Annual Report 2016/17

Murrayville Water Supply Protection Area Groundwater Management Plan

July 2016 to June 2017

FOREWORD

The preparation of this report is required by Section 32C(1) of the *Water Act 1989*. Copies of the report have been provided to the Minister for Water and the Mallee Catchment Management Authority in accordance with Section 32C(2) of the *Water Act 1989*. A copy of this report is also available for inspection at the office of GWMWater, and a notice of availability of the report will be published in local newspapers as required by Section 32D of the *Water Act 1989*. This report will also be available on the GWMWater website, www.gwmwater.org.au.

The purpose of this report is to detail GWMWater's activities undertaken in administering and enforcing the Murrayville Groundwater Management Plan and to provide information that is required to be reported under the Plan.

Area:	Murrayville Water Supply Protection Area (WSPA)
Segment:	Groundwater
Year Area Declared:	1998
Date Plan Approved:	17 July 2001
Permissible Consumptive Volume:	10,883 ML
Date Abolished:	13 July 2017
Implementation Authority:	Grampians Wimmera Mallee Water Corporation
Relevant CMA:	Mallee Catchment Management Authority
Report Period:	1 July 2016 – 30 June 2017

GWMWater has continued to monitor groundwater levels, quality and metered use, and undertake groundwater management activities stipulated in the Murrayville Water Supply Protection Area (WSPA) Plan and the *Water Act 1989*.

Assessment of the data indicates that groundwater levels and salinity continue to respond as expected to the level of extraction in a confined aquifer system. In 2016/17, groundwater extraction from the Tertiary Limestone Aquifer was 5,255 megalitres, amounting to less than fifty percent of the Permissible Consumptive Volume.

This will be the final annual report for the now abolished Murrayville WSPA, future reporting will be for the Murrayville Groundwater Management Area being managed under the Local Management Plan 2017.

Signed

Mark Williams
Managing Director

TABLE OF CONTENTS

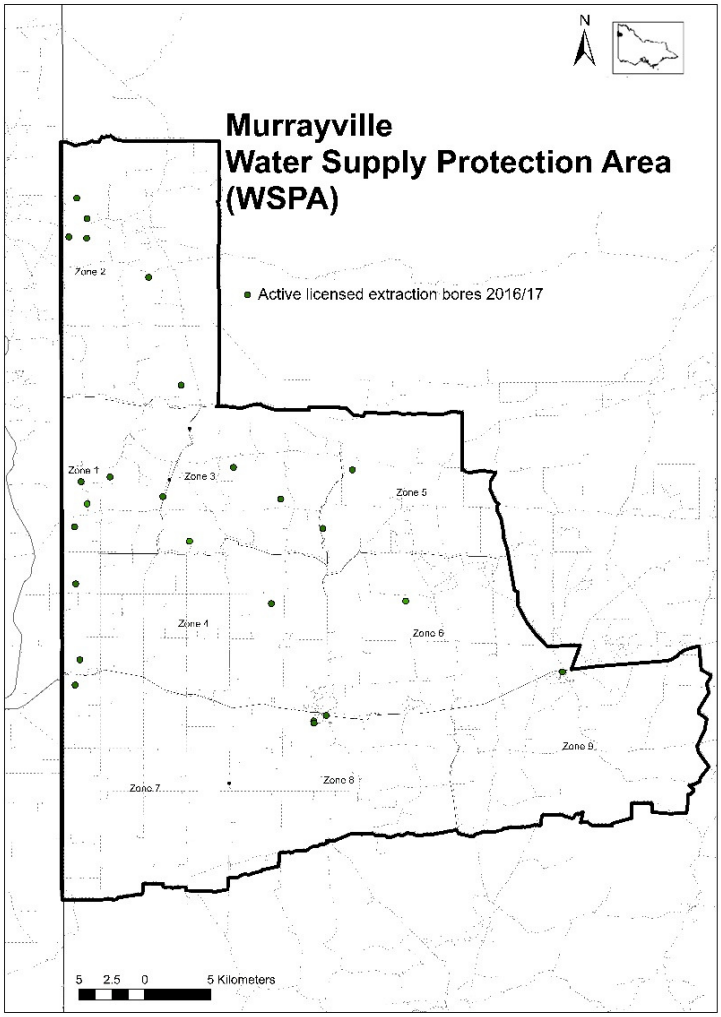
1. INTRODUCTION....3
2. KEY OBSERVATIONS....4
2.1. Rainfall....4
2.2. Groundwater Water Levels....4
3. PLAN IMPLEMENTATION....6
3.1 Requirements of the Plan – Bore Monitoring....7
3.1.1 Water Level Monitoring....10
3.1.2 Water Quality Monitoring....12
3.2 Bore Metering, licencing and use....12
3.2.1 Water Use....15
Appendix 1 Murrayville Water Supply Protection Area –monitoring sites....16
Appendix 2 Salinity readings – Plan bores....17
Appendix 3 Salinity sampling domestic and stock bores - November 2016....18

1. INTRODUCTION

The Murrayville Water Supply Protection Area (WSPA) occupies 1,578 km², is centred on the town of Murrayville, and abuts the South Australian border as illustrated in **Figure 1.1**. Groundwater is the sole source of water for domestic and stock, town supplies and irrigation in the region.

The dominant land use within the WSPA is dryland agriculture. However, since the early 1990s landholders have taken advantage of the good quality groundwater and suitable soils to cultivate irrigated crops, particularly potatoes and olives. Groundwater has also been used for irrigating dryland cereal and canola crops, ensuring a reasonable yield under unseasonable dry conditions. During the 2016/17 reporting period approximately 920 hectares were irrigated, Figure 1.1 illustrates the location of the bores used for irrigation in 2016/17. A total of 5,255 ML of groundwater was extracted in the WSPA during the reporting period with 5,146 ML for irrigation and the remaining 109 ML for urban supply.

Figure 1.1: *Location of Murrayville Water Supply Protection Area and active extraction bores (2016/17)*



2. KEY OBSERVATIONS

2.1. Rainfall

A total of 418 mm of rainfall was recorded for period July 2016 to June 2017 at the Bureau of Meteorology site in Murrayville (76038). The mean annual rainfall measured at this site is 327 mm (based on figures gathered from 1911 to 2016). Actual and average monthly rainfall is shown in **Figure 2.1.**

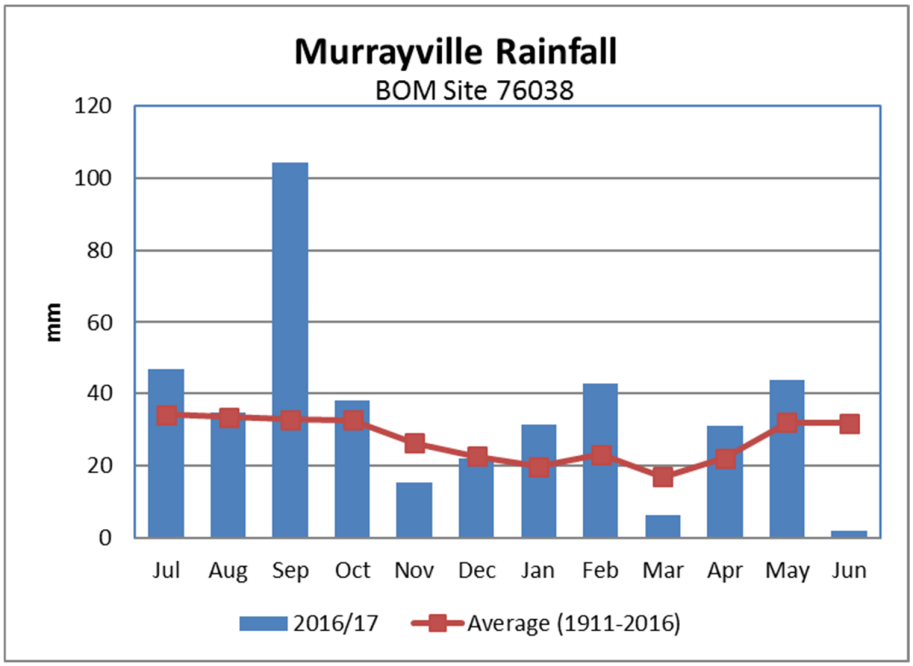


Figure 2.1: *Murrayville Rainfall*

The amount of rainfall received, and the timing can influence groundwater use in the Murrayville WSPA, but does not recharge the Tertiary Limestone Aquifer due to its confined nature in the WSPA, which prevents direct access to the aquifer by rainfall.

2.2. Groundwater Water Levels

Groundwater levels are measured monthly across 35 state-owned observation bores within the WSPA. An additional eight observation bores are monitored at quarterly intervals. A list of these observation bores is provided in **Table 3.1**. The location of selected observation bores are illustrated in **Figure 2.2** with corresponding hydrographs showing the groundwater levels observed at each site.

Within the Murrayville WSPA, the Tertiary Limestone Aquifer is confined by the over lying Tertiary aquitard (Bookpurnong Beds). The long-term trend in groundwater levels observed in the hydrographs reflect seasonal drawdown (annual peaks and troughs) which is consistent with the response to groundwater pumping for irrigation from a confined aquifer.

The observations from the network of monitoring bores indicate that the aquifer continues to respond as expected with the level of extraction recorded both within the WSPA and directly across the border in South Australia.

Groundwater use for irrigation in the Mallee Prescribed Wells Area of South Australia is also sourced from the same Tertiary Limestone Aquifer and use in this area has an influence on groundwater levels observed in the Murrayville WSPA. This is particularly evident at observation bore 134951 which is located adjacent to South Australia's Peebinga district, and closer to irrigation activity in South Australia than in the Murrayville WSPA. Use in this area was anecdotally less than in previous years which is evident from the recent observed groundwater levels, where the seasonal drawdown is less than previously observed.

The total metered extraction within the Murrayville WSPA for the year ending 30 June 2017 was 55% of the licenced volume. The hydrographs (see **Figure 2.2**) reflect the volume and geographic spread of the extraction bores utilised in 2016/17 (see **Figure 1.1**)

The Explanatory Paper for the Murrayville Groundwater Management Plan describes the seasonal drawdown limit as a maximum of 22 metres, with an eight metre residual drawdown over the period 2001 to 2020, or 0.4 m/year in the most intensively developed area, centred on Panitya (WSPA zone 1). Analysis of water levels in the key observation bores around zone 1 (see **Figure 2.2** - Panitya North) show that over the past sixteen years the impact of extraction on seasonal groundwater levels is significantly less than 22 metres, and at the current rates of extraction, is unlikely to reach the eight metre residual drawdown by 2020.

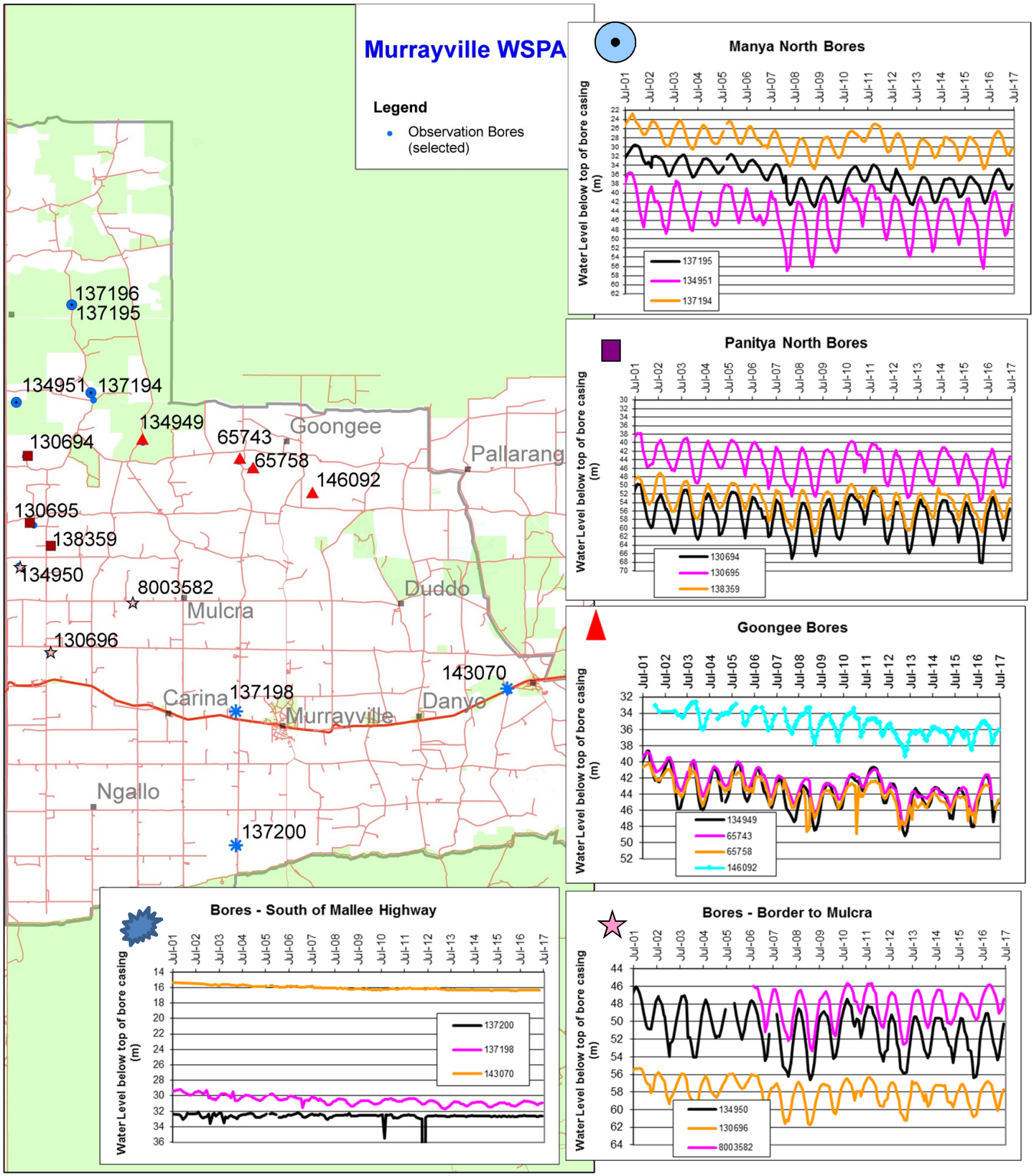
The Border Groundwaters Agreement also includes a prescription for the lowering of the Potentiometric Surface at a maximum rate of 0.65m per year for the management zones in the Murrayville WSPA, the rates observed are well with this limit.

Table 2.1 summarises the aquifer response compared with the limits interpreted from the groundwater plan for zone 1 of Murrayville WSPA.

Table 2.1: *Summary of Aquifer Response*

Bore ID	Maximum seasonal drawdown (m)	Residual drawdown (since 2000)(m)	Average drawdown (m/year)
130694	14	3.46	0.25
130695	12	3.85	0.24
138359	10	3.39	0.21
Plan Limit	***22***	***5.6***	***0.4***

***Figure 2.2**: Selected observation bores and hydrographs (to June 2017)*



3. PLAN IMPLEMENTATION

3.1 Requirements of the Plan – Bore Monitoring

Water level and some water quality monitoring is undertaken by Ventia (www.ventia.com.au) on behalf of DELWP and GWMWater, in accordance with the Murrayville Groundwater Management Plan (the Plan). Additional bores are monitored to address identified data gaps. Monitoring occurs through the State Groundwater Monitoring Contract. **Table 3.1** outlines the monitoring requirements of the Plan for both water level and water quality in relation to activities undertaken during 2016/17.

As reported previously, a small number of bores that were included in the original schedules of the Plan have been replaced by either newly constructed bores or bores in close proximity (usually within three kilometres).

Table 3.1: *Monitoring requirements of the Groundwater Management Plan.*

Prescription	Comment for 2016-2017
8.1 MAINTENANCE OF MONITORING BORES	
(a) The Secretary must, for each bore specified in Schedule 2: (i) periodically inspect the condition of each bore; and (ii) maintain the bore in good condition; and (iii) keep a record of all inspections and work undertaken under paragraph (i) or (ii) (b) GWMWater must, for each bore specified in Schedule 3: (i) periodically inspect the condition of each bore; and (ii) maintain the bore in good condition; and (iii) keep a record of all inspections and work undertaken under paragraph (i) or (ii)	All bores monitored under Schedules 2 and 3 of the Plan are maintained under the SOBN contract by the contractors Ventia. Ventia keeps records of all inspections and works as part of the agreement with DELWP and GWMWater. Annual inspections and depthing is undertaken and works are conducted as necessary under extra works assessments and recorded via the contract documentation with the contract manager.

8.2 WATER LEVELS	
(a) When this Plan commences GWMW and the Secretary must implement a water level monitoring program. (b)The monitoring program requires: (i) the Secretary to determine the potentiometric level in each bore in Schedule 2 during July, October, January and April of every year; (ii) GWMW to determine the potentiometric level in each bore listed in Table 1 Schedule 2 in every month of the year not mentioned in subclause 8.2(b)(i). (iii) GWMW to determine the potentiometric level in each bore so designated in Table 1 Schedule 3 in every month of the year (iv) GWMW to determine the potentiometric level in every bore in Table 2 Schedule 3 during July, October, January and April of every year.	Monitoring as required with exceptions noted in Table 3.2.
(v) the Secretary and GWMW, respectively, must record every potentiometric level in each bore on the Groundwater Management System within 30 days after the level is determined.	Ventia as part of the SOBN contract transfers data to the Water Management Information System (WMIS, http://data.water.vic.gov.au/monitoring.htm) within 30 days of the measurement being determined.

8.3 WATER QUALITY	
(a) When this Plan commences GWMW and the Secretary must implement a water quality monitoring program.	
(b)The monitoring program requires:	
(i) the Secretary to collect and analyse for salinity, a sample of water from each bore in Table 1 Schedule 4 in July October January and April of each year; and	A sample was taken for bore 54642 in October. There is no data available for the remaining bores listed in Table 1 of Schedule 4 on WMIS.
(ii) GWMW to collect and analyse for salinity a sample of water from each bore in Table 2 Schedule 4 in September and March of each year; and	Samples were collected by GWMW in October and June for each of the bores (or replacement bores) listed in Table 2 of Schedule 4.
(iii) the Secretary and GWMW respectively must record the results of each analysis on the Groundwater Management System within 30 days after the salinity is determined	Salinity data has been entered into the WMIS, though not consistently within the timeframe required by the Plan due to no direct access to the data input portal of WMIS. The data collected by GWMW is now being forwarded directly to DELWP for input to the WMIS.

3.1.1 Water Level Monitoring

The tables within schedule 2 of the Plan regarding water level monitoring are summarised in **Table 3.2.** A map illustrating the locations of the current monitoring sites in the Murrayville WSPA is provided in Appendix 1. The map in Appendix 1 illustrates the geographic extent of monitoring throughout the WSPA, with particular concentration in areas where the extraction is greatest. Comments regarding the water level monitoring undertaken in compliance with the plan is further summarised in **Table 3.2**.

There were no reported cases of observation bores requiring works in 2016/17. There was one bore on private property which appeared to have been pumped by the landholder with a significant drop in level noted, however groundwater levels had returned to the expected level by the next reading visit.

Table 3.2: *Observation bore water level monitoring schedule*

Bore ID	Scheduled Frequency	Comment
130694	Monthly	
130695	Monthly	New headworks April 2011
143069	Monthly	
130696	Monthly	
134950	Monthly	New headworks April 2011
82220/ 8003582	Monthly	82220 decommissioned 8003852 commenced October 2006
137197	Monthly	
65758	Monthly	
65743	Monthly	
137191	Monthly	
137198	Monthly	
137199	Monthly	
137195	Monthly	
137196	Monthly	
137200	Monthly	
137201	Monthly	
137194	Monthly	
134949	Monthly	
137190	Monthly	
134951	Monthly	New headworks April 2011
138359	Monthly	New headworks April 2011

Bore ID	Scheduled Frequency	Comment
61571/ 8003857	Quarterly	Ceased September 2008, bore decommissioned and replaced, new bore 8003857 monitored from July 2010
61572/ 8003923	Quarterly	Ceased September 2008. Bore decommissioned and replaced new bore 8003923 monitored from July 2010
61573/ 8003854	Quarterly	Completed monthly to September 2008. Bore decommissioned and replaced, new bore 8003854 monitored from July 2010
77201	Quarterly	Not monitored. Reported previously
138350	Quarterly	Not monitored. Reported previously
82242	Quarterly	Not monitored. Reported previously
138361	Quarterly	Not monitored. Reported previously
85806	Quarterly	Completed monthly
143070	Quarterly	Completed monthly (in fill)
49676	Quarterly	Completed
49677/ 8003858	Quarterly	Ceased September 2008. Decommissioned and replaced by 8003858
49678	Quarterly	
82235	Monthly	
146092	Monthly	New headworks April 2011
New Bores not in plan		
8002663	Monthly	Monitored from August 2005
8002664	Monthly	Monitored from August 2005
8002665	Monthly	Monitored from August 2005
8002666	Monthly	Monitored from August 2005

3.1.2 Water Quality Monitoring

Table 3.3 provides a summary of the water quality monitoring sites scheduled in the plan. A map and the associated salinity readings are provided in Appendix 2. The salinity levels are stable at these sites, hence the altered frequency of monitoring, as this does not appear to compromise the information gathered. All data collected indicates that the salinity levels have remained relatively stable throughout the WSPA.

The water quality program scheduled in the plan has been enhanced by annual sampling of more than 40 domestic and stock bores located throughout the WSPA. This program has been in place since 2008. Annual sampling provides sufficient data to monitor salinity trends across the WSPA. A map illustrating the salinity data at sampling points as recorded in November 2016 is illustrated in Appendix 3. Graphs of bores grouped by Parish are also illustrated in Appendix 3.

Table 3.3: *Salinity monitoring undertaken*

Bore	Monitored by	Scheduled Frequency in Plan	Comment
54642	DELWP	Quarterly	One sample in October 2016
54636	DELWP	Quarterly	Not undertaken 2016/17
65745	DELWP	Quarterly	Not undertaken 2016/17
77199	DELWP	Quarterly	Replaced by 77201 – monitored to June 2007
49679	DELWP	Quarterly	Not undertaken 2016/17
49677	DELWP	Quarterly	Not monitored since June 2006
61585	GWMWater	Six monthly	Completed
141209	GWMWater	Six monthly	Completed
141210/8002325	GWMWater	Six monthly	Replaced by 8002325, completed
141211	GWMWater	Six monthly	Ceased due to lack of infrastructure
61578/8004168	GWMWater	Six monthly	Replaced by 8004168, completed
97184	GWMWater	Six monthly	Completed
97181	GWMWater	Six monthly	Completed
105355	GWMWater	Six monthly	Completed

3.2 Bore Metering, licencing and use

Table 3.4 outlines the requirements of the Plan with regards to licencing and use and the comments with regards to implemenation.

As part of the Bore Metering Program undertaken by GWMW, each irrigation bore and active commercial bore is fitted with a meter. All meters were replaced early in 2016. A total of 31 meters have been installed, all of which were utilised this year. Meters are read mid-season in January and end of season in June by GWMWater.

Table 3.4: *Requirements of the Groundwater Management Plan – licencing and use.*

Prescription	Comment for 2016-2017
9.2 METER READINGS	
(a) GWMW must implement a bore meter reading program for each bore operating in the WSPA. (b) The metering program requires GWMW to read each meter twice yearly. (c) GWMW shall estimate the volume and rate of extraction for any bore where the meter has failed.	New meters were installed for season 2016. Readings were taken in January and June. No estimates were required in 2016/17, metered data was input into the Victorian Water Register by 30 June 2017.
9.3 OTHER GROUNDWATER ACCOUNTING PROCEDURES	
(a) GWMW must record annually from every irrigation bore in the Protection Area: (i) the total area of land irrigated with groundwater, and (ii) the type of crop irrigated with groundwater	GWMWater has provided the estimated irrigated area in Section 1, Introduction. Section 1 of this report describes the crops irrigated but does not disclose the area specifically due to past poor return rates of crop plans from irrigators.
10 RESTRICTIONS AND PROHIBITIONS ON ISSUING GROUNDWATER LICENCES	
(a) GWMW must not grant a groundwater licence for any volume of groundwater which would cause (i) the Upper Limit of Allocation for any Zone to be exceeded or (ii) the Permissible Annual Volume of the whole of the Protection Area to be exceeded.	One new licences was issued as illustrated in Table 3.3. The volume licenced did not cause any exceedance of allocation limits.
11 EXTENT TO WHICH A LICENCE MAY BE TRANSFERRED	
(a) GWMW may only approve the transfer of a groundwater licence entitlement: (i) from a licensee to a person who proposes to extract groundwater within the Protection Area that is not from a licensee outside Zone 1 to a person who proposes to extract groundwater within Zone 1.	All transfers are conducted within the Zone Limits.
(b) GWMW must maintain a register and record the following information about any transfer of any groundwater licence:	The Victorian Water Register is used as the register for trades.

Prescription	Comment for 2016-2017
(i) the Groundwater Management System identification number of the bore of the transfer and transferee; (ii) the groundwater licence number, (iii) the date upon which the transfer was approved, (iv) the maximum volume of groundwater transferred.	
12 NOTIFICATION OF DOMESTIC AND STOCK USES	
The occupier of any bore from which groundwater is taken solely for domestic and stock purposes must within six months after this Plan commences and at five yearly intervals thereafter notify GWMW of the taking of groundwater on a form provided by GWMW for that purpose.	A survey was not required in this reporting period.
13 LICENCE CONDITIONS	
In any year an additional 20% of the maximum annual volume may be taken and used provided that the total volume taken over three successive years does not exceed three times the maximum annual volume.	No licencee required the application of this condition in 2016/17.

3.2.1 Water Use

Table 3.5 provides details of total water use in the WSPA during the reporting period compared to previous years. This is represented graphically in **Figure 3.1**.

Of the 33 licences in the WSPA, 18 were utilised for the extraction of groundwater. Three temporary transfers of water entitlement were administered in 2016/17. There were no instances of use in excess of the allowable volume for the licence (including transfers and consideration of the "*Three-year rolling average*").

Table 3.5: *Water use*

Parameter	2016/17	2015/16	2014/15	2013/14	2012/13	2011/12	2010/11	2009/10
Number of licences	33(4)	32	32	32	32	32	36(1)	35
Total licensed volume (ML)	9,633.5	9,633.5	9,633.5	9,633.5	9,633.5	9,633.5	9,633.5(3)	9,633.8(2)
Total use (ML)	5,255.4	5,581.18	4,961.15	3,585.51	5,568	4,667.0	4,057.8	5,415
Use of licensed volume (%)	54.55%	57.94%	51.5%	37.22%	57.80%	48.4%	42.1%	56.2%
PCV (ML)	10,883	10,883	10,883	10,883	10,883	10,883	10,883	10,883
Use of PCV (%)	48.3%	51.28%	45.59%	32.95%	51.16%	42.9%	37.3%	49.8%

Notes

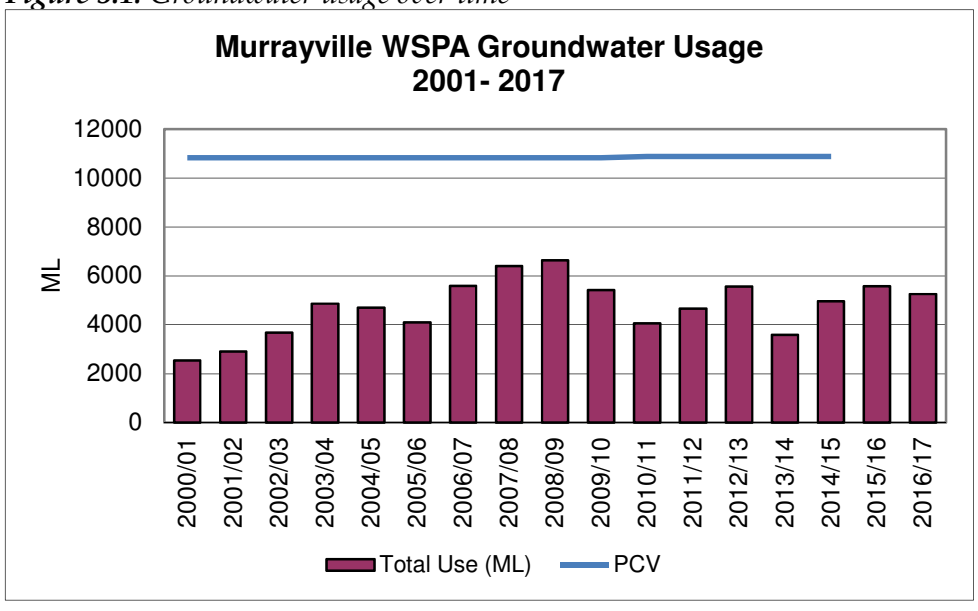
(1) The number of licences increased as some were split across management zones to assist assessment and reporting.

(2) There was an error in reporting total allocated volume which has carried through until 2008/09 when it was identified. The volume allocated has not changed since 2004/05. The error occurred in the process of accounting for temporary transfers, with the same volume being transferred each year that the incorrect figure was reported.

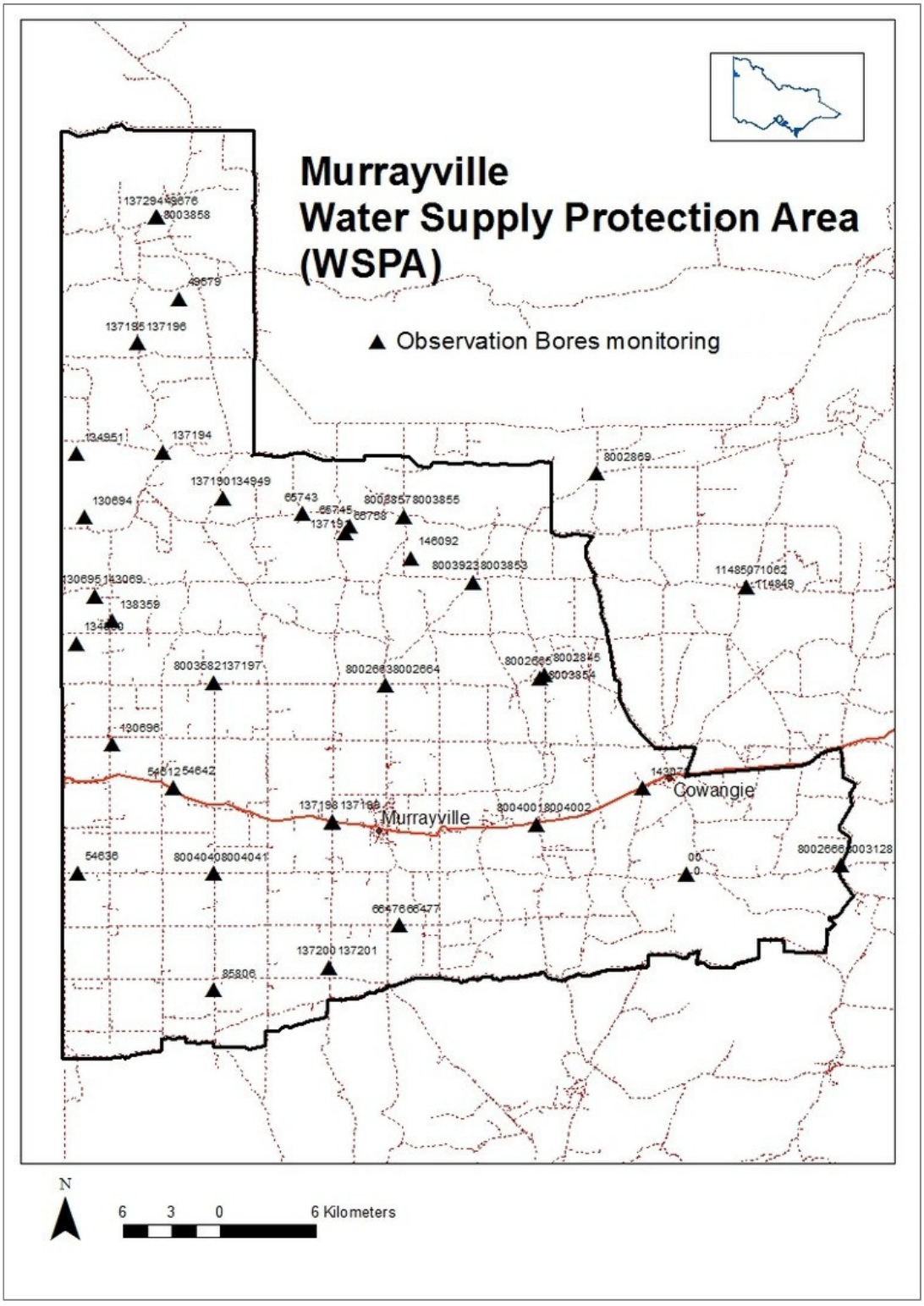
(3) Licensed volume adjusted to correct a rounding error detected in 2010/11.

(4) One new licence issued, with no increase in total licensed volume.

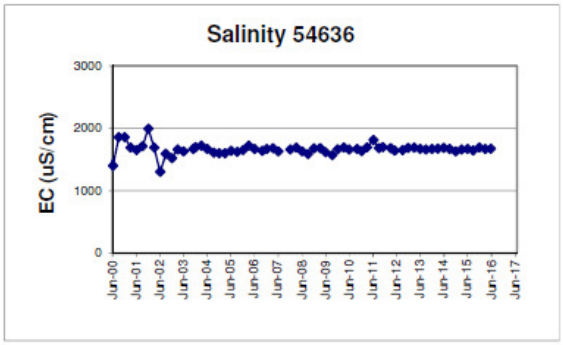
Figure 3.1: *Groundwater usage over time*

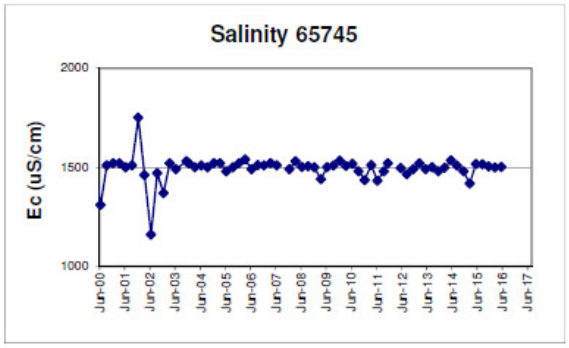


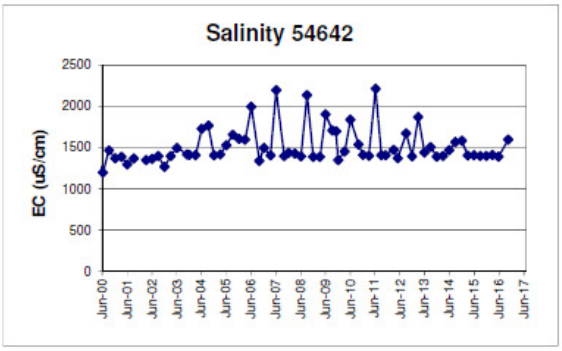
Appendix 1 Murrayville Water Supply Protection Area –monitoring sites

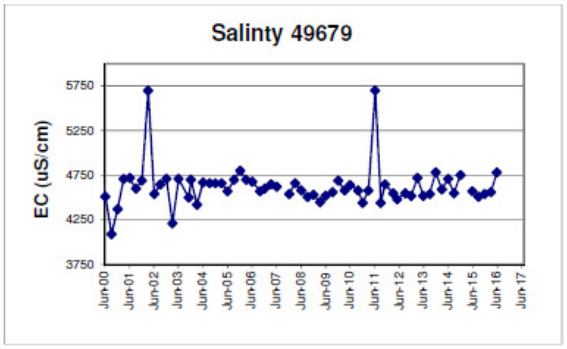


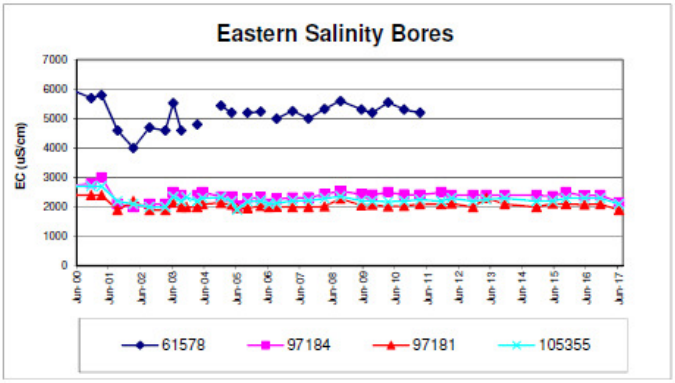
Appendix 2 Salinity readings – Plan bores

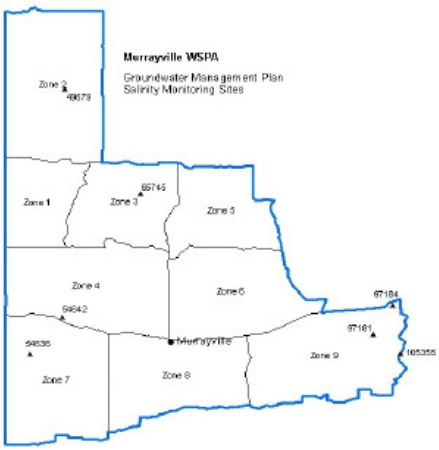




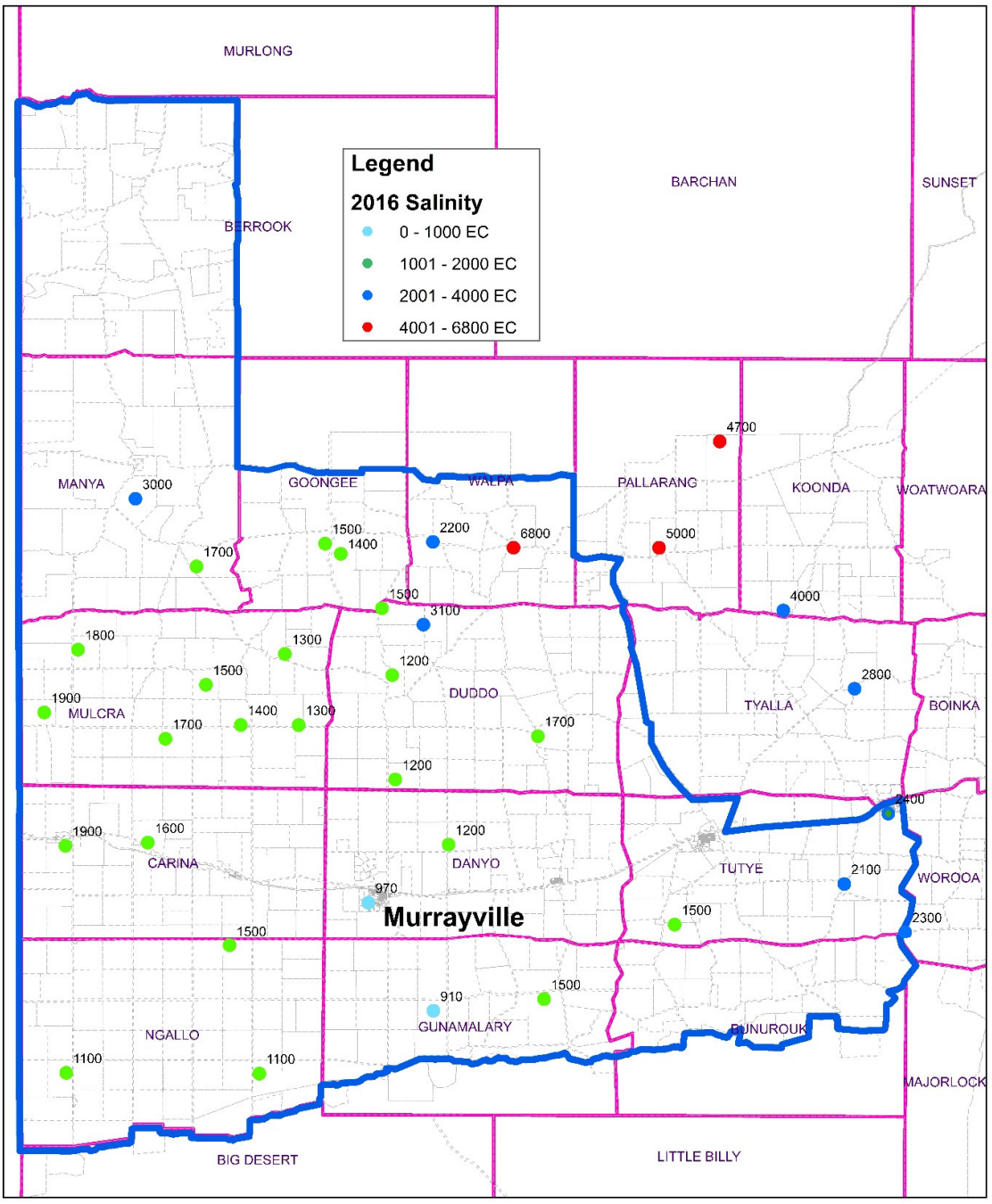








Appendix 3 Salinity sampling domestic and stock bores - November 2016



File:

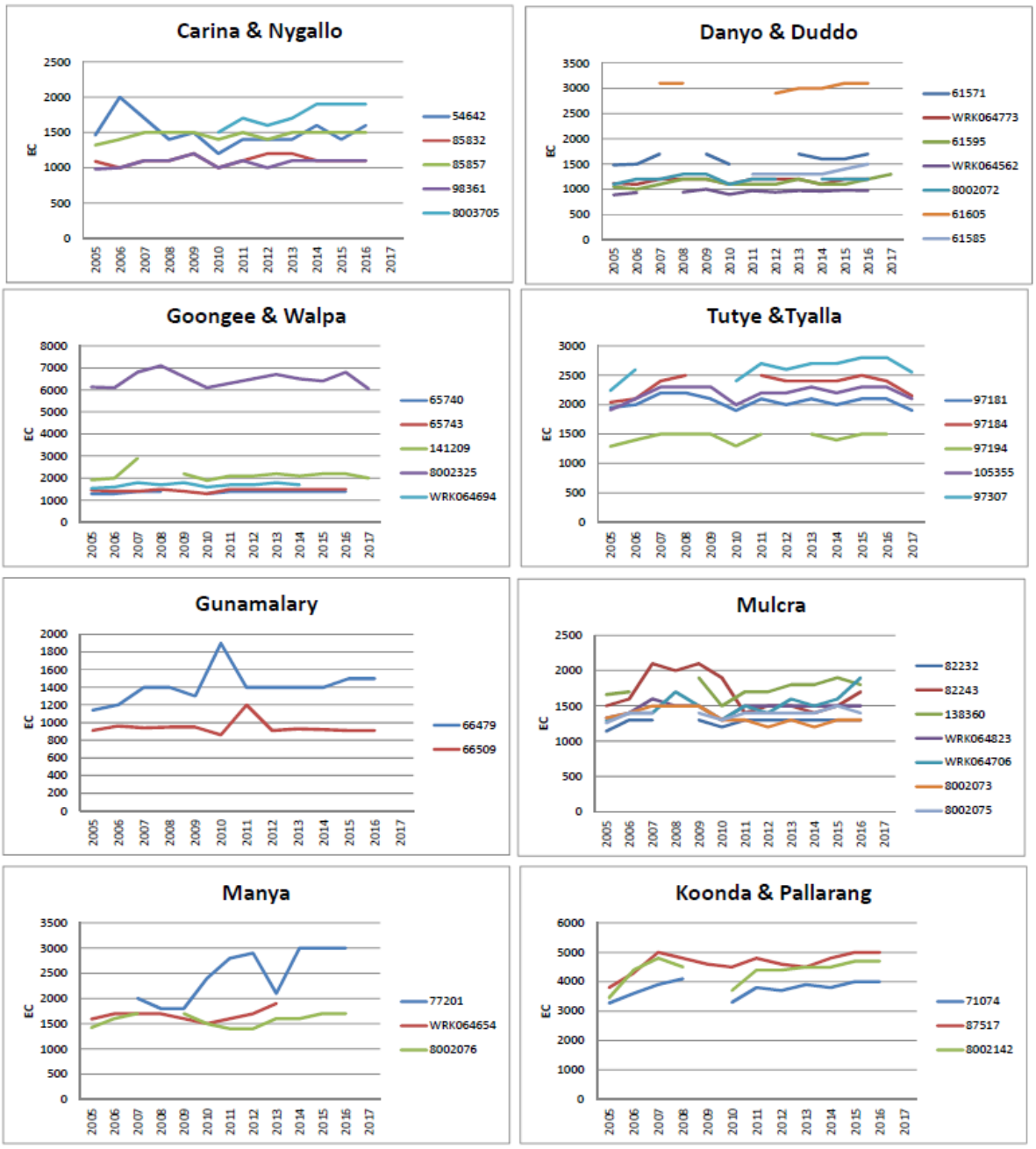
GWMWater

Condition of Use:

Geographic Information System (GIS) information is provided by GWMWater to external parties on the understanding it will only be used for the project intended. The information provided must not be used in whole or in part for any other use without prior approval from GWMWater. The information is intended to be indicative only. External parties should make their own enquiries to ensure the accuracy of the information. GWMWater takes no responsibility for inaccurate or misleading data.

Murrayville Salinity Sampling 2016

Scale:
Scale: **1:261,073**
Original Sheet Size: **A4**
Print Date: **March 2016**
Datum: **Geocentric Datum of Australia (1994)**
Projection: **UTM Map Grip of Australia**
M.G.A. Zone 54

N

Salinity readings – Domestic and stock bore sampling results (2005-2017) by location (Parish)