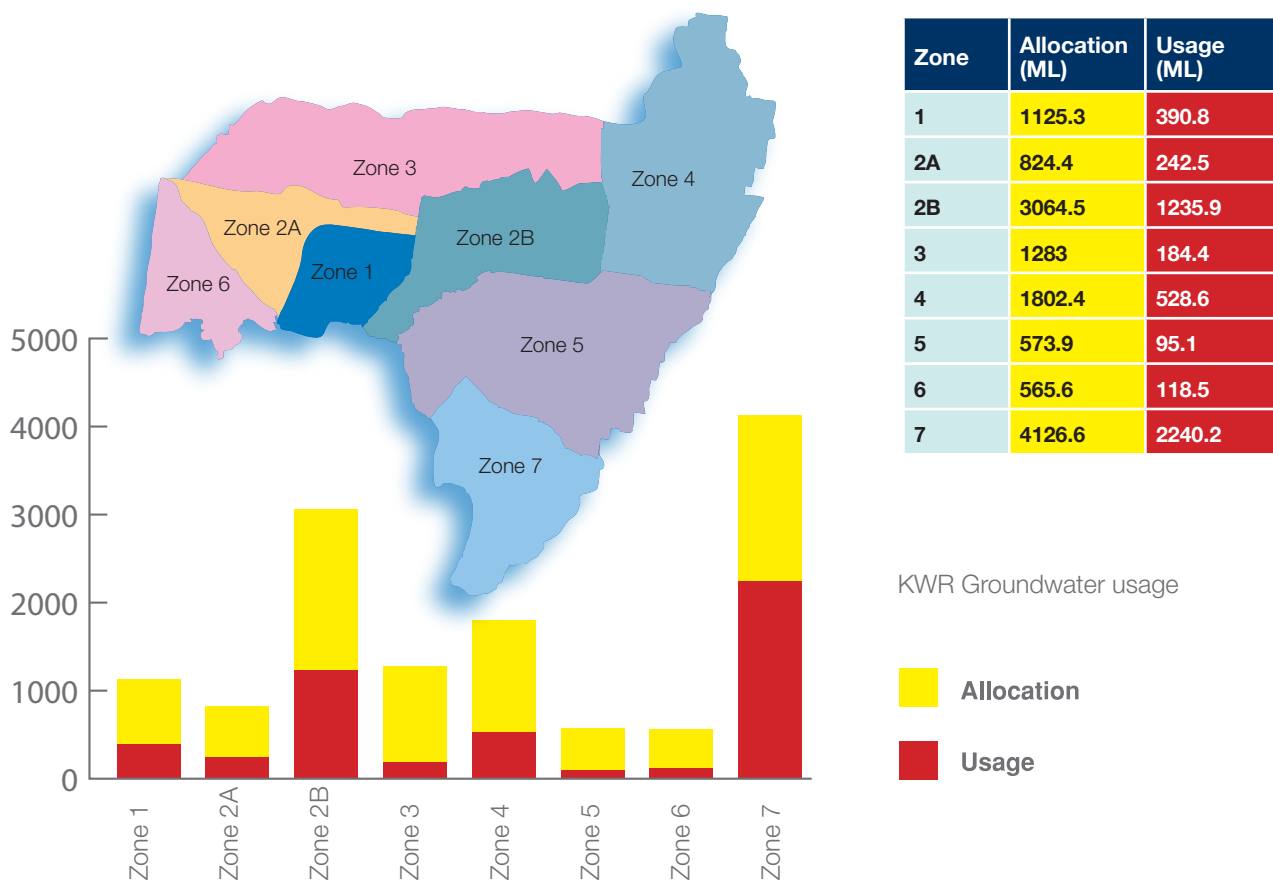
**1. Based on metered data collected by SRW**

**2. Based on an estimated usage of 13ML per/yr for unmetered dairy licences. This estimate was taken from a study conducted by the Department of Primary Industries.**

**3. Based on 2ML per D&S bore. As the total number of D&S bores is uncertain and only 250 applications for new D&S bores have been received since 2005, D&S use is shown as a constant volume.**

Should groundwater extractions continue to increase and groundwater levels continue to decline, a review of the sustainable yield of the aquifer, and consequently the management plan, may be necessary (see Section 4 for details).

**Figure 6 - Groundwater allocation and metered usage by management zone**



## 8 Administration and Enforcement of the Management Plan

The Corporation has the duty of administering and enforcing the management plan. To keep the community informed on the condition of the resource, monitoring and metering results and other issues arising, the Corporation will make the Annual Report publicly available.

## 9 Restrictions on Taking Groundwater

The management plan does not place restrictions on the taking of groundwater already held under licence through S51 of the Water Act, but does allow for the taking of water to be restricted in the future, if deemed necessary to ensure the sustainability of the resource.

Continual monitoring of water levels will enable the Corporation to assess the significance and implications of groundwater level declines on an ongoing basis and to design and implement appropriate management actions. The metering program and rainfall data will provide additional information to help understand the behaviour of the groundwater system. Salinity monitoring will also help determine if groundwater extractions are adversely impacting on groundwater quality.

If necessary, the Corporation is able to temporarily qualify rights to groundwater under section 33AAA of the Act if a water shortage occurs because of an inadequate volume or quality of water being available. The following guidance on potential restrictions is provided but the Corporation will continue to review data regularly and actual management actions or restrictions may vary from the scenarios described on page 17.



1. In the event that metered groundwater usage (compared to total allocation) in any one zone exceeds 50% in any year ending 30th June, SRW will review groundwater level and quality data and assess whether restrictions or other management changes may be required for the following irrigation season within the subject zone or across the WSPA as a whole. In the first instance, the restriction level shall be 75% (i.e. S51 licensed users may use up to 75% of their total allocation prior to 30th June of the following year). Additional restrictions may be placed in 25% increments, if warranted. Voluntary restrictions shall be applied to D&S users (i.e. SRW will request that groundwater users access water from D&S bores for household food production (kitchen garden), and essential human and stock use only with restriction on ornamental garden watering. A restriction on permanent and/or temporary water trading may also be applied to the subject zone.
2. In the event that metered groundwater usage (compared to total allocation) across the WSPA as a whole exceeds 50% in any year ending 30th June, SRW will review groundwater level and quality data and assess whether restrictions or other management changes may be required for the following irrigation season within any particular zone or across the WSPA as a whole. In the first instance, the restriction level shall be 75% (i.e. S51 licensed users may use up to 75% of their total allocation prior to 30th June of the following year). Additional restrictions may be placed in 25% increments, if warranted. Voluntary restrictions shall be applied to D&S users (i.e. SRW will request that groundwater users access water from D&S bores for household food production (kitchen garden), essential human and stock use only with restriction on ornamental garden watering. A restriction on permanent and/or temporary water trading may also be applied to the WSPA as a whole or to a particular zone.

The KWR WSPA comprises 8 zones. These are illustrated Figures 1 and 4 and are based on hydrogeology and extraction density. Coastal sub-zones are also illustrated on the maps and additional detail is provided in Schedule 3.

## 10 Licence Transfers

The trading rules developed for the WSPA in 2002-03 prohibit transfer of groundwater extraction from inland management zones into coastal management zones, in order to limit the risk of seawater intrusion and “spread out” extraction across the WSPA.

The transfer rules allow for additional protection of zones that have historically had the greatest draw down. For this reason, transfer into zones 1, 2B, 4 & 5 was considered unacceptable. Zone 5 was included in this group as any further allocation in this area would impact on zone 2B and zone 1 due to the flow of water between zones.

Applications for licence transfers, whether permanent or temporary, will be determined by the Corporation in accordance with the relevant provisions of the Act and/or supplementary policies.

### Prescription

#### **1. Temporary trade of water entitlement IS allowed within a zone or coastal sub-zone and from one zone to another zone provided that:**

- (i) Where usage has exceeded 80% of allocation over the previous 2 years, water levels have recovered appropriately\*;
- (ii) Transfer does not occur into coastal sub-zones\*\*;
- (iii) Transfer does not occur into zones 1, 2B, 4 and 5; and
- (iv) A temporary trade shall expire no later than 30th June in the financial year in which it is approved (ie 1 July to 30 June).
- (v) At the request of both trading parties, the temporary transfer may commence on 1 July if it is approved prior to 30 June (ie transfer entitlements can start in the new irrigation season rather than having to commence in the middle of an irrigation season).

#### **2. Permanent trade of Water Entitlement shall be allowed within zones and from one zone to another zone provided that:**

- (i) Where usage has exceeded 80% of allocation over the previous 2 years, water levels have recovered appropriately\*;
- (ii) Review of groundwater monitoring data indicates that the transfer is unlikely to have significant adverse impacts and seasonal water level recovery in the target zone is acceptable.
- (iii) Transfer does not occur into zones 1, 2B, 4 & 5; and
- (iv) Transfer does not occur into coastal sub-zones.

\* SRW shall consult with DSE on appropriate recovery levels for zones if the 80% rule is triggered.

\*\* Where a long history of previous transfer has occurred which would now mean water is going into a coastal sub-zone, SRW will use discretion in consultation with DSE to assess the application.

# 11 Restrictions and Prohibitions on the Issue of Licences

## 11.1 General

The uncertainties associated with potential for saline intrusion mean that a precautionary approach of limiting allocations to current licence levels should be adopted. The level of allocation can be reviewed in future years.

For licensing administration purposes, new groundwater licences sometimes need to be issued. They may need to be issued to allow for groundwater licences to be amalgamated, divided or where there is a requirement for a new bore or different property to be included on a groundwater licence. It may also be necessary to issue licences as a result of licence transfers and/or to reflect historical use, (as in the case of dairy licences – see below). However, no new/amended groundwater licences can be issued if the total of all groundwater licence entitlements exceeds the PCV declared for the area by the Minister. In the case of dairy licence amendments, the Corporation may need to apply to the Minister for adjustment of the PCV to reflect historical use.

New bore construction licences may also need to be issued and the Corporation will make appropriate assessments and attach relevant conditions in accordance with the provisions of the Act that includes an assessment of extraction rate, distance to existing bores and other factors.

## 11.2 State Water Register

Victorian government policy requires that all groundwater and surface water use licences be transferred to the State Water Register. This will standardise the conditions on all licences. Schedule 2 contains a summary of standard licence conditions in line with the State's Take and Use policies

## 11.3 Dairy Licences

In 2004 the Government released a White Paper – Our Water, Our Future which indicated that dairy use licences had in the past been issued with groundwater licence entitlements that would normally be associated with domestic and stock use. Most dairy licences in the Protection Area authorise an average of 1.2 ML/year to be taken.

In dairies, water is used for yard washing, shed wetting, milk cooling and cleaning equipment and the amount of water used can vary greatly depending on the setup, production volume and practices. Work by the Department of Primary Industries indicates that the average water use in a large dairy is in the vicinity of 13 ML/year. The estimate for dairy use indicated in Table 2 is based on this figure, not current licence entitlement.

When renewing dairy licences, the Corporation will make an assessment of the amount of groundwater used in each dairy. Any adjustments to licences will be made in accordance with any State-wide policy approved by the Minister for Water.

### Prescription

- 3. All groundwater licenses in the WSPA will be migrated to the State Water Register within six months of Ministerial approval of this Management Plan.**
- 4. No new groundwater licenses shall be issued, except as described in Prescriptions 7 and 8.**
- 5. The total licence entitlement/allocation shall not exceed 12,826 ML (licence entitlement at time of writing), or any volume adjusted in accordance with Prescriptions 6 to 8.**
- 6. If a groundwater licence is surrendered, revoked or not renewed the total entitlement in Prescription 5 will be reduced by that licence volume.**
- 7. The Corporation may issue a licence which may lead to the total groundwater licence entitlement in Prescription 5 being exceeded to overcome an administrative oversight or other anomaly, provided it does not exceed the PCV (12,915ML at time of writing).**
- 8. The Corporation may issue or amend a groundwater licence in accordance with any State-wide policy. The volume in Prescription 5 and the PCV (by application to the Minister) will be adjusted.**
- 9. The Corporation must report the details of any licence referred to in Prescriptions 6 to 8 in the annual report.**

## 12 Metering Program

### 12.1 General

Metering water use enables better management of the water resource. It provides vital information on the amount and location of water used, which aids in the sustainable management of the resource. It also ensures that the water is shared equitably and licensees stay within their licence entitlement. Metering also provides benefits to the farming operation and can lead to greater water use efficiencies.

### 12.2 History

Meters were originally installed on active, licensed bores across the WSPA in the 1970s. At the time of writing, all meters within the WSPA were being replaced in order to bring the area up to National Metering Standards. All meter replacement is expected to be completed by June 2010.

### 12.3 Installation and maintenance of meters

A flow meter must be installed in compliance with National Metering Standards on all licensed operational groundwater bores in line with both State Government and Corporation metering policy.

The Corporation will also meter any bore constructed or any new licence issued after the approval of this Plan that is subject to a groundwater licence irrespective of the volume authorised to be taken from the bore. All metering costs shall be met by the licensee.

Meters need to be maintained in accordance with National Metering Standards to ensure accurate readings can be taken. Both the Corporation and the licensee have a responsibility to ensure meters are properly maintained.

#### Prescription

**10. All meters will comply with State metering policy and the Corporation's metering policy**

### 12.4 Meter Readings

Meters shall be read twice a year; the collected data is to be maintained on a database.

#### Prescription

**11. The Corporation must:**

- i. ensure all meters within the Protection Area are read twice per year – in or around January and June;
- ii. determine the volume of water extracted from the bore since the flow meter was last read; and
- iii. within 30 days after a meter is read, record the amount of water used on a database.

**12. The Corporation may request the Licensee to read a meter and to provide the Corporation with the meter reading:**

- i. the Licensee must comply with the request; and
- ii. for the purposes of this clause, the Corporation must provide a phone number, email address, pre-paid mail or similar method for the licensee to lodge the meter read.

# 13 Monitoring Program

## 13.1 General

Groundwater monitoring provides information to enable sustainable management of the resource. Observation bores are used to:

- assess annual and long term water level response to groundwater pumping;
- monitor regional and local seasonal drawdown;
- provide information for future resource assessments;
- monitor groundwater water quality generally throughout the Protection Area; and
- monitor groundwater quality in areas close to Westernport Bay.

Monitoring will be undertaken on a strategic basis taking into account the hydrogeology of the Protection Area, features such as rivers, and the location of production bores. The Corporation, in conjunction with the Department, will regularly review the monitoring program and details of the monitoring strategy will be presented in an annual report prepared by the Corporation. New bores may be needed in some areas and others may no longer need to be monitored or monitoring frequency may need to be varied. As bores deteriorate they may also need to be replaced.

It will be the responsibility of the Corporation and the Department to ensure that an appropriate level of monitoring is carried out in the area and that observation bores are properly maintained. The data from the observation bores will be recorded in the Department's Groundwater Management System (computerised database) soon after they are collected.

### Prescription

**13. The Department must ensure that monitoring bores are properly maintained and replaced if necessary; and**

**14. The Department and the Corporation must ensure that data collected from monitoring bores are entered into the State's groundwater management system (or equivalent), within 30 days of them being received.**

## 13.2 Groundwater Level Monitoring

The Management Plan aims to effectively manage the groundwater resources of the Protection Area. Monitoring is therefore critical to understanding:

- a) how the aquifer responds in the long-term to the management arrangements introduced under this management plan; and
- b) the interaction of the aquifer with the broader hydrological system.

At the time this Management plan was prepared over 40 observation bores were monitored on a regular basis (see Schedule 1). Bores regularly monitored within the WSPA at the time of writing are illustrated on Figure 4 and target various depths to monitor the aquifers, as described in Schedule 1.

### Prescription

**15. The Department and the Corporation must ensure that water level monitoring and investigations are carried out at appropriate locations throughout the Protection Area to:**

- i. assess annual and long term impact on water levels from groundwater pumping;
- ii. monitor regional and local seasonal drawdown;
- iii. examine interaction between groundwater and surface water;
- iv. provide information for future resource assessments; and
- v. monitor the impacts of groundwater pumping generally across the Protection Area and in areas of high intensity groundwater pumping.

**16. The Corporation shall review the groundwater level monitoring program as the established trigger level is approached (the trigger level at the time of writing is specified in Schedule 1 but may be reviewed and amended by the Corporation, as necessary).**

## 13.3 Salinity Monitoring

Regular water quality monitoring will be carried out on selected bores in the Protection Area to determine whether there are any changes in the general salinity of groundwater within the area. Water quality monitoring will also be carried out on observation bores near Westernport Bay to determine if seawater is moving inland.

Water samples will be taken and analysed in accordance with appropriate standards. The Corporation will ensure that all water quality monitoring data are entered into the Groundwater Management System within 30 days of them being received.

At the time of writing, water quality monitoring of the bores listed in Schedule 1 is undertaken regularly. Additional water quality monitoring may be necessary if there are significant declines in groundwater levels or a deterioration in water quality is detected.

### Prescription

**17. The Corporation must ensure that water quality monitoring is carried out at appropriate locations throughout the Protection Area to provide information that allows assessment of changes in the groundwater salinity.**

**18. The Corporation shall review the groundwater quality monitoring program as the established trigger level is approached (the trigger level at the time of writing is specified in Schedule 1).**

## 14 Annual Report

By 30 September every year the Corporation will prepare an annual report in relation to the Management Plan. The report will be submitted to the Minister for Water and will be publicly available. The annual report shall be in accordance with Ministerial requirements.

In the fifth annual report the Corporation will make comment on the need to review the management plan. If changes to the Management Plan are recommended, the Minister for Water may propose to amend the plan. However, under the Act, the Minister must first publish notices of the proposed amendment and consider submissions and must also appoint a consultative committee to advise on the proposed amendment.

The annual report will also contain details about the groundwater monitoring strategy to be undertaken in the following year and results of monitoring conducted in the reporting year.

## 15 Recommendations For Further Technical Investigation

To increase understanding of the groundwater system and inform sustainable management of the aquifer, future technical investigations may involve:

- Analysis of potential threats to groundwater resources as a result of land use change, such as urbanisation, plantation development, and water use patterns;
- Investigation into the number, distribution and groundwater use from domestic and stock bores;
- Assessment of potential for groundwater allocation carryover with regard to sustainability of total extraction in dry years;
- Further conceptualisation and assessment of groundwater-surface water interactions and potential for seawater intrusion; and
- Whole of aquifer definition, including a boundary review if appropriate.

The need for these investigations will be based on technical evaluation of monitoring data and highlighted to the Minister in the annual report(s).

## 16 Technical References Used in the Development of This Plan

WD Birch (Ed.), 2003 Geology of Victoria, Geological Society of Australia (Victoria Division), Special Publication No. 23.

Cook, P. & Hart, B., April 2004, Audit Report, Koo Wee Rup WSPA Groundwater Management Plan

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Dept of Minerals & Energy, 1980, 1:100,000 scale Western Port Hydrogeological Map

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Geological Survey of Victoria, April 1980, Western Port Groundwater Basin. A Quantitative Hydrogeological Evaluation - (Interim Report)

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Lakey, R. and Tickell, S., 1981, Explanatory Notes on the Western Port Groundwater Basin 1:100000 Hydrogeological Map. Geol. Surv. Vict. Report No. 69.

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Sinclair Knight Merz, June 2002, Lang Lang Groundwater Supply Protection Area: GSPA Monitoring Bore Installation

Sinclair Knight Merz, January 1998, Permissible Annual Volume Project, The Lang Lang GMA.

Sinclair Knight Merz, January 2001, Western Port Groundwater Monitoring: Results of Sampling and Analytical Program, 2001

Sinclair Knight Merz, September 2001, Koo-Wee-Rup/Dalmore and Lang Lang Groundwater Supply Protection Area: Report on Modelling of Potential Groundwater Use and Implication for PAV

SKM, January 2003, Koo Wee Rup Water Supply Protection Area, Preliminary Report on the Result of Groundwater Sampling and Chemical Testing of the Coastal Monitoring Bores

SKM, June 2003, Koo Wee Rup Water Supply Protection Area Technical Assessment. Final Report

SKM, October 2002, Koo Wee Rup Water Supply Protection Area Technical Assessment - Addendum to Final Report - Transfer of Water Entitlement

Koo Wee Rup Water Supply Protection Area. GSPA Background Report -

Southern Rural Water, Jan 2009, Koo Wee Rup WSPA GMP Discussion Paper

SRWA, March 2000, GMA Reviews. Amalgamation of the Kooweerup/Dalmore GCA and Lang Lang GMA

## Schedule 1

### Water level and salinity monitoring bores in the Protection Area at the time the Management Plan was approved.

At the time of writing, groundwater level was monitored quarterly by the Department with the Corporation conducting additional monthly monitoring when the groundwater level in bore 71183 is below -2mAHD in November/December. The same trigger level initiates quarterly salinity monitoring at the specified bores, which would otherwise be monitored annually.

Bore Number	Bore location co-ordinates GDA 94 MGA Zone 55		Aquifer Monitored	Monitoring frequency*	
	Eastings	Northings		Water level	Salinity
61182	394480	5782529	Older Volcanics	Monthly to Quarterly	
68351	391819	5790103	Quaternary Sands	Monthly to Quarterly	
71183	361989	5774348	Sherwood & Older Volcanics	Monthly to Quarterly	
71184	367536	5777680	Baxter	Monthly to Quarterly	
71187	369850	5774542	Older Volcanics	Monthly to Quarterly	
71189	358211	5768925	Sherwood	Monthly to Quarterly	Quarterly to Annually
71190	369855	5774539	Baxter	Monthly to Quarterly	
71192	365094	5769393	Baxter, Sherwood, Volcanics	Monthly to Quarterly	Quarterly to Annually
71200	362250	5771262	Sherwood	Monthly to Quarterly	Quarterly to Annually
71201	360459	5769208	Sherwood	Monthly to Quarterly	
71203	360288	5768137	Sherwood	Monthly to Quarterly	Quarterly to Annually
71210	358894	5768835	Sherwood	Monthly to Quarterly	Quarterly to Annually
71215	358001	5768911	Sherwood	Monthly to Quarterly	Quarterly to Annually
71216	357999	5768906	Baxter	Monthly to Quarterly	Quarterly to Annually
71219	358886	5768832	Baxter	Monthly to Quarterly	Quarterly to Annually
71847	386443	5773961	Yallock	Monthly to Quarterly	
71848	389450	5782215	Yallock	Monthly to Quarterly	
71853	377956	5777206	Yallock	Monthly to Quarterly	
S9020317	377956	5777206	Yallock	Monthly to Quarterly	
74306	374492	5755599	Childers	Monthly to Quarterly	
74309	370311	5757916	Older Volcanics	Monthly to Quarterly	Quarterly to Annually
74310	370319	5757935	Sherwood	Monthly to Quarterly	Quarterly to Annually
74311	370320	5757943	Baxter	Monthly to Quarterly	Quarterly to Annually
74608	382536	5764698	Older Volcanics	Monthly to Quarterly	
74609	382543	5764751	Yallock	Monthly to Quarterly	
84032	371770	5780933	Older Volcanics	Monthly to Quarterly	
87304	363924	5776558	Baxter	Monthly to Quarterly	
91025	351914	5767480	Sherwood	Monthly to Quarterly	Quarterly to Annually
91026	354965	5769125	Sherwood	Monthly to Quarterly	Quarterly to Annually

## Schedule 1 (continued)

Bore Number	Bore location co-ordinates GDA 94 MGA Zone 55		Aquifer Monitored	Monitoring frequency*	
	Eastings	Northings		Water level	Salinity
91028	358856	5771606	Sherwood	Monthly to Quarterly	
91029	355372	5772091	Sherwood	Monthly to Quarterly	
91030	349397	5769483	Sherwood	Monthly to Quarterly	Quarterly to Annually
91076	351068	5773317	Silurian Bedrock	Monthly to Quarterly	
91078	357574	5769462	Sherwood	Monthly to Quarterly	Quarterly to Annually
91079	357573	5769467	Baxter	Monthly to Quarterly	Quarterly to Annually
106102	369326	5764377	Baxter	Monthly to Quarterly	Quarterly to Annually
106103	374702	5773439	Baxter	Monthly to Quarterly	
109671	353889	5771394	Baxter	Monthly to Quarterly	
109782	369333	5764370	Childers	Monthly to Quarterly	Quarterly to Annually
109785	378541	5769284	Older Volcanics	Monthly to Quarterly	
110735	382538	5764699	Quaternary Sands	Monthly to Quarterly	
126975	353545	5779653	Older Volcanics	Monthly to Quarterly	
145259	379226	5761228	Westernport	Monthly to Quarterly	
145260	379224	5761228	Childers	Monthly to Quarterly	
145261	374048	5751759	Westernport	Monthly to Quarterly	Quarterly to Annually
145262	374057	5751757	Childers	Monthly to Quarterly	Quarterly to Annually
71853	377956	5777206	Yallock	Monthly to Quarterly	
S9020317	377956	5777206	Yallock	Monthly to Quarterly	



## Schedule 2

### Summary of Standard S51 Licence Conditions from State Water Register

- Water may only be taken under this licence if it is taken by the methods expressly approved by this licence.
- The licence holder must at all times provide the Authority with safe access to inspect all works and appliances used to take water under this licence.
- Water may only be taken under this licence if it is taken at the location specified in the licence under “extraction point details”.
- The volume of water taken under this licence, in any twelve-month period from 1 July to 30 June, must not exceed the licence volume, less any volume that has been temporarily transferred to another person or location.
- The maximum volume that may be taken under this licence in any one day is [insert number here] megalitres per day.
- The Authority may determine water allocations at 1 July or during the course of the subsequent twelve-month period that are less than 100% of the licence volume, in which case the licence volume is correspondingly reduced for that twelve-month period.
- Unless otherwise directed by the Authority, water may be taken at any time between 1 July and 30 June.
- When directed by the Authority, water must be taken in accordance with the rosters and restrictions determined by the Authority, and advised to the licence holder.
- Water must be taken in accordance with the rosters and restrictions as set out in the management plan, local management rules or other document that is available on the Authority’s website, and before taking water under this licence the licence holder must check the restrictions that currently apply.
- Water may only be taken under this licence if it is taken through a meter approved by the Authority.
- Meters must be installed, in accordance with the specifications set by the Authority, at the licence holder’s expense.
- The works referred to in the licence must not be made operational until the licence holder provides the Authority with safe access to meters for the purpose of reading, calibration or maintenance.
- The licence holder must at all times provide the Authority with safe access to meters for the purpose of reading, calibration or maintenance.
- The licence holder must notify the Authority within one business day if the meter ceases to function or operate properly.
- The licence holder must not, without the consent of the Authority, interfere with, disconnect or remove any meter used for the purposes of the licence.
- Water taken under this licence may only be used on the land, and for the purposes, specified in the licence.
- The licence holder must, if required by the Authority, monitor and record water levels in the bore(s) before and after pumping; the licence holder must also provide this information in writing as directed by the Authority.
- The licence holder must, at the licence-holder’s expense, if required by the Authority, conduct a pumping test and obtain a hydrogeological report, to the Authority’s specification, on the potential for bore operation to interfere with any bore; aquifer, groundwater dependent ecosystem or waterway.
- The licence holder must, if required by the Authority, provide the Authority with the results of water quality tests on samples of water pumped from the bore.
- The licence holder must provide the Authority with safe access to the licensed bore and works for the purposes of obtaining water level measurements, water samples and any other information or data pertaining to the operation of the bore, the works and the aquifer.
- The licence holder must, if required by the Authority, cease taking water entirely, or cease taking water for a given period, or reduce the quantity of water taken during any period if, the Authority reasonably believes, or in accordance with the assessment in a Groundwater Management Plan, the use or disposal of water under this licence may injure or adversely affect any other person or an aquifer or the environment.
- The licence holder must, if required by the Authority, enter into a formal agreement to supply water to any party affected by interference from bore operation.

**COPY OF RECORD IN THE VICTORIAN WATER REGISTER  
TAKE AND USE LICENCE**

*under Section 51 of the Water Act 1989*

*The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.*

*This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the take and use licence.*

*Water used under this entitlement is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.*

*The Authority does not guarantee, by the granting of the licence, that the licensee will obtain any specific quantity or quality of water. The Authority is not liable for any loss or damage suffered by the licensee as a result of the quantity of water being insufficient or the quality of the water being unsuitable for use by the licensee at any particular time or for any particular purpose.*

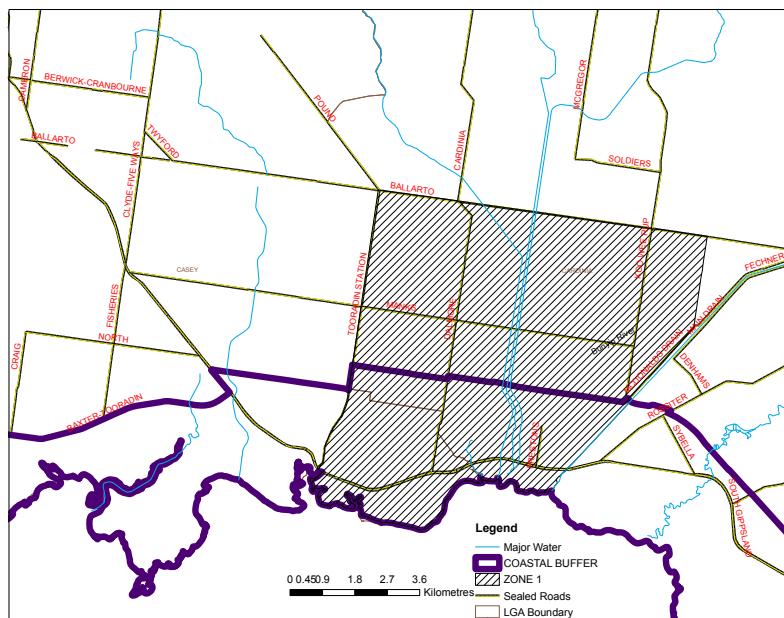
This take and use licence entitles its holders to take and use water as set out under the licence description, subject to the conditions that are specified.

Standard water quality and quantity disclaimer for S51 Take & Use Licences.

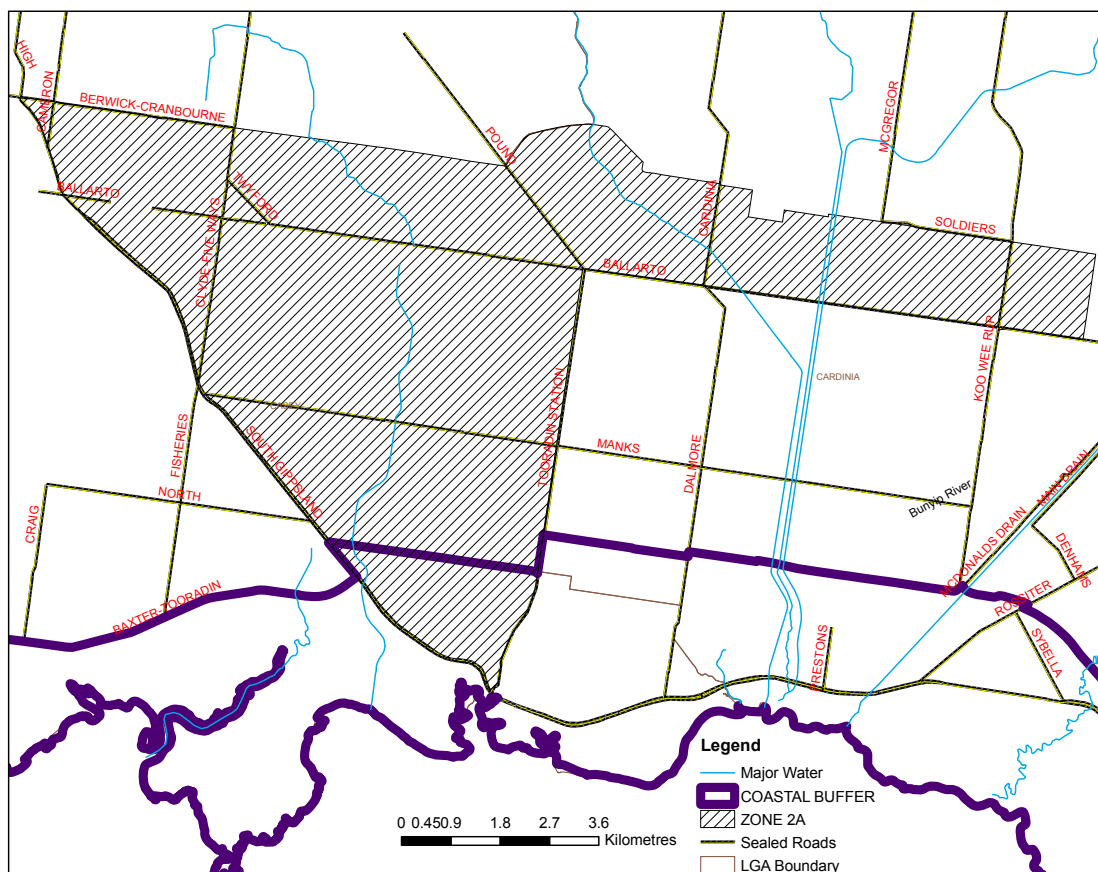
# Schedule 3

## Zoned Boundaries

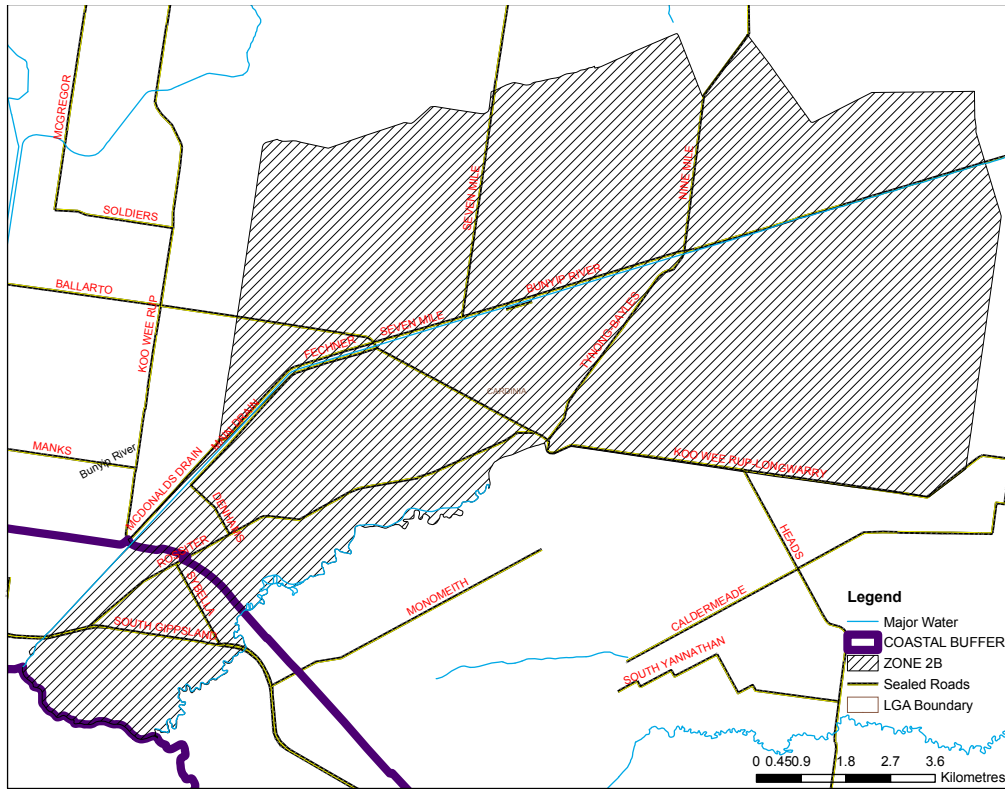
**Zone 1** is bounded by Toradin Station Road, Bullarto Road, McDonalds Drain and the coast. **Zone 2A** is defined as: starting at the intersection of the coast line at Sawfells creek with the South Gippsland Highway, along the highway to the north west to Pattersons Road and then a line along the alignment of Pattersons Road to the east, continuing east of Pound Road to McDonalds Drain, then south along McDonalds Drain to Bullarto Road.



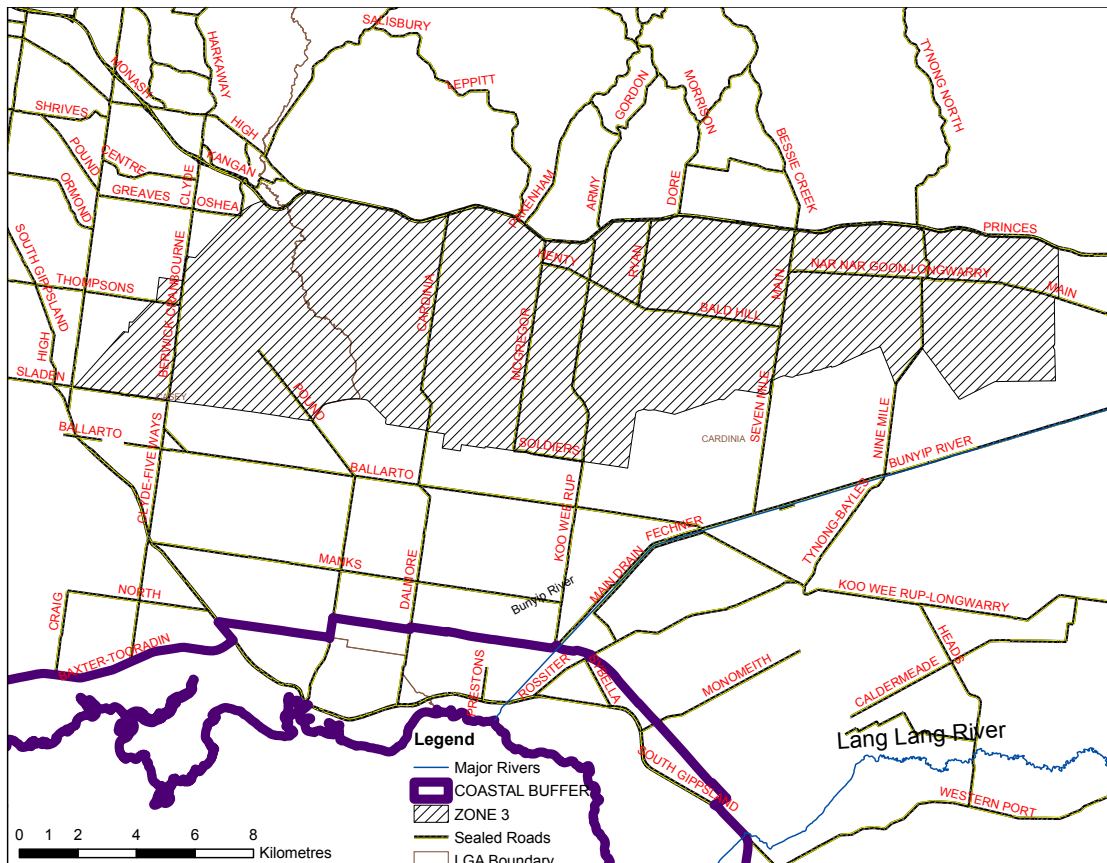
**Zone 2A** is defined as: starting at the intersection of the coast line at Sawfells creek with the South Gippsland Highway, along the highway to the north west to Pattersons Road and then a line along the alignment of Pattersons Road to the east, continuing east of Pound Road to McDonalds Drain, then south along McDonalds Drain to Bullarto Road.



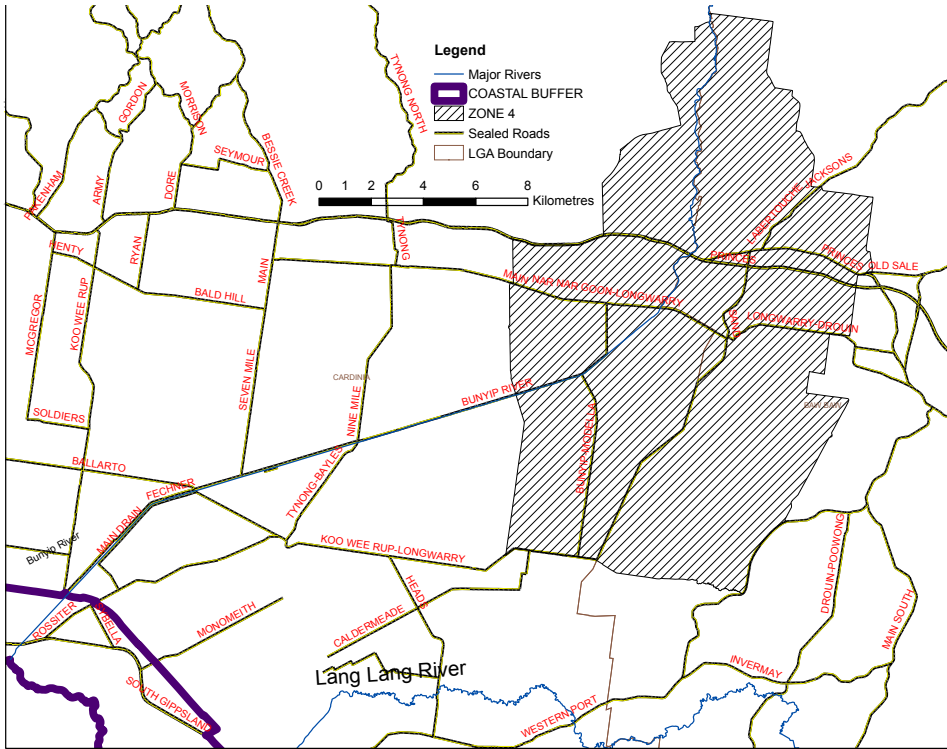
**Zone 2B** is defined as: from the coast at the outlet of McDonald's Drain, along McDonald's Drain and an unnamed feeder drain to Daly Road, then south to Nine Mile Road, then north to Eleven Mile Road, then south along Eleven Mile Road to Lone Pine Road, then to Thirteen Mile Road, then south along Pitt Road to the Koo Wee Rup Longwarry Rd, then west to Yallock Creek, then along the creek to the Coast.



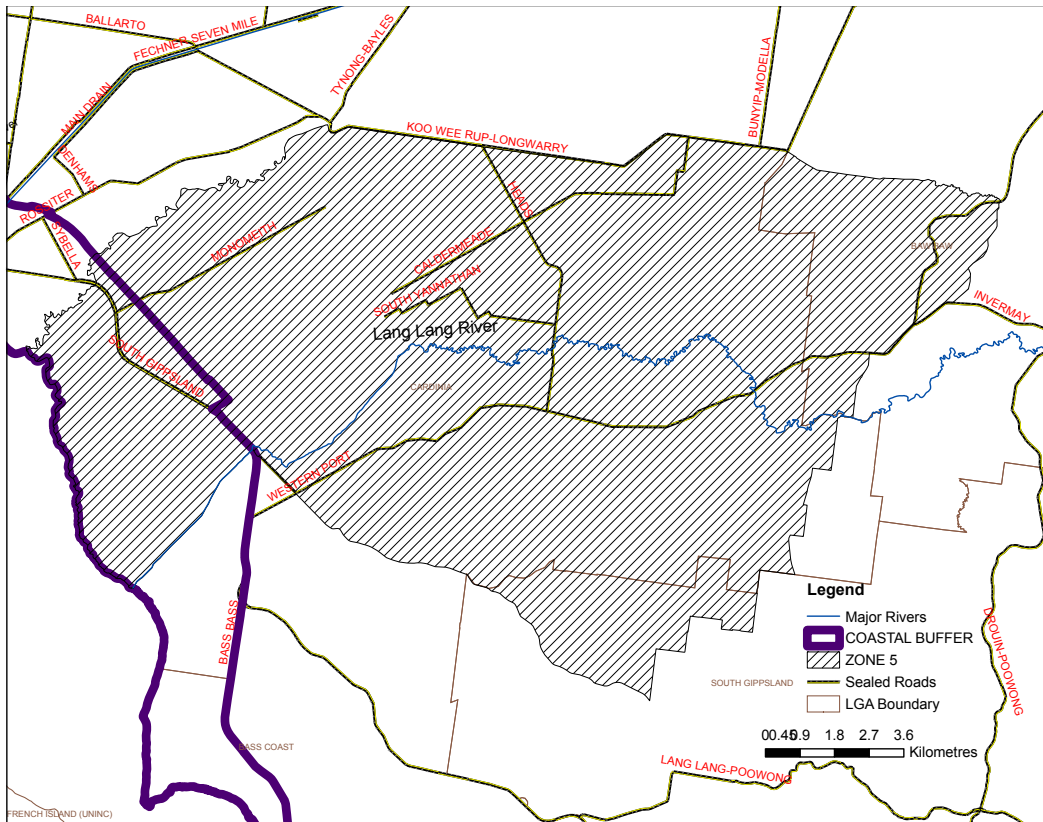
The boundaries of **zone 3** are the western and northern boundaries of the WSPA. The zone is further defined: to the east by the Garfield Road (south of the Princes Highway) to Garfield, then intersecting the eastern boundary of Zone 2B; and, by the northern boundary of Zone 2A.



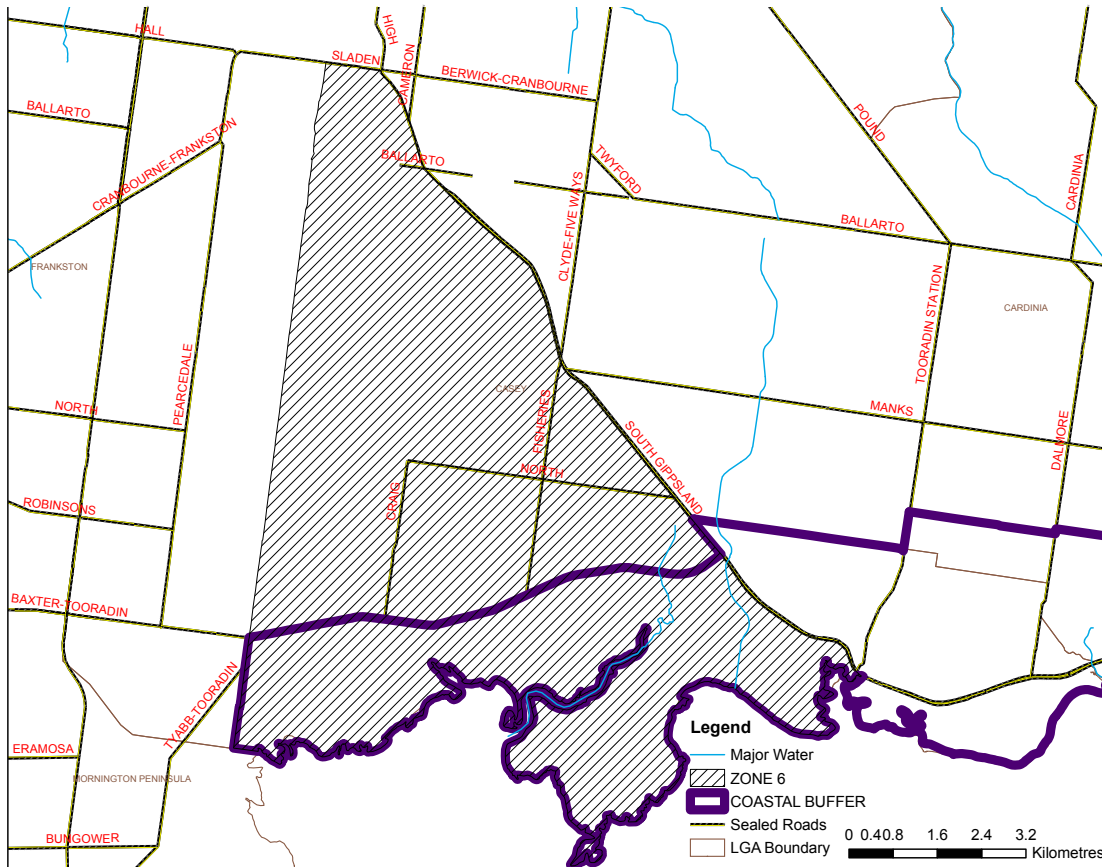
**Zone 4** boundaries are: (a) The northern boundary of the WSPA (b) The eastern boundary of the WSPA (c) The eastern boundary of zone 3 (d) The eastern boundary of zone 2B (e) In the south, the boundary intersects the south eastern corner point of Zone 2B and follows the Koo Wee Rup - Langwarry Road, then an unnamed stream (drain) just north of Chambers Road and then to the east until it intersects the WSPA boundary in the vicinity of Ripplebrook.



The boundaries of **zone 5** are defined by: the eastern limit of the WSPA south of zone 4; and, the southern boundary of Zone 2B; and, in the south by the centre-line of McDonalds Track at the point of intersection with the eastern WSPA boundary, west to Lang Lang then on to the South Gippsland Highway, then follows an unnamed creek to the southwest where it intersects the coast.



**Zone 6** is defined by the western edge of the WSPA, the southern boundary of zone 2A and the Coast.



**Zone 7** is bounded to the east by the eastern edge of the WSPA below zone 5, along the Heath Hill Fault. To the south and west the boundary is the coastline. The northern boundary is defined as the southern boundary of zone 5.

