Otway Water

- One Giant Environmental Footprint.

otwywater.org.au
Malcolm Gardiner

Boundary Creek

Wetland along Boundary Creek September 2008

October 2008

ACKNOWLEDGEMENT and DEDICATION

As Margaret Mead wrote ...

> *"Never doubt that a small group of thoughtful committed citizens can change the world. Indeed it is the only thing that ever has."*

This book is dedicated to and in acknowledgement of the inspiration gained from *"...a small group of thoughtful committed citizens..."*

... my partner Kay, for the 40 residents of the Kawarren and Gellibrand valleys who attended the first meeting at the Gellibrand Hall; the 75 people who at short notice attended the Barwon Water offices in Colac; the 230 people who attended the Gellibrand meeting in October 2007; the printers of books and other material; the placard makers; the emailers; the letter writers; the proof readers; the solicitors; the T- Shirt makers; the web site co-ordinators; the regular attendees of the Wednesday night gatherings; the car sticker designers; the big photos maker; the young and the elderly alike; the Pointers; the attendees of meetings as far away as Warrnambool, Geelong and Melbourne; the librarians; cartographer; the people in contact with the multitude of organisations; the media **AND especially those people in the background facilitating and making it possible for the "workers" to do their "work."**

It never ceases to amaze me how many people are capable of providing that spark of enthusiasm, drive and willingness to contribute and persevere against seemingly stacked odds.

We are indeed also very fortunate to be living in a country where the freedom still exists enabling its citizens to openly voice their objections to an issue.

Disclaimer

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October 2008

Email: otwaywater@yahoo.com.au

INTRODUCTION

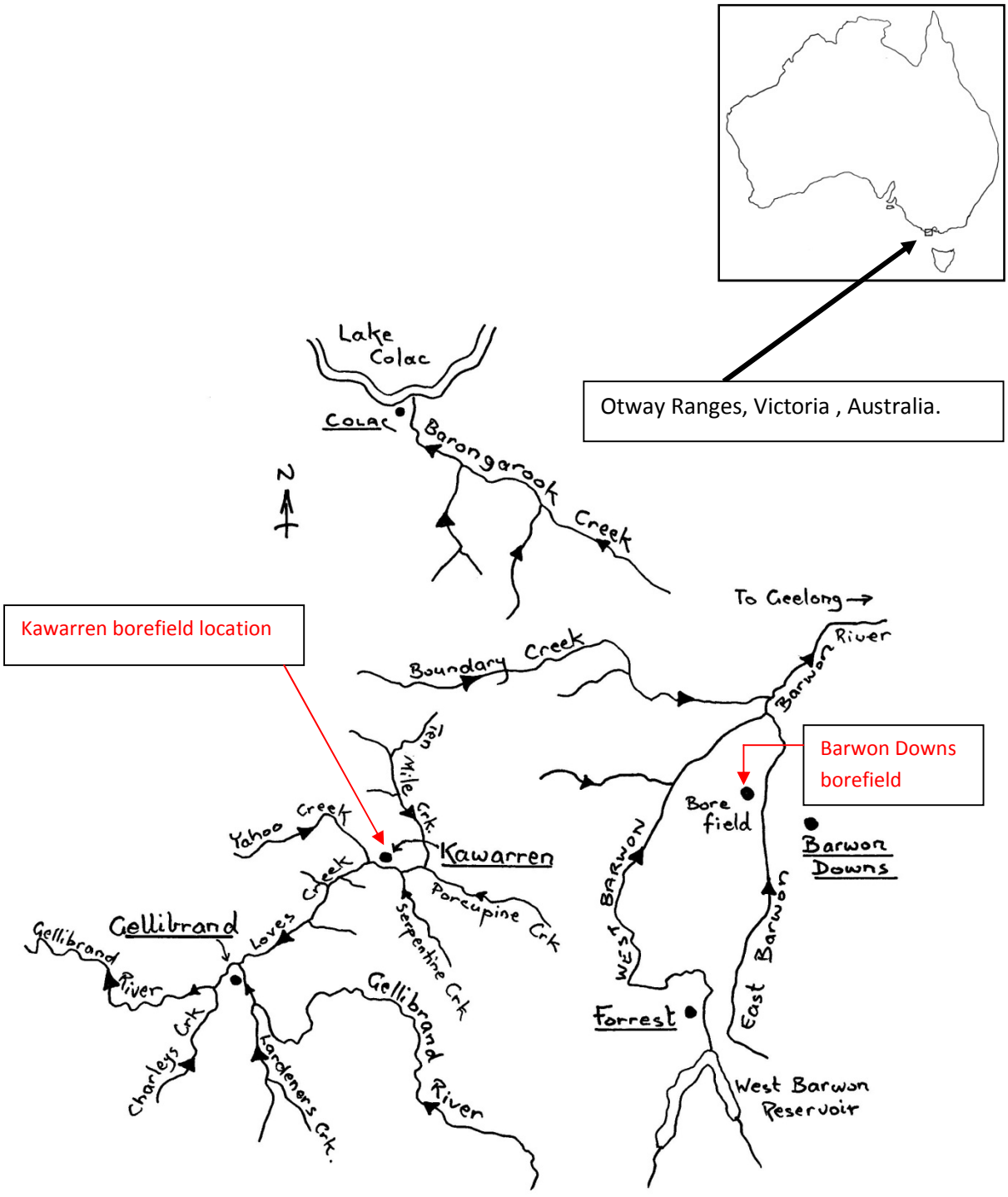
The Barwon Regional Water Authority has been extracting large volumes of groundwater from the Gerangamete Groundwater Management Area off and on since the drought of 1982–83. The water is extracted between 500 to 600 metres below ground level, at the Barwon Downs borefield. It is treated and then conveyed and used in the Greater Region of Geelong. The environmental and social impacts of this pumping regime have been profound. Since Barwon Water has indicated that it is going to begin test pumping from a borefield at Kawarren with the aim of extracting 16 000 ML/year, Barwon Water's Sustainable Management Practices have come under scrutiny from the Kawarren and Gellibrand community residents and landholders.

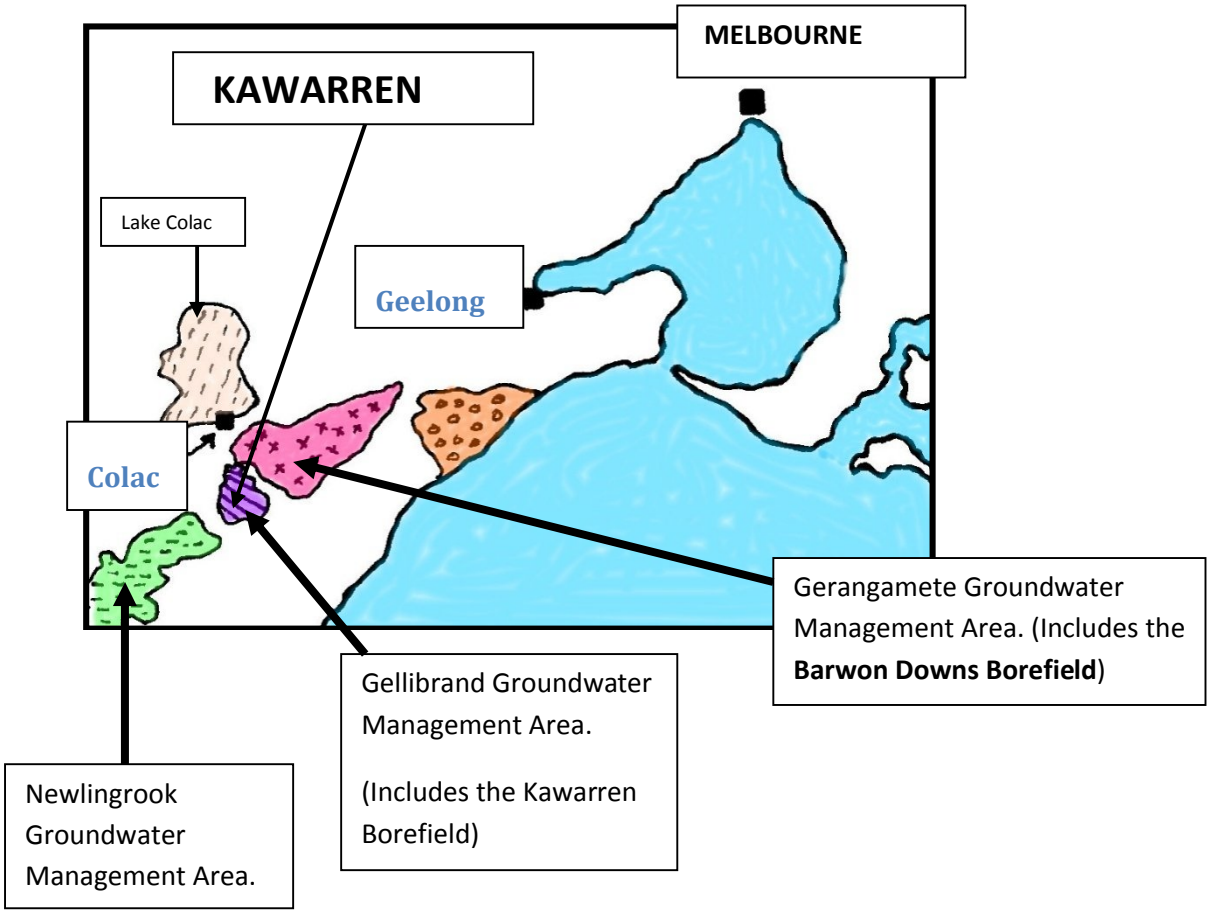
This scrutiny indicates that there has to be a monumental shift in sustainable management practice before any groundwater extraction of any kind can be allowed to proceed at the Kawarren or any other borefield.

This book is the eighth of a series on Otway Water. Earlier books have provided documented and referenced material that clearly shows groundwater extraction from the borefield at Barwon Downs has had a profound detrimental affect on the area surrounding this borefield. There are a number of indicators presented in this book that suggest the detrimental sphere of influence maybe more severe and covering a wider area than first thought. Regardless, it is blatantly obvious that a full and comprehensive review of groundwater extraction in the Barwon Downs area is long overdue. Considering that the planned borefield investigations at Kawarren were to be conducted in a similar fashion to the 1987 Barwon Downs borefield investigations, it would be prudent to delay any of this work until the findings of the Barwon Downs review have been completed.

Einstein's idea that "the significant problems we face today, cannot be solved at the same level of thinking that created the problems," is worthy of consideration. Perhaps it could be said that the significant problems we face along Boundary Creek cannot be solved by the same consultants and managers that created the problems.

LOCATION MAP





Source: The Our Water Our Future Victorian State Government publications.

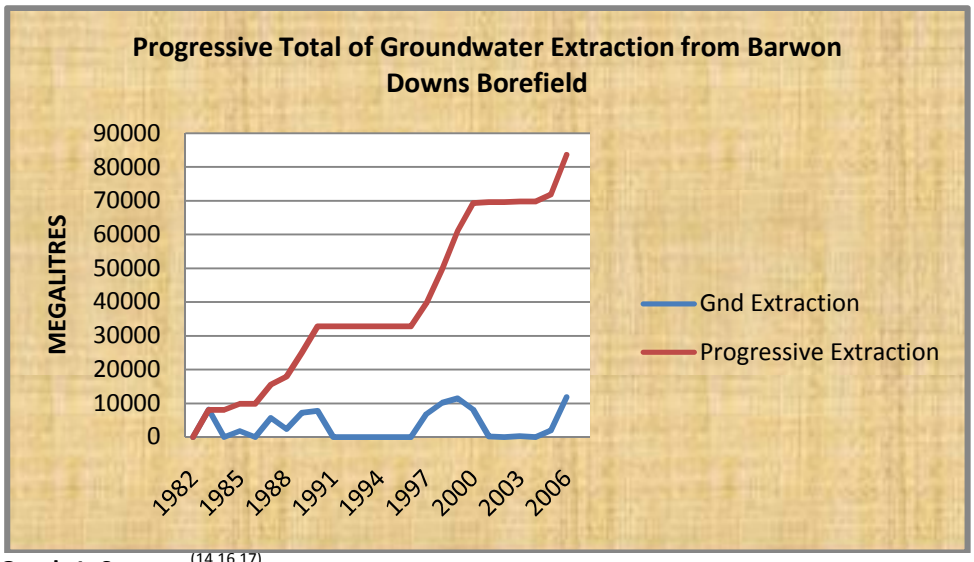
CONTENTS

CHAPTER 1

Drawdown in the Barwon Downs Valley

This chapter presents the known drawdown effects that have resulted from the extraction of groundwater at the Barwon Downs borefield at Gerangamete.

It is reasonable to assume that until the drought of 1982-83 when Barwon Water extracted huge amounts of groundwater from the Barwon Downs borefield, that the groundwater resources from this aquifer were relatively untouched[11].



Graph 1. Sources [14,16,17]

By the end of the 2006-07 reporting period approximately 83 000 ML had been extracted. In simplistic terms the following sketch gives some indication of the extent that this extraction has had on the drawdown of the water table in the Dilwyn aquifer.

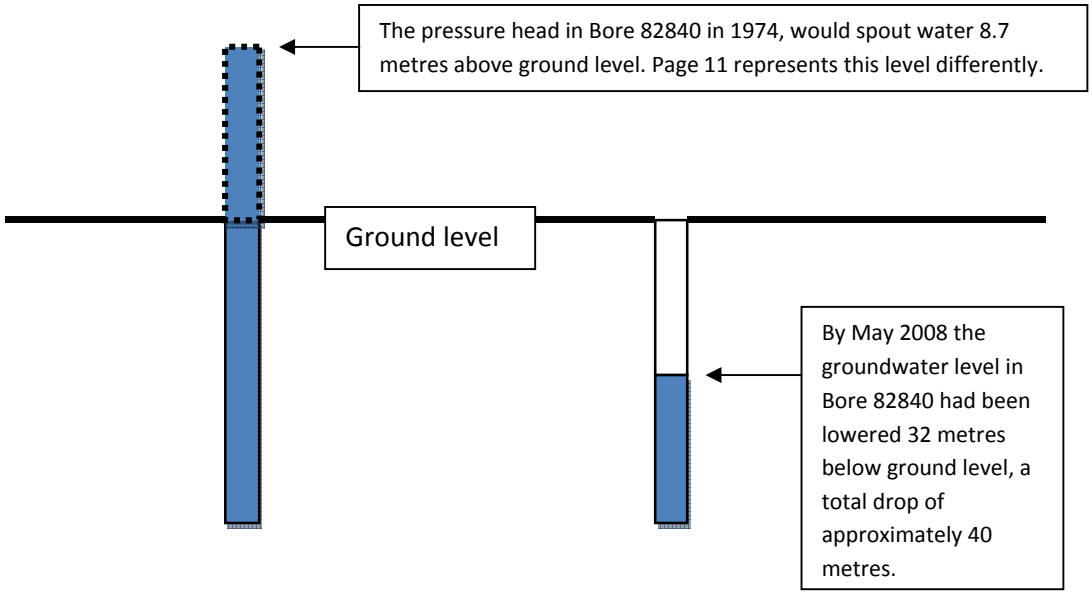


Diagram 1.

A similar drawdown in the water table is apparent throughout the area as a result of groundwater extraction at Barwon Downs. At the point of extraction the drawdown has been in the order of 50 metres.

Before groundwater extraction at Barwon Downs, the deepwater aquifer in this area would spurt from the bores high into the air.

These bores were artesian[10](also see page 26 for a Statutory Declaration to this fact).

This is Bore 82840 along Wire Lane, Muroon. The corrosive effect of the groundwater is obvious.

Open one of these gate valves when the Barwon Downs borefield is in operation and air will be sucked in due to the vacuum created by the drawdown in the water table. This Bore 82840, used to squirt water 8.7 metres into the air but in May 2008 the water level was 32 metres below the surface.(see Graph 2, page 10).

In 2004 this bore was no longer considered artesian as indicated in the groundwater extraction Licence Number 893889 (see page 9). Under normal conditions this bore would be regarded as artesian. Stop the groundwater extraction and this bore would replenish and water would freely flow from it.

This is extremely significant when considering the claims being made by farmer Roger Brien who farms in this immediate area. Roger maintains that his farm is seriously affected by the drawdown of the aquifer in his locality.

This is an example of artesian water at Kawarren in the Gellibrand Groundwater Management Area (Bore 108910). This water is spurting approximately 3 metres above ground level, May 2008.

The water table graph for this bore in the Gellibrand Groundwater Management Area is seen on page 12, Graph 5.
The Blue line in these graphs represents the ground level. The red line represents the water table level. When the red line is above the blue one the bore is regarded as being artesian. The water will spurt out of an uncapped bore.

Extract from the 2004 Groundwater Licence for the Barwon Downs borefield.

Groundwater Licence No. 893889
Barwon Region Water Authority

THIRD SCHEDULE

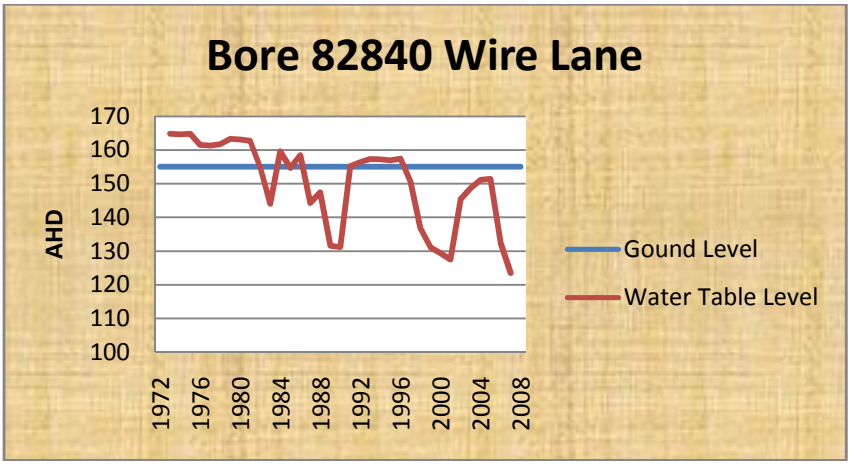
BoreID	RunID	Zone AMG	Easting	Northing	Parish	Locality	Road Name	Nearest Cross Road	VicRoads Ref	BoreType
47771	BD3M	54	750880	5744900	BAMBRA	DEANS MARSH	Pennyroyal Valley Rd	Winchelsea-Deans Marsh Rd	92F8	non artesian
47773	BD3M	54	752700	5747000	BAMBRA	DEANS MARSH	Smiths Lane	Bambra Cemetery Rd	92G8	non artesian
47774	BD3M	54	753850	5749150	BAMBRA	BAMBRA	Winchelsea-Deans Marsh Rd	Fultons Lane	92G7	non artesian
47775	BD3M	54	750000	5749000	BAMBRA	DEANS MARSH	Salt Creek Lane	Rifle Butts Rd	92F7	non artesian
48001	BD3M	54	729350	5741750	BARONGAROOK	BARONGAROOK	Barongarook-Gerangamete Rd	Westwards Track	92C9	non artesian
48249	BD3M	54	740280	5737655	BARWON DOWNS	BARWON DOWNS	Woodlands Rd	Mahers Rd	92E9	non artesian
62578	BD3M	54	730605	5747505	ELLIMINYT	YEO	Yeo-Yeodene Rd	Old Yeo Rd	92C8	non artesian
64227	BD3M	54	731089	5737164	GERANGAMETE	GERANGAMETE	Pipeline Rd	Boundary Rd	92C9	non artesian
64228	BD3M	54	731155	5736982	GERANGAMETE	GERANGAMETE	Pipeline Rd	Boundary Rd	92C9	non artesian
64229	BD3M	54	737615	5740832	GERANGAMETE	GERANGAMETE	Dewings Bridge Rd	Seven Bridges Rd	92D9	artesian
64230	BD3M	54	738700	5741367	GERANGAMETE	GERANGAMETE	Dewings Bridge Rd	Dewings Rd	92D9	artesian
64233	BD3M	54	734250	5741550	GERANGAMETE	GERANGAMETE	Westwood Rd	Westwood Track	92C9	non artesian
64234	BD3M	54	738750	5741450	GERANGAMETE	GERANGAMETE	Dewings Bridge Rd	Dewings Rd	92D9	artesian
64235	BD3M	54	732400	5739150	GERANGAMETE	GERANGAMETE	Meadowell Rd	Gold Hole Rd	92C9	non artesian
64236	BD3M	54	736300	5737800	GERANGAMETE	GERANGAMETE	Seven Bridges Rd	Dewings Bridge Rd	92D9	non artesian
64237	BD3M	54	733800	5738100	GERANGAMETE	GERANGAMETE	Seven Bridges Rd	Colac-Forrest Rd	92C9	artesian
64238	BD3M	54	733600	5742900	GERANGAMETE	GERANGAMETE	Westwood Rd	Thru Track	92C8	non artesian
64239	BD3M	54	732150	5742000	GERANGAMETE	GERANGAMETE	Thru Track	Westwoods Rd	92C9	non artesian
64240	BD3M	54	734200	5741500	GERANGAMETE	GERANGAMETE	Westwoods Rd	Westwoods Track	92C9	non artesian
64241	BD3M	54	736900	5736550	GERANGAMETE	FORREST	Track off Seven Bridges Rd (thru State Forest)	Seven Bridges Rd	92D9	non artesian
64242	BD3M	54	738850	5741375	GERANGAMETE	GERANGAMETE	Dewings Bridge Rd	Dewings Rd	92D9	non artesian
64244	BD3M	54	731725	5739500	GERANGAMETE	GERANGAMETE	Link Rd	Gold Hole Rd	92C9	non artesian
64245	BD3M	54	738288	5737858	GERANGAMETE	GERANGAMETE	Dewings Bridge Rd	Dewings Rd	92D9	artesian
64246	BD3M	54	738870	5741370	GERANGAMETE	GERANGAMETE	Dewings Rd	Dewing Bridge Rd	92D9	artesian
64247	BD3M	54	737557	5740323	GERANGAMETE	GERANGAMETE	Dewings Bridge Rd	Seven Bridges Rd	92D9	non artesian
64248	BD3M	54	738779	5742075	GERANGAMETE	GERANGAMETE	track off Dewings Bridge Rd	Dewings Rd	92D9	artesian
82838	BD3M	54	742052	5743756	MURROON	MURROON	Wire Lane	Colal-Forrest Rd	92E8	non artesian
82840	BD3M	54	742052	5743756	MURROON	MURROON	Wire Lane	Colac-Forrest Rd	92E8	non artesian

Bore along Wire Lane that was artesian when drilled in the 1970s.

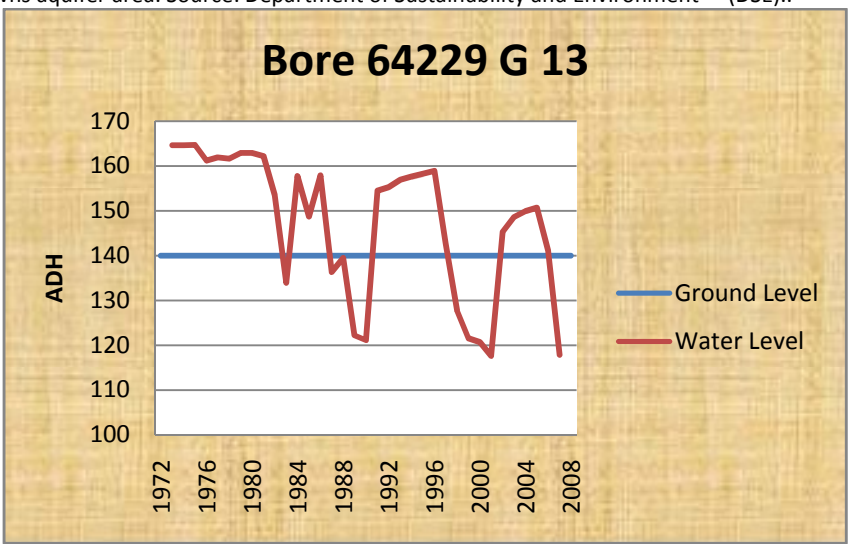
This bore along Wire Lane is clearly indicated as non artesian.

These are bores that Barwon Water has to monitor under Licence conditions Number 893889.

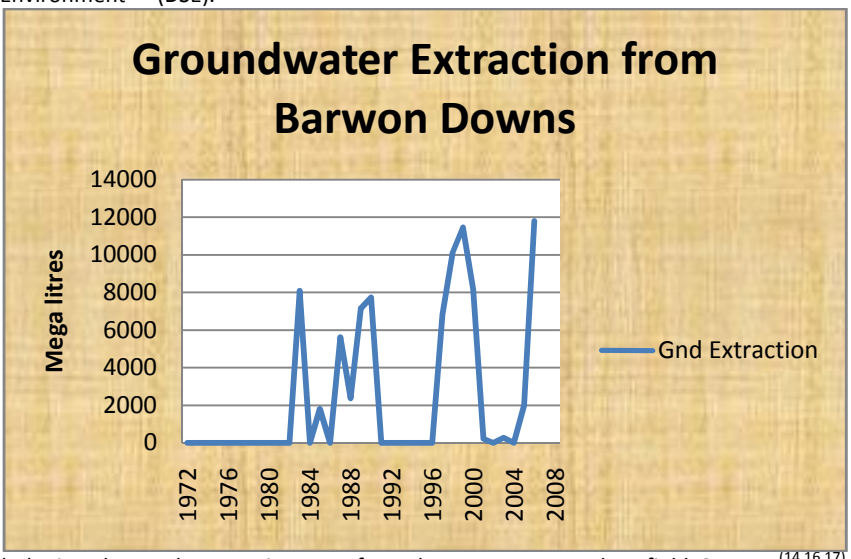
When asked for the drawdown data on all bores that were artesian and are no longer so (point 6 page 17), Barwon Water did not include the data for this bore along Wire Lane until prompted (point 5 page 18). This is quite amazing and indicates a lack of thoroughness with record keeping and retrieval processes. There are other possibilities for this omission that come to mind.



Graph 2. This Wire Lane bore is approximately 4 km from the extraction bores at the Barwon Downs borefield. This bore is in the Barwon Downs aquifer area. Source: Department of Sustainability and Environment[10] (DSE)..



Graph 3. G 13 is at the extraction point. This bore is also in the Barwon Downs aquifer area. Source: Department of Sustainability and Environment[10] (DSE).



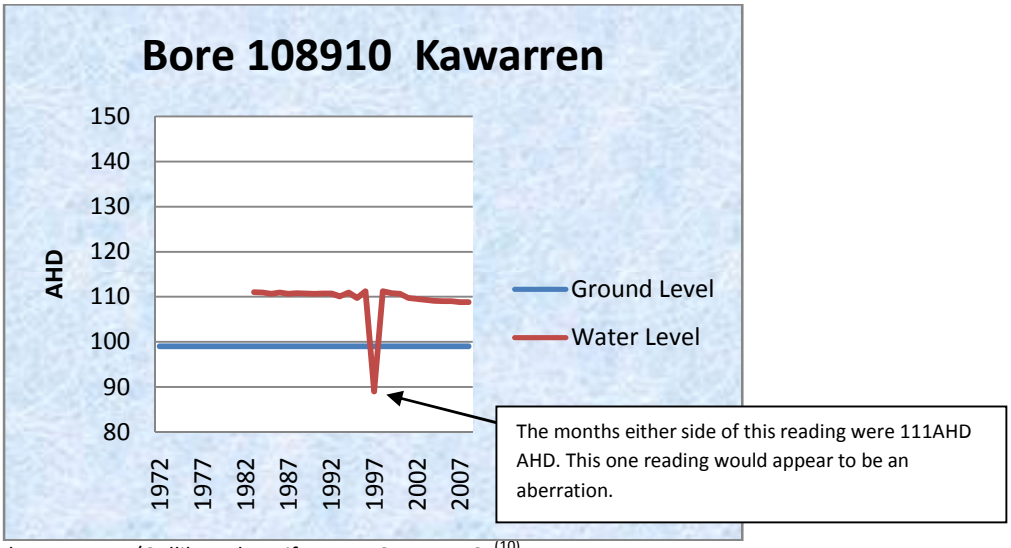
Graph 4. This graph depicts the yearly extraction rates from the Barwon Downs borefield. Source: [14,16,17].

The drawdown Graphs 2 & 3, closely follow the inverse to the extraction rates from the Barwon Downs borefield as seen in Graph 4.

When Bore 82840 was first drilled into the aquifer this was the height of the water spurting out of the ground, 8.7 metres above ground level. This is the same aquifer that Barwon Water extracts groundwater from. As at November 2007 this extraction had lowered the water table point at least 40 metres lower (see graph 2 above).

0.9 metres.

Bore Number 82840 along Wire Lane.



Graph 5. This bore is in the Kawarren/Gellibrand aquifer area. Source: DSE[10]

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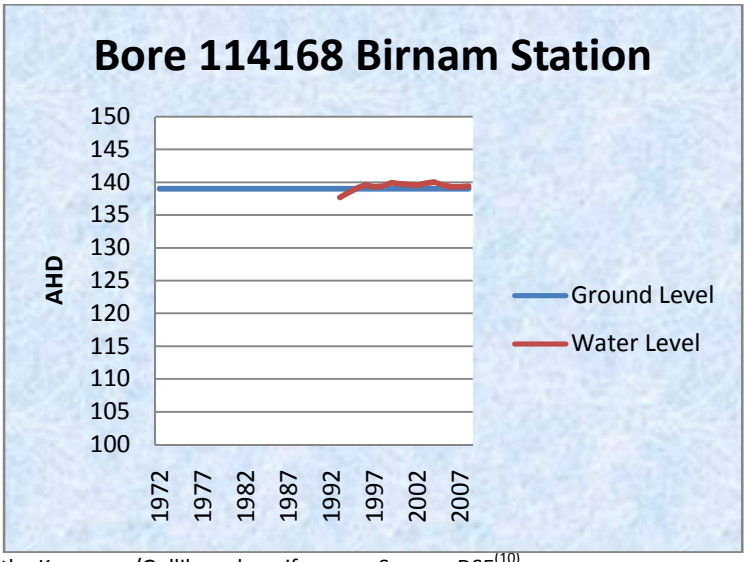
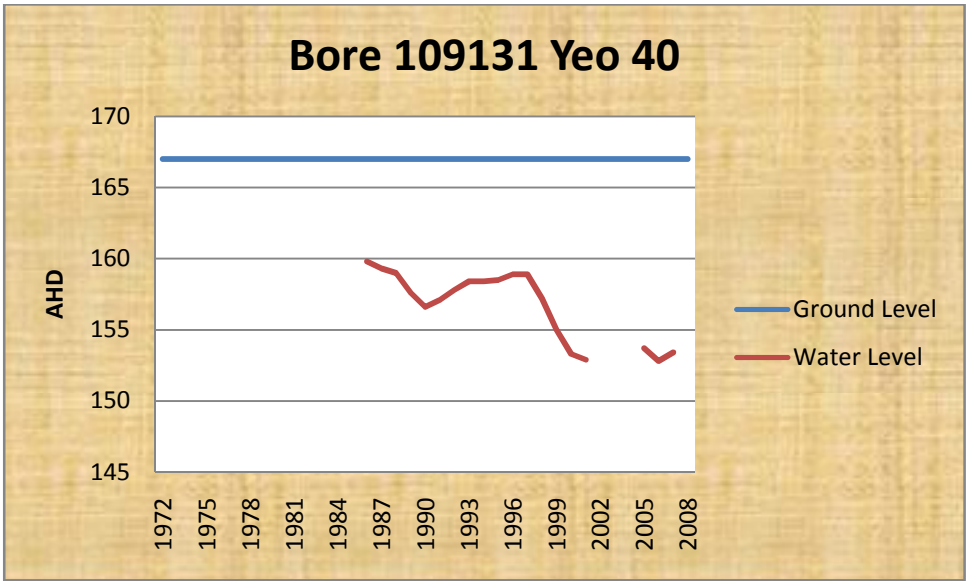


Graph 6. This bore is in the Kawarren/Gellibrand aquifer area. Source: DSE[10].

Both these bores in the Kawarren/Gellibrand area are artesian. There is a distinct difference between the water table graphs of these bores, where there has been negligible groundwater extraction, to the ones in the Barwon Downs area where there has been significant groundwater extraction. From this limited data it would appear most obvious that groundwater extraction in the Barwon Downs area is having a significant impact. It must also be noted that these two Kawarren bores have shown little effect from the worst drought on record.



Graph 7. Yeo 40 is one of the Trigger Level bores for the Barwon Downs extraction Licence.

In 1986 Farmar-Bowers[11] indicated that Yeo 40 was not an artesian bore. The water table was 7.34 metres below ground level.

Farmar-Bowers also had these things to say in his report...

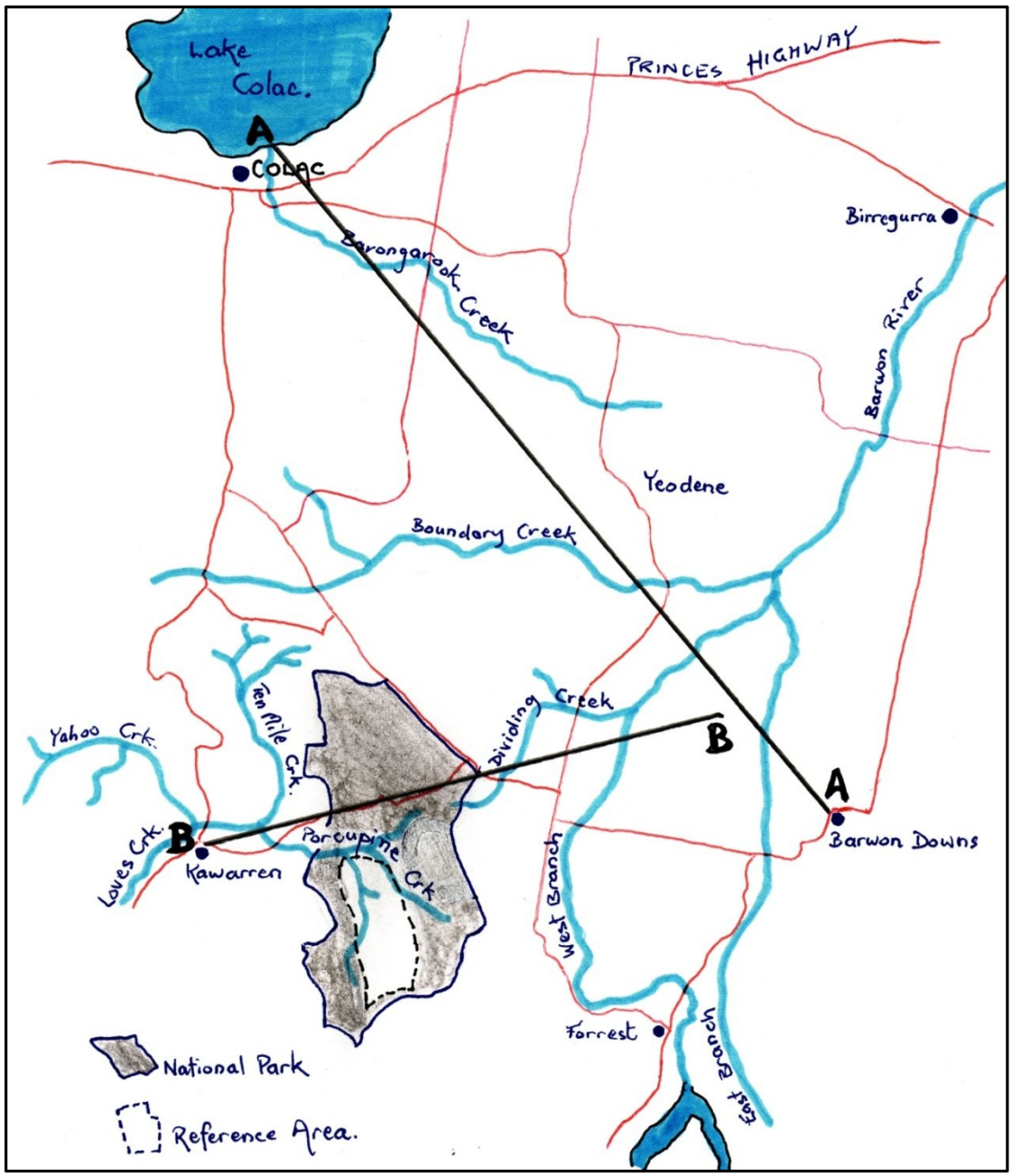
- *"Currently water tables appear to be quite stable and there is little movement between seasons or years. (J. Leonard Pers. Com.)."*
- *"Map 2*(this map is one in Farmar-Bowers report) *gives information on groundwater levels in the area adjacent to the middle reaches of Boundary Creek. The levels are taken from current (1986) readings of D.I.T.R. bores. They indicate that groundwater adjacent to the creek is artesian*."

When groundwater is extracted from the deep water aquifer the pressure head is lowered and the dynamics of the sediment layers sitting on top of the crystalline rock that makes up the crust of the earth undergoes subtle changes. The more water extracted the greater the dynamics are altered. Taking out sizeable amounts of groundwater makes the symptoms of these changes blatantly apparent. They are no longer subtle. In earlier "Otway Water" books ecosystem impacts such as creeks, wetlands and springs drying up; increased peat wild fire; vegetation changes and creek bank subsidence have been dealt with in some detail. The next few chapters in this book discuss the more controversial ideas, concepts and possible impacts of extensive extraction that are taking place under the surface in the sedimentary layers of the earth's crust.

As the pressure head in the deep water aquifer is reduced and the equilibrium of the regime is altered the whole dynamics of the underground system undergoes change. Water from the saturated sediments above the deep aquifer begins to leak downwards. As these sediments dry out they begin to shrink and crack allowing the process to take place all the way to the surface. In times of drought this situation is further compounded with the lack of rain water percolating down from precipitation.

A serious and diligent attempt has been made to gain an accurate picture of the sphere of influence of the deep water aquifer drawdown effects. The following maps and dialogue demonstrate the difficulties encountered attempting to gain a comprehensive picture. This highlights the inadequacy of data collection, reporting, accessibility and reluctance of Barwon Water to provide data on drawdown figures.

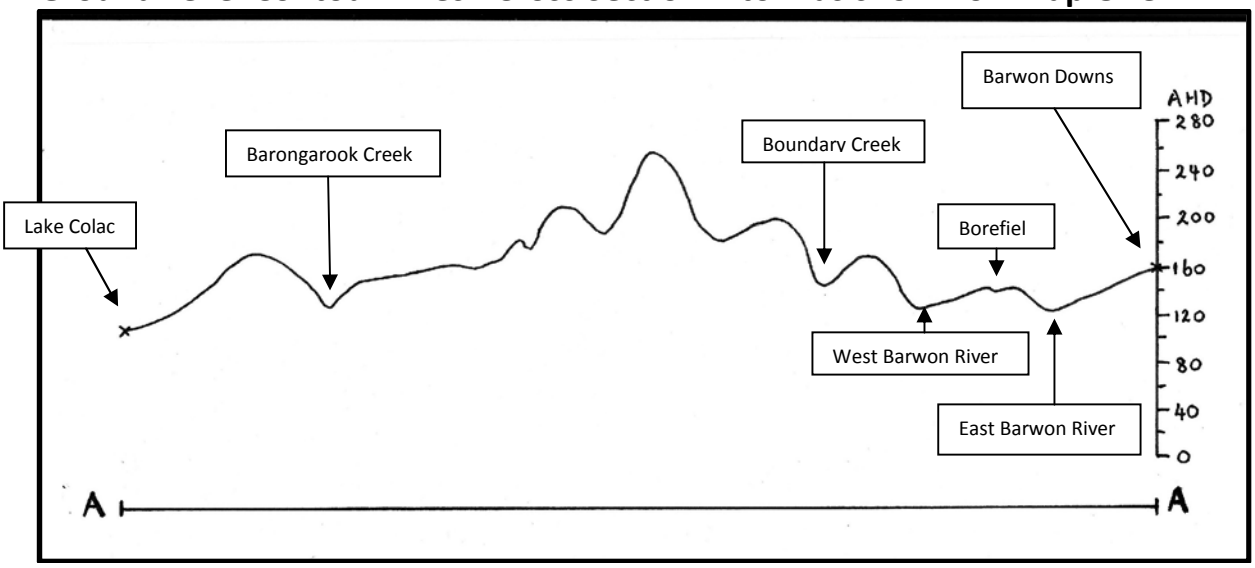
Map One has been sourced from a drawdown map that Barwon Water distributed as part of the consultative process when reviewing Licence 893889, in 2000 (see page 22 Map 4). The cross section lines A-A and B-B have been added as have the National Park and Reference Area in the Porcupine Creek catchment area.



Map One – showing the cross sections A to A and B to B. (Sources: Barwon Water handout 2000 – Department of Sustainability and Environment MapShare.)

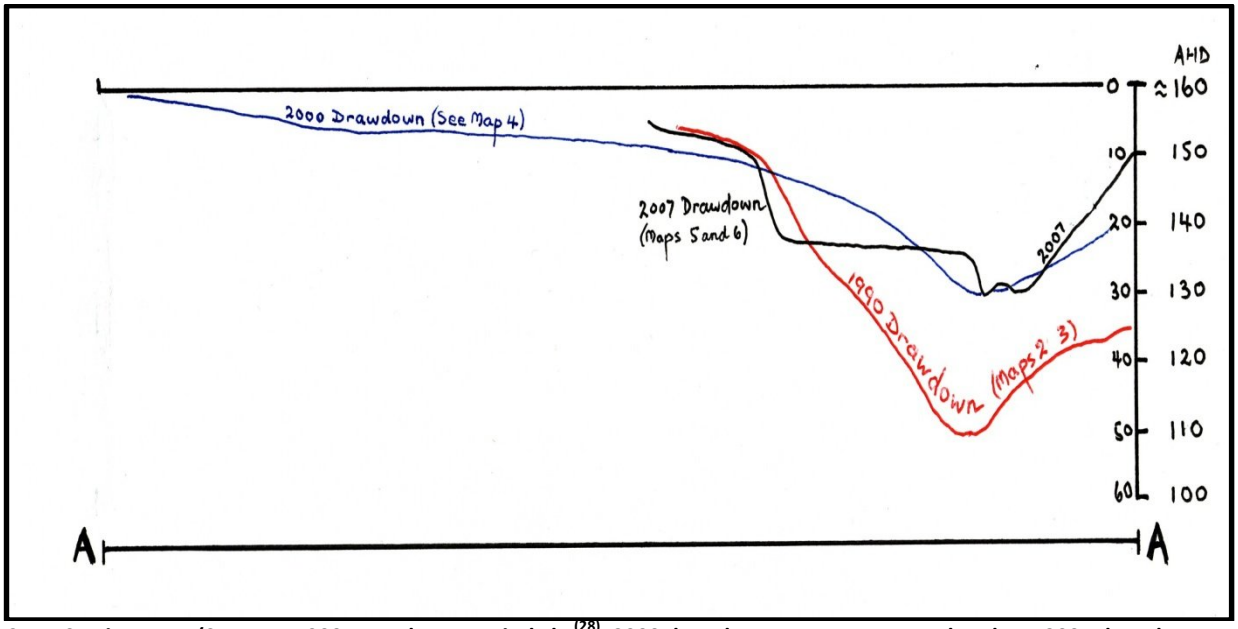
The data presented in the following maps and cross sections are approximations that are as accurate as possible considering the limited information that has been made available by Barwon Water. The material presented in these maps and cross sections is representational only.

Ground Level Contour Lines - Cross Section A to A as shown on Map One.



Cross Section One. (Source: VICMAP.)

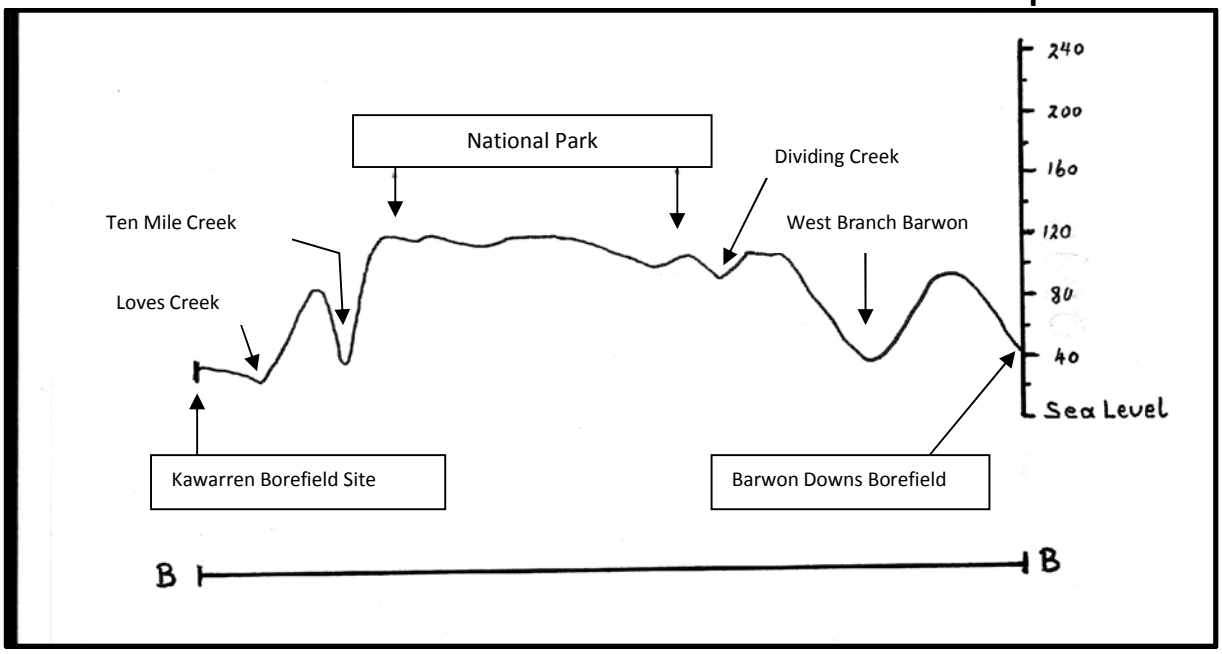
Drawdown from Groundwater Extraction – Cross Section A to A.



Cross Section Two. (Sources: 1990 Drawdown – Witebsky[28], 2000 drawdown – Barwon Water handout, 2007 drawdown – Barwon Water.)

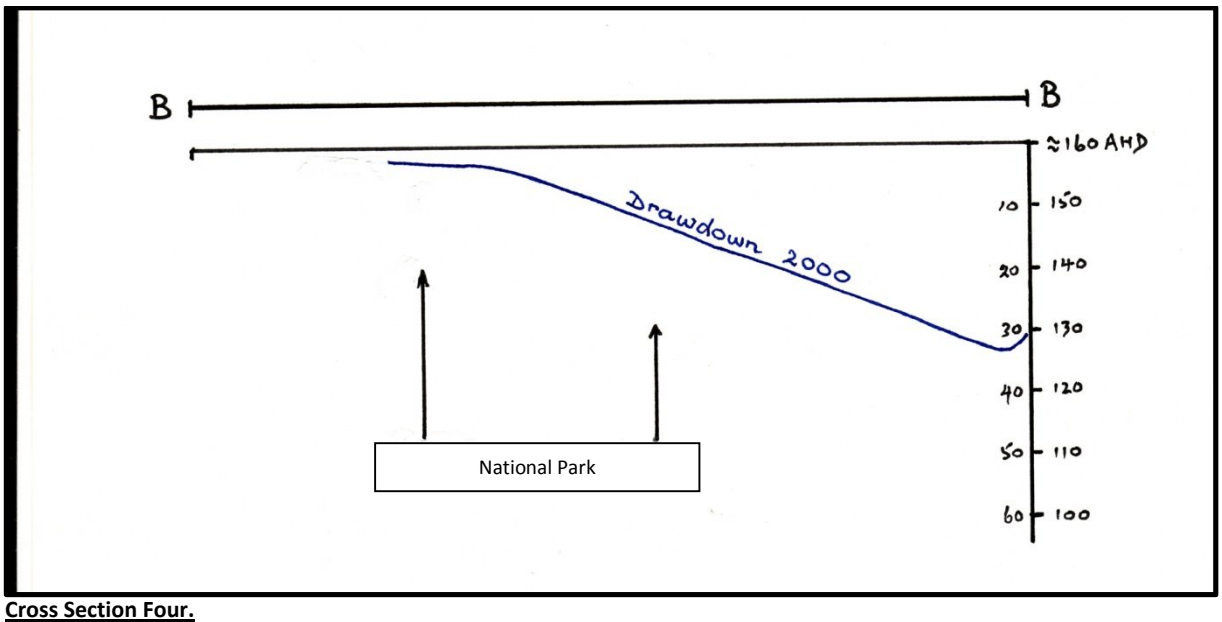
The June 2007 drawdown graph above, was prepared using Map Six, June 2007 (see page 24). Between June 2007 and November 2007 the Wire Lane water table had dropped considerably further.

Ground Level Contour Lines - Cross Section B to B as shown on Map One.



Cross Section Three.

Drawdown from Groundwater Extraction – Cross Section B to B.



Cross Section Four.

Unfortunately information in many instances has been difficult to obtain and consequently presenting a complete picture of the groundwater drawdown contours has been impossible. For instance, on 15 May 2008 Barwon Water was asked to provide specific data including groundwater drawdown contours out to the point **of zero or no drawdown influence** (see copy of letter below).

Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN
Vic 3249
15-05-2008

Carl Bicknell
Executive Manager Water Systems
Barwon Water
PO Box 659
Geelong
Vic 3220

Dear Carl,
Could you provide me with the following information, please?

1. Maps showing the drawdown in both the Dilwyn and PebblePoint Formations from the earliest recordings up to the latest available.
2. Could these dates be provided?
3. I would like the drawdown contours to extend out from the Gerangamite borefield to the point where the drawdown is zero.
4. Could these maps be such a size that they can be read easily?
5. Could I have the drawdown data on those observation bores that Barwon Water monitors in the Gerangamete Groundwater Management Area that were artesian and are no longer?
6. At what stage are the Kawarren borefield investigations at? Considering that I am an interested and affected party I have had no contact from Barwon Water for six months.

Hoping that you can answer these queries...

Sincerely yours,

Malcolm Gardiner.

It was two months before Barwon Water responded to this letter. This happened after a personal visit was made to the Geelong officerequesting reasons for the delay. The request was not regarded as a high priority and this was the reason for the delay.

The reply arrived some weeks later and the following letter (page 18) best explains the total inadequacy of the material provided.

Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN
Vic 3249
01-08-2008

Peter Morgan
Manager Asset Planning
Barwon Water
PO BOX 659
GEELONG
Vic 3220

SENDER TO KEEP
CV9120201

Peter,
Re: The information you sent on the Gerangamete borefield, your Ref. 40/220/0030V, 24 July 2008.

I am extremely disappointed that the information sent did not provide the data asked for in points 1-5 of the 15 May 2008 letter.

1. Point one asked for the earliest recordings and the latest drawdown figures. The first map that you provided is dated June 2004. This and the other drawdown maps are identical to the ones in the reports Barwon Water has sent to Southern Rural Water. I have these although they are extremely reduced and difficult to read. I also have a Feb 1990 map and a 2000 one provided by your staff in 2000. I was hoping to fill in the gaps but it would appear that you can't do this.
2. *
3. The maps provided fell well short of showing the drawdown contours extending to zero. Is it possible that you have no idea of the sphere of drawdown affect the groundwater extraction at Barwon Downs is having?
4. In some parts of the maps I still have to use a magnifying glass to read the data but they are by far much better than the maps provided in your annual reports sent to Southern Rural Water.
5. In regard to the data sent on bores that were and are no longer artesian I am surprised that one of the bores I was particularly interested in has not even been recognised. This may well not be your fault because in the Licence No. 893889 bore ID 82840 is marked as non artesian(see pages 8, 9 of this chapter). However, pre pumping of the Barwon Downs borefield this bore was approximately -8.7 metres DBNS indicating that it was very artesian. Irrespective of what the Licence states I would assume that since the borefield has been in operation since the early 1980s, you would have this data.

In effect, Peter, what took you over two months to compile does not even go close to providing the information asked for and considering that this material you provided is readily available I am surprised it took so long to compile.

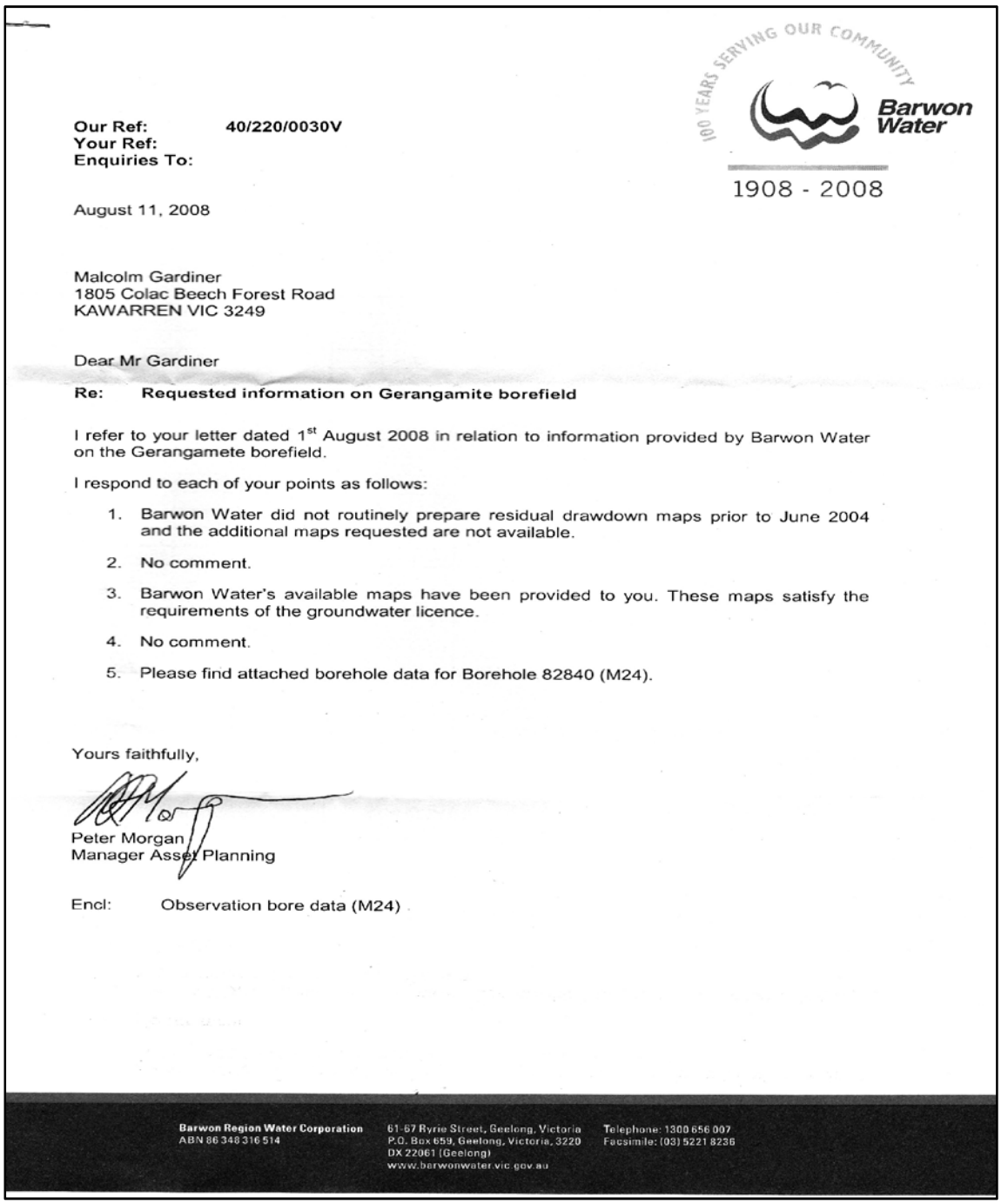
If you can provide the information asked for it would be most appreciated. If you can't I would appreciate a reason why this is not possible.

Regards,
Malcolm.

It would have been interesting to view the full extent of the drawdown effect as a result of the groundwater extraction at the Barwon Downs borefield but Barwon Water would not or could not

provided this data. However, it is reasonable to expect that considering the borefield has been in operation for over 26 years that there should be extensive data somewhere in the system that would indicate the sphere of influence this groundwater extraction is having. If this is not the case then the lack of objective appraisal has to be a dereliction of duty civically, environmentally and commercially. The recording, compiling and appraisal of this information is obviously well over due.

In reply to the above letter, a few days later the following mail arrived and ***the most alarming fact is that Barwon Water appears quite happy with these developments.*** Provided the requirements of the groundwater licence are satisfied (See point 3 in the letter below) it would appear that a query will be ignored if it falls outside these requirements. The full extent of the drawdown effect appears to fall into this category and consequently the effects may never be known.



100 YEARS SERVING OUR COMMUNITY

Barwon Water

1908 - 2008

Our Ref: **40/220/0030V**
Your Ref:
Enquiries To:

August 11, 2008

Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN VIC 3249

Dear Mr Gardiner

Re: Requested information on Gerangamite borefield

I refer to your letter dated 1st August 2008 in relation to information provided by Barwon Water on the Gerangamete borefield.

I respond to each of your points as follows:

1. Barwon Water did not routinely prepare residual drawdown maps prior to June 2004 and the additional maps requested are not available.
2. No comment.
3. Barwon Water's available maps have been provided to you. These maps satisfy the requirements of the groundwater licence.
4. No comment.
5. Please find attached borehole data for Borehole 82840 (M24).

Yours faithfully,

Peter Morgan
Manager Asset Planning

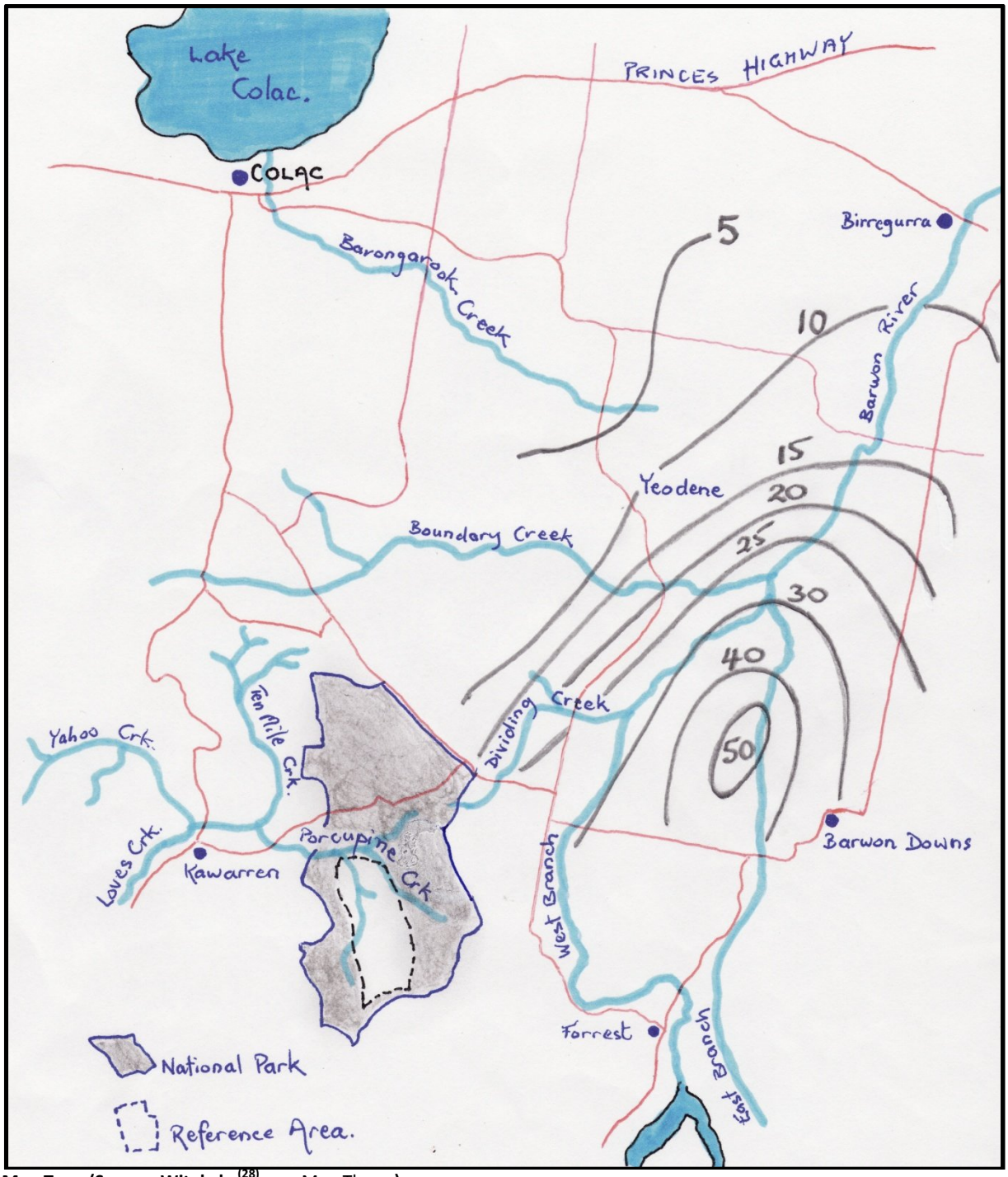
Encl: Observation bore data (M24)

Barwon Region Water Corporation
ABN 86 348 316 514

61-67 Ryrie Street, Geelong, Victoria
P.O. Box 659, Geelong, Victoria, 3220
DX 22061 (Geelong)
www.barwonwater.vic.gov.au

Telephone: 1300 656 007
Facsimile: (03) 5221 8236

Groundwater Drawdown- 1990



Map Two. (Source: Witebsky[28], see Map Three.**)**

After the 1987 -1990 test pump when 25 00 ML were extracted the 1990 drawdown contour under the headwaters of Barongarook Creek was 5 metres. The full extent of the drawdown affect was not graphed .

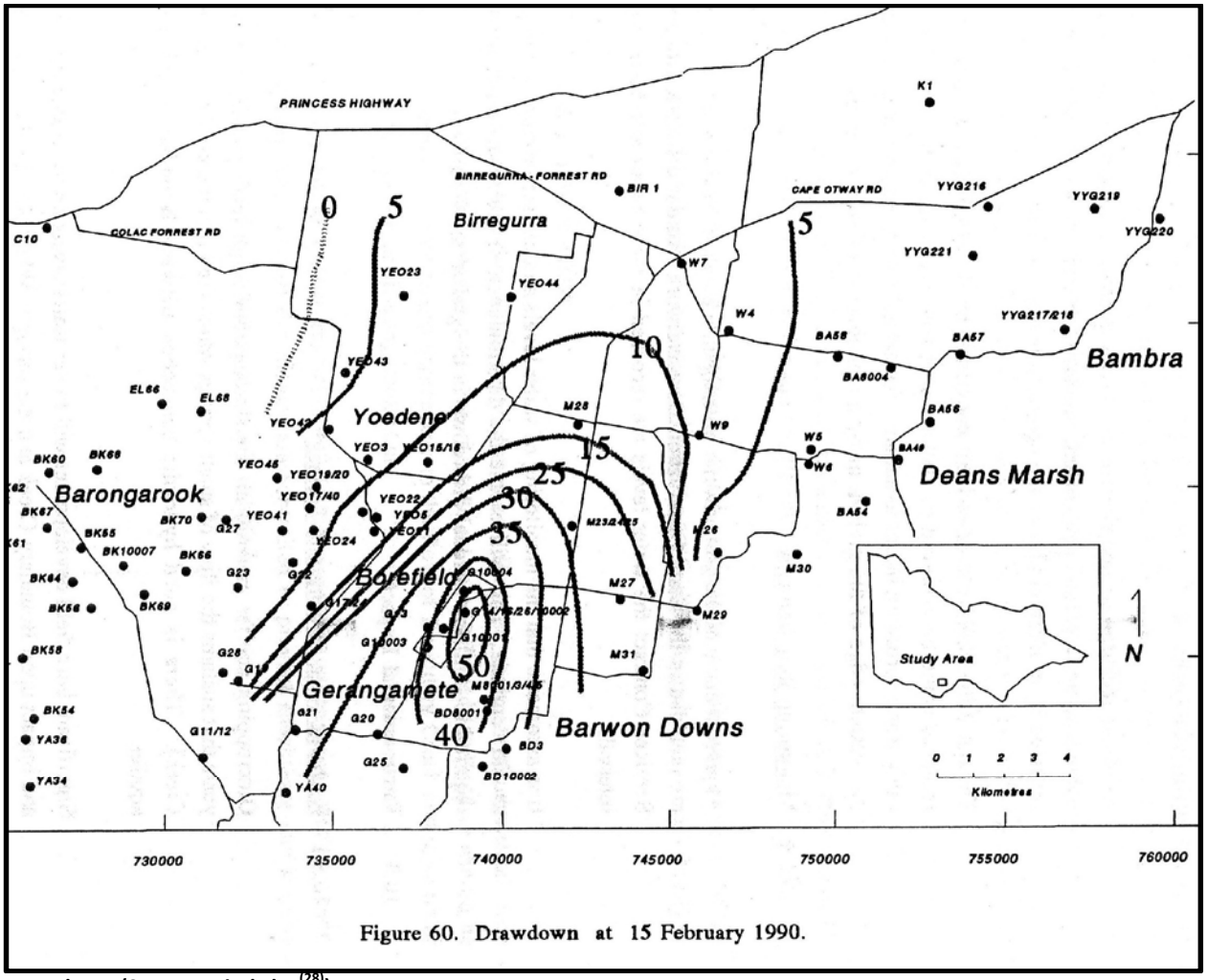
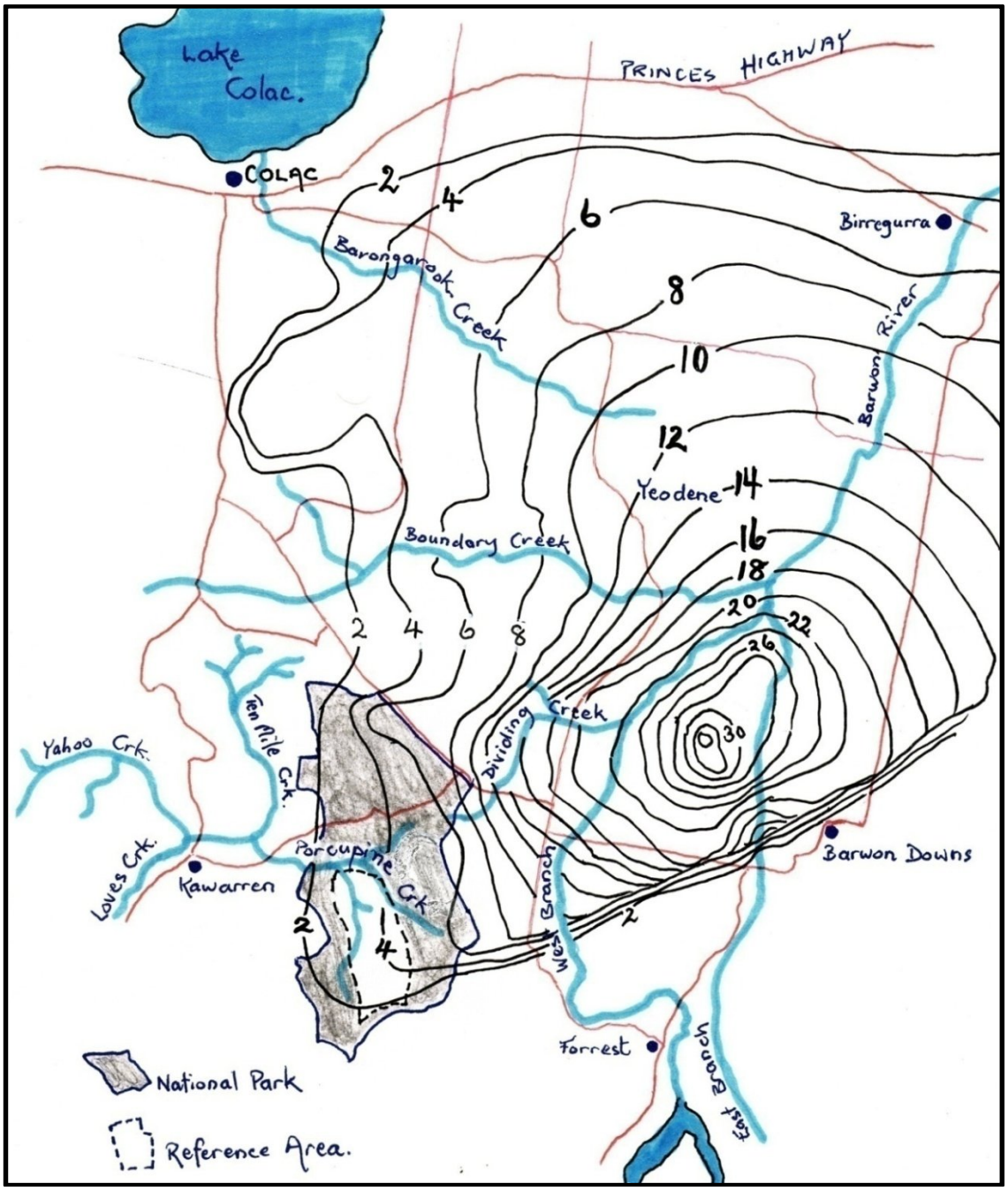


Figure 60. Drawdown at 15 February 1990.

Map Three. (Source: Witebsky.[28])

These drawdown levels were calculated after the extraction of approximately 25 000 ML of groundwater between 1987-1990. Between 1982 and 2007 over 83 000 ML have been extracted from the Barwon Downs borefield so it would be reasonable to expect the latest drawdown contourts to be much more extreme.

Groundwater Drawdown – 2000 providing a clearer picture of the drawdown influence.



Map Four. (Source: Barwon Water handout 2000.)

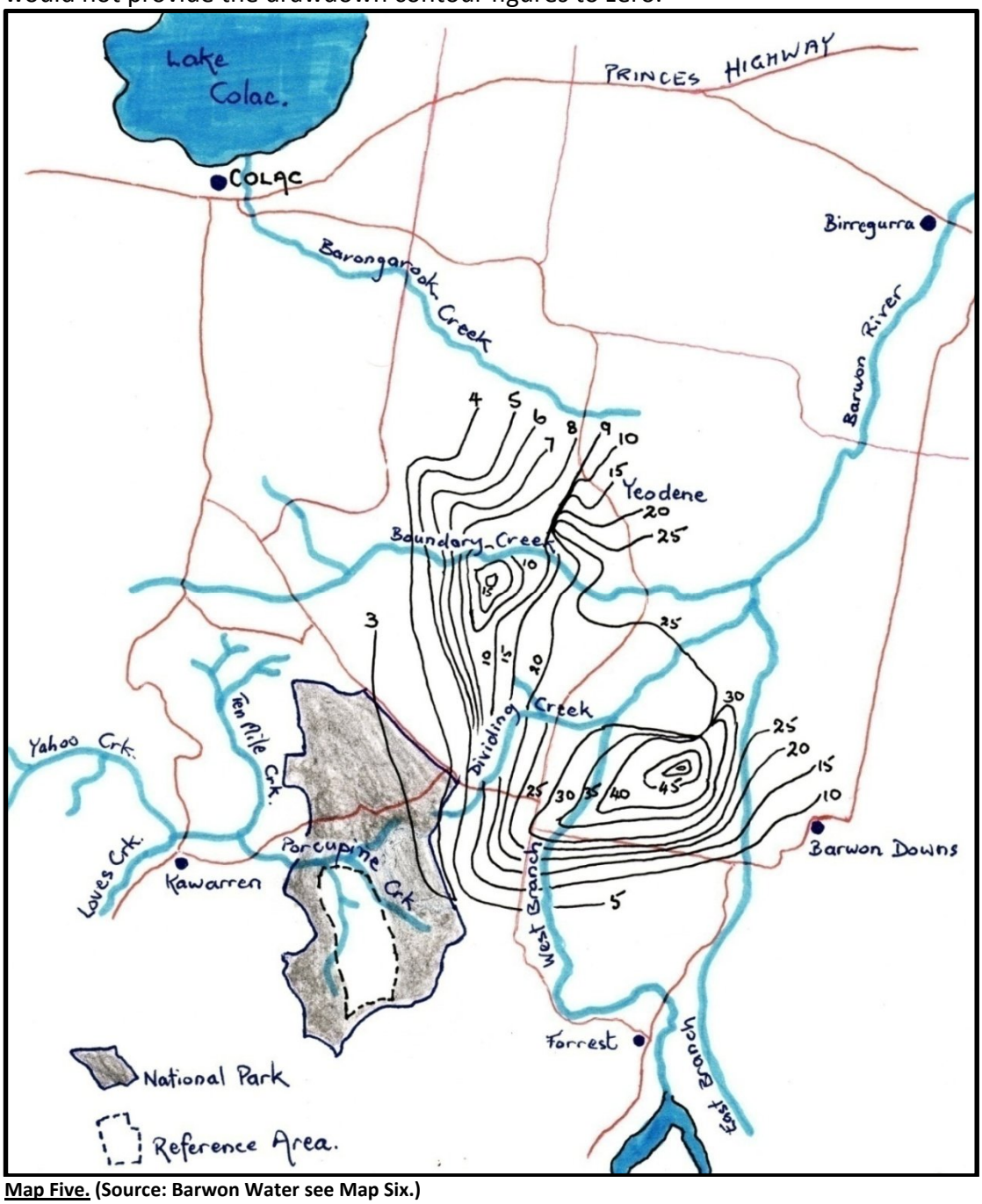
Groundwater extraction between 1998 and 2000 was approximately 28 000 ML. Witebsky[28] indicated in 1995 that the extraction of groundwater at the Barwon Downs borefield beyond 1500 ML/year would impact on springs, wetlands and streams. This map would indicate that this is indeed a distinct possibility.

In 2002, Peter Greig President of the Upper Barwon Landcare Network, in a submission[21] to Barwon Regional Water Authority's Licence Renewal Panel, reported that groundwater extraction effects similar to those being experienced along Boundary Creek were apparent along many creeks including Barongarook Creek. Looking at this map would indicate that there is also considerable

influence in the National Park vicinity. If this is the case the Gellibrand Groundwater Managment Area is being impacted upon from groundwater extraction at Barwon Downs.

It is as feasible to suggest that there is a drawdown affect on Lake Colac. Thompson[27] in 1971 calculated that it was feasible that 3000 acre feet of groundwater was flowing into Lake Colac. He also stated that the seepage losses of lakes in the area to groundwater could range between 12 and 20 % in drier periods. Blake[7] as late as November 1995 made a recommendation that groundwater discharging into Lake Colac should be quatified. He also makes mention that the drying out of wetlands and the lowering of lake levels in the area are the main risk if there is an over exploitation of the groundwater.

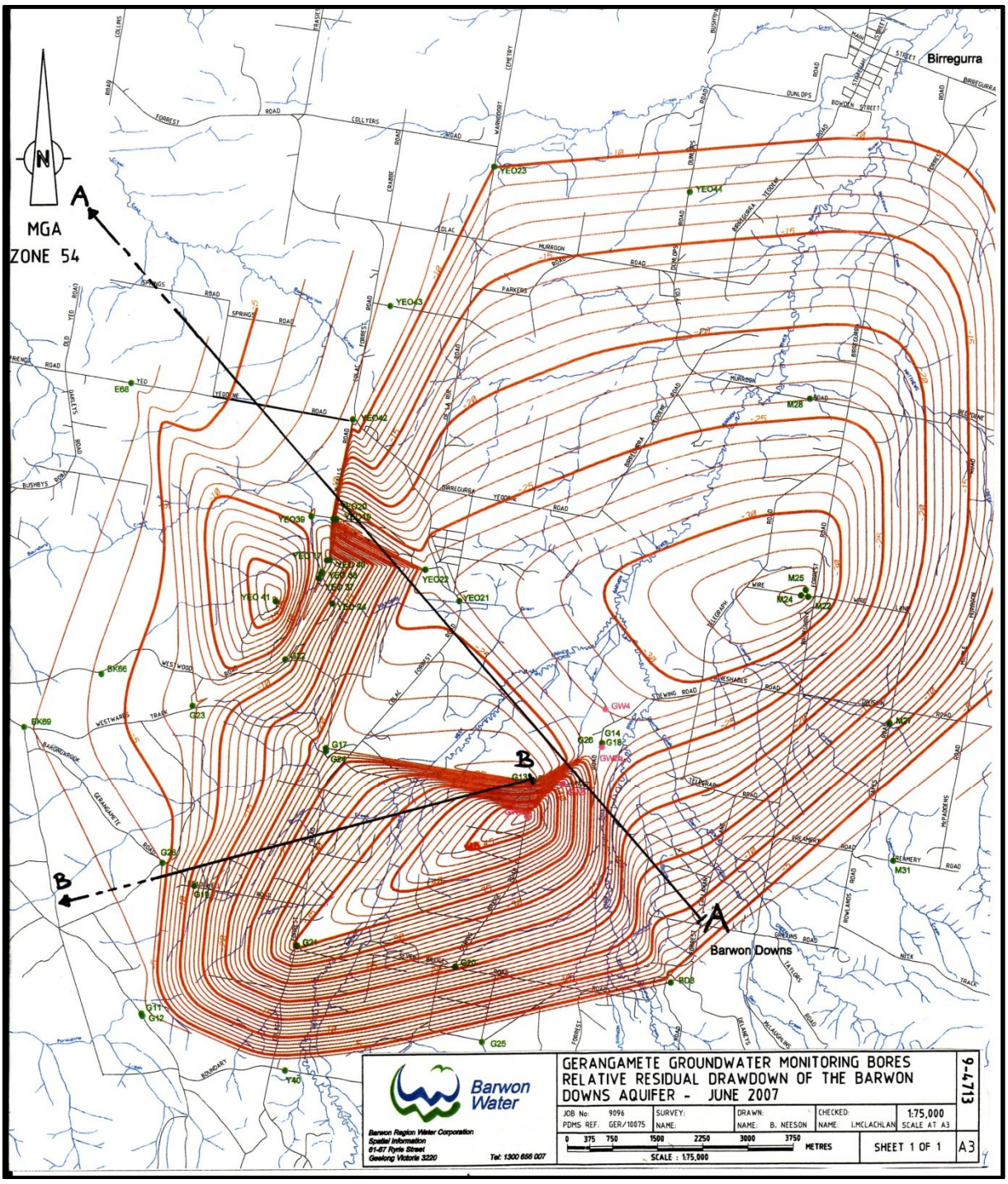
Groundwater Drawdown – June 2007 unfortunately lacking data. Barwon Water would not provide the drawdown contour figures to zero.



Map Five. **(Source: Barwon Water see Map Six.)**

Between 2005 and June 2007 groundwater extraction has been approximately 14 000ML. These groundwater drawdown figures are the only ones Barwon Water will release as they are the only ones that have to be supplied under the "licence requirements."

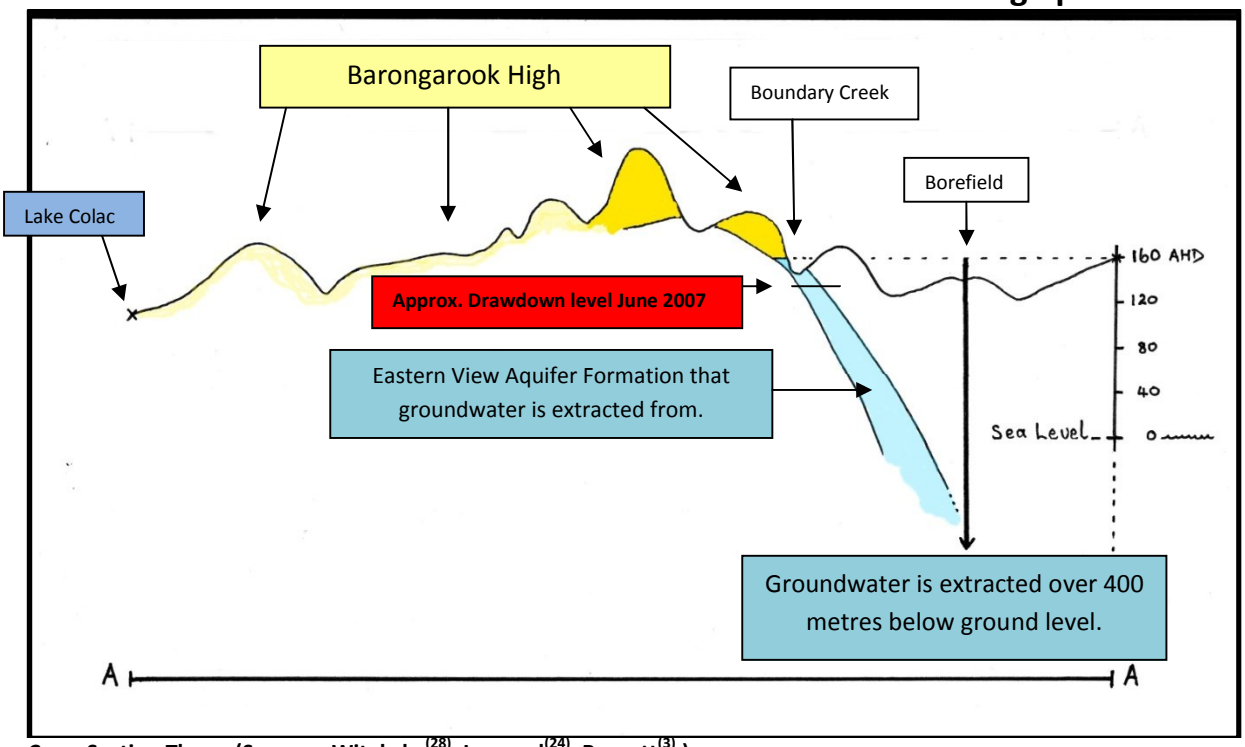
Groundwater Drawdown – June 2007



Map Six.

This map is a copy in actual size of a section of the June 2007 map that was issued by Barwon Water as a result of the 15 May request (see page 17). The cross section lines have been added.

Pre 1984 the Eastern View Aquifer Formation discharged into Boundary Creek. The June 2007 drawdown level is well below this discharge point.



Cross Section Three. (Sources: Witebsky[28], Leonard[24], Barnett[3].)

It is interesting to note that the groundwater being extracted from the Barwon Downs borefield is well below sea level.

The sands of Barongarook High soak up approximately 17% of rainfall that helps replenish the Eastern View Formation.

CONCLUSION

This chapter highlights the fact that the "known drawdown effects" of groundwater extraction from the Barwon Downs borefield, falls well short of a comprehensive and complete picture. How appropriate management decisions can be made with vital information "black holes" is a mystery. It would be a reasonable conclusion to draw that it appears appropriate decisions are not being made. The following chapters highlight additional symptoms of inappropriate management.

NOTE: The Department of Primary Industry work being conducted in close proximity to the extraction bores at Barwon Downs is applicable to this chapter (see pages 29-30).

Statutory Declaration Re: Artesian Bores along Wire Lane

M J Freshwater
519 St Michael St
Deniliquin NSW 2710

June 11, 2008

To whom it may concern:

From the early 1970s until 1988 our family owned and operated a property on the corner of Wire Lane and Barwon Downs Road at Murroon, Victoria. Observation bores were drilled in the early 1970s on Wire Lane, adjacent to that property.

When bore 82839 and bore 82840 were drilled they were observed by me to be artesian with streams of free flowing water. These bores were capped and fitted with gate valves. For many years (until the gate valves were locked in the mid 1980s) opening the gate valves resulted in water escaping under considerable pressure, with no obvious loss of pressure over time.

It is still my belief that these bores remained artesian in nature at least until I left the district in 1989.

Yours sincerely,

Murray James Freshwater

Witnessed by: J.P. 12/6/08

Kathy M Henderson JP 137876

CHAPTER 2

Possible Drawdown Effects-Salinity

As a result of the research local residents have been conducting in the Barwon Downs area there appears to be considerable evidence that there has to be a major rethink in regard to salinity in the Otways - salinity brought about as a result of extracting large volumes of groundwater from the Otway aquifers. In fact the sphere of influence on salinity may be both unexpected and unexpectedly large. This Chapter attempts to present enough doubt to indicate a need for further and closer scrutiny regarding the connectedness of groundwater extraction and salinity problems.

Because the concepts of saltwater intrusion, increased salinity in both surface springs and relatively shallow bores are repugnant, those in authority tend to shy away from such matters. That exploiting groundwater at Barwon Downs, Kawarren or Newlingrook could create a serious salinity problem requires serious investigation.

The Ghyben-Herzberg Effect[20].

Where there is a salt water and freshwater interface when one unit of freshwater is extracted the interface can rise by 40 times this unit. The actual effect will depend on the relative densities of the saline and overlying fresh water but the general effect can be seen in the following diagram.

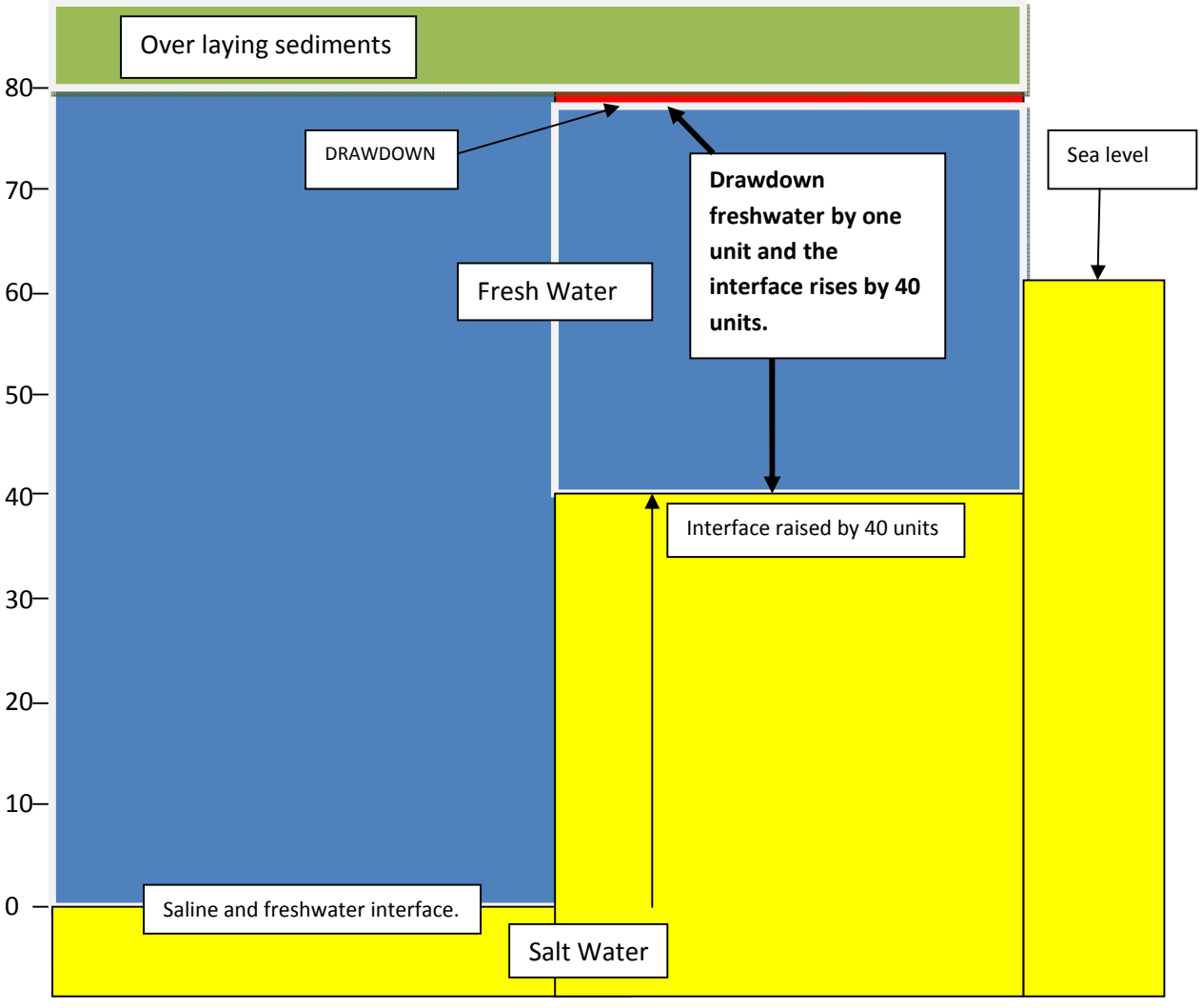


Diagram 2. This diagram attempts to demonstrate the Ghyben-Herzberg Effect in a simplified form.

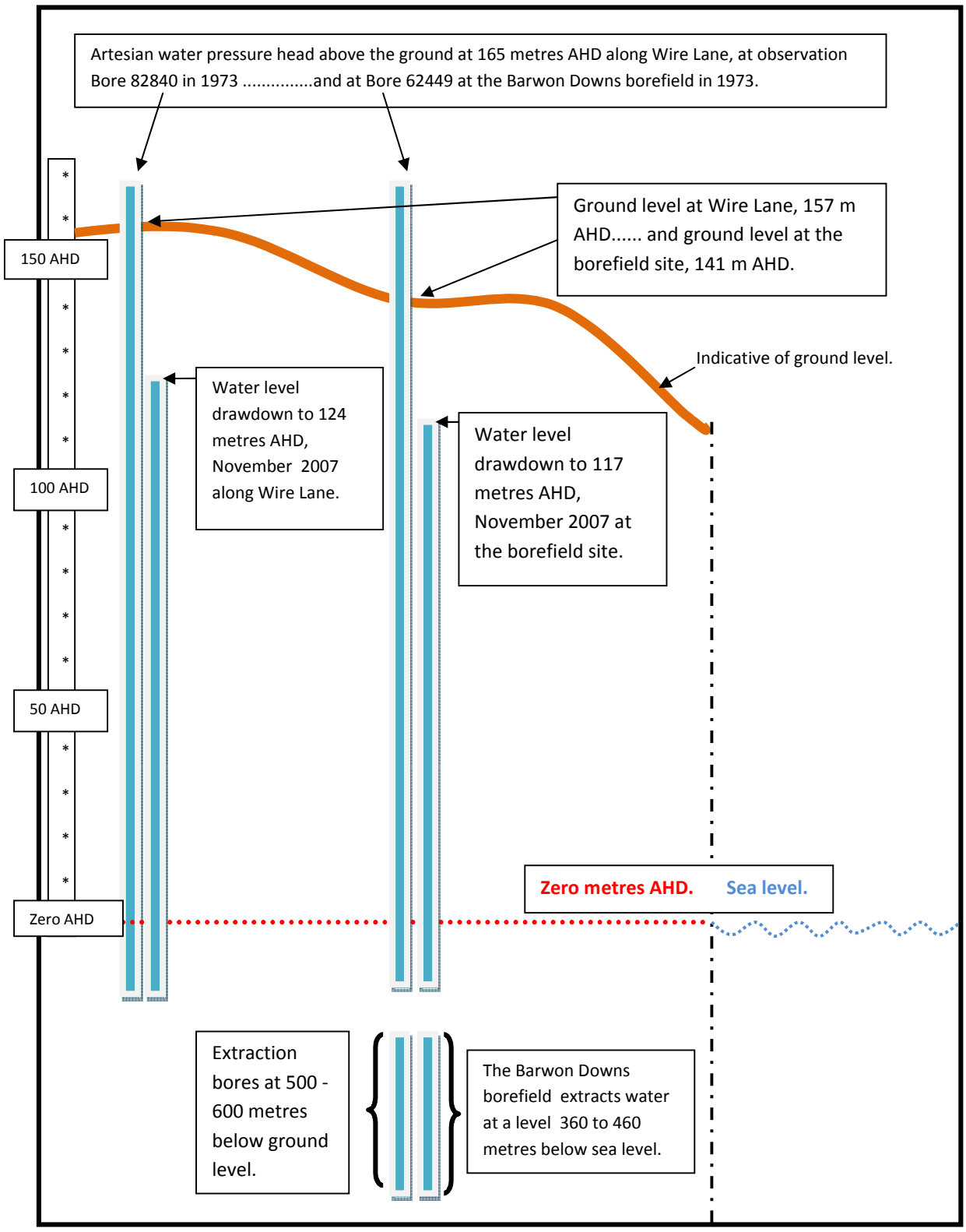


Diagram 3 . Drawdown effects on 2 bores in the Barwon Downs area. AHD levels have been rounded off.)

At the Wire Lane Bore 82840, the water level has been dropped approximately 40 m. The water level in Bore 62449 at the borefield has been lowered approximately 47 metres. Up to the drought of 1982-83 there had been insignificant extraction from the Barwon Downs borefield. Considering that in the 25 year period between 1982 and November 2007 there were eleven years when there was

no extraction, the magnitude of drawdown would appear to be of some concern. If there is a salt water/fresh water interface in the deep water aquifer, applying the Ghyben-Herzberg formula and allowing for the cone of depression effect, it is reasonable to assume that if an interface exists it will have risen dramatically.

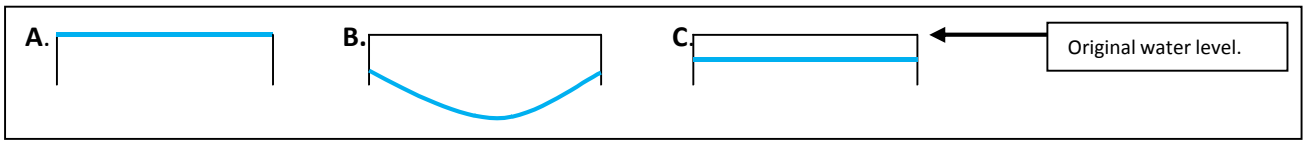


Diagram 4.

In Diagram 4 the **A** sketch represents a water table level before groundwater extraction, the **B** sketch shows a cone of depression during groundwater extraction and sketch **C** indicates a drawdown after extraction ceases and the aquifer has a chance to even out.

It may not be caused by the Ghyben-Herzberg phenomenon, but there does appear to be dramatic changes taking place in regard to salinity impacts in the Barwon Downs borefield area of influence.

- Freshwater spring fed dams that were utilised for house gardening and stock water now kill vegetables attempted to be grown and stock can no longer drink the water,
- trees are suffering and or dying from salt intrusion,
- freshwater springs have become salt springs, and
- winter fill licences used for potato growing are unable to be activated until a flush drops salinity to acceptable levels.

Salinity Monitoring.

It could be strongly argued that the salinity problems that have developed in the vicinity of Barwon Downs have been exacerbated by the drawdown of the water level in the deep water aquifer due to the extraction of groundwater at the Barwon Downs borefield. When the 2004 licence for this extraction was being considered, farmers were concerned about many issues. Some of these were...

- historically secure water supply,
- subsidence,
- salinity,
- moisture in the summer feeding flats, and
- the environment.

The 2004 licence that expires in 2019 named three bores that had to be monitored yearly for 5 years and then once every five years thereafter. These three bores measure the deep water table. If it is accepted that the dynamics of the sub surface interaction between the various sediment layers can be affected by extraction of water from deep levels, then this amount of monitoring has to be regraded as extremely inadequate. To assume that measuring these observation bores would reflect and indicate the salinity parameters of the area is quite dubious.

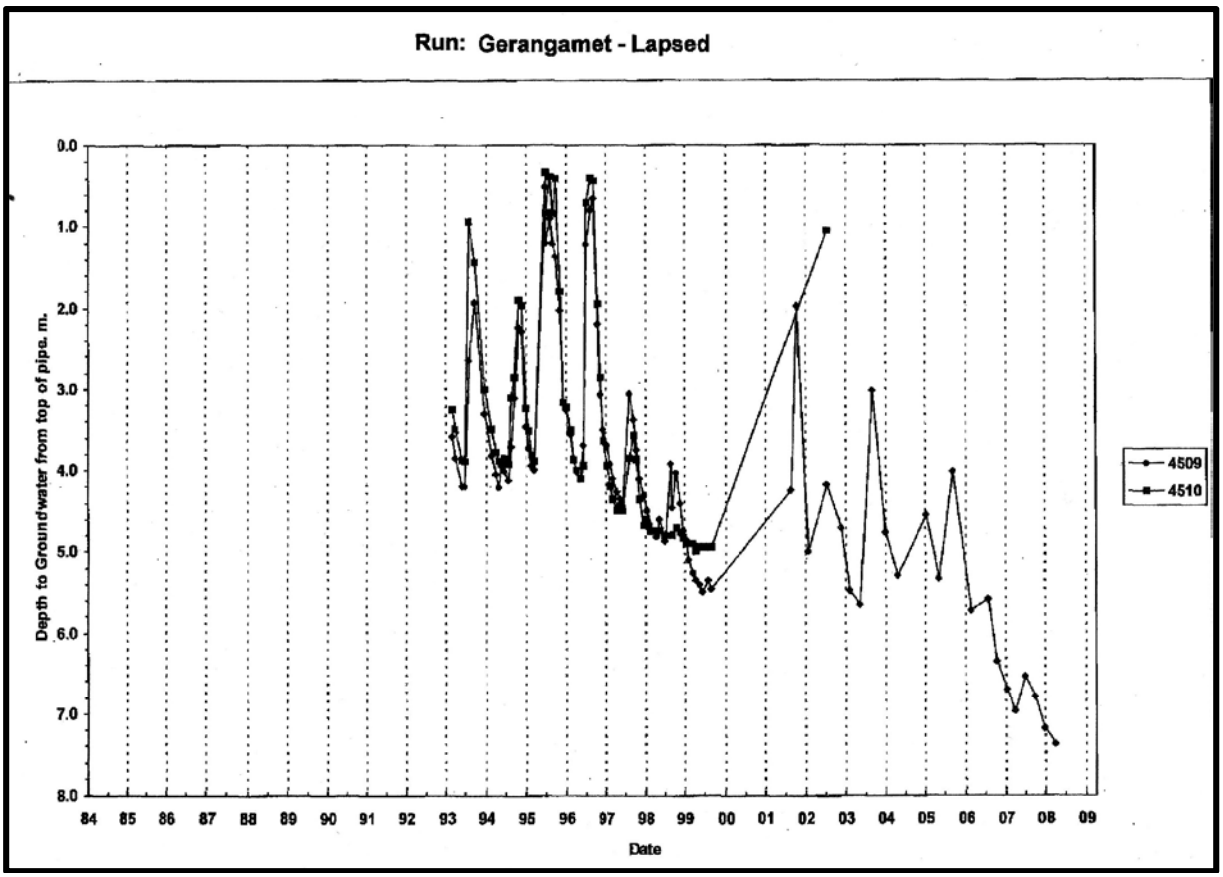
Gardiner[(14)] in Otway Water – the Summaries Part 5 (pages 211-12), clearly demonstrates that the reporting of the data from these bores is somewhat questionable and as a consequence much doubt is raised as to the reliability of this data to provide any indication of what is actually taking place in regard to salinity.

Shallow Water Table Monitoring

The Department of Primary Industries has been conducting shallow bore observations in the direct vicinity of the extraction bores at Barwon Downs. Many observation bores are located in this area and amazingly the water table is dropping (see graph below). Usually when the water table drops the salinity problems decrease.

The graph below shows a clear trend that is similar to the deep water aquifer drawdowns.

The complexity of the salinity problems occurring in the area requires a thorough investigation, better data collection and review of the Barwon Downs groundwater extraction licence.



CONCLUSION

I t would appear that data collection and the gaining of a clear picture of the effects of salinity from groundwater extraction at the Barwon Downs borefield is not being undertaken. All levels of the sediment layers that have observation bores should be scrutinised for salinity dynamics. Farmers' observations should be considered and checked. Trees, springs and dams in the area of influence should be closely monitored and reported on.

CHAPTER 3

Possible Drawdown Effects-Subsidence

When ever groundwater is extracted from an aquifer there is always the possibility that as the water is removed the spaces previously occupied by the water will compact with that particular sediment layer becoming thinner. This chapter discusses earlier studies on the Barwon Downs borefield and raises questions based on these studies and what present day data is able to be obtained.

Drawdown varies with distance, time and extraction rate and in 1995 Witebsky et. al[28] indicated that subsidence in the Barwon Downs valley was unlikely to be a problem unless the overall pressure levels in the graben was permanently lowered by 20 metres. Even then it was thought that it would take several hundred years for the large thickness of Gellibrand and Narrawaturk Marl to consolidate.

S.R. Anderson/U.S. Geological Survey

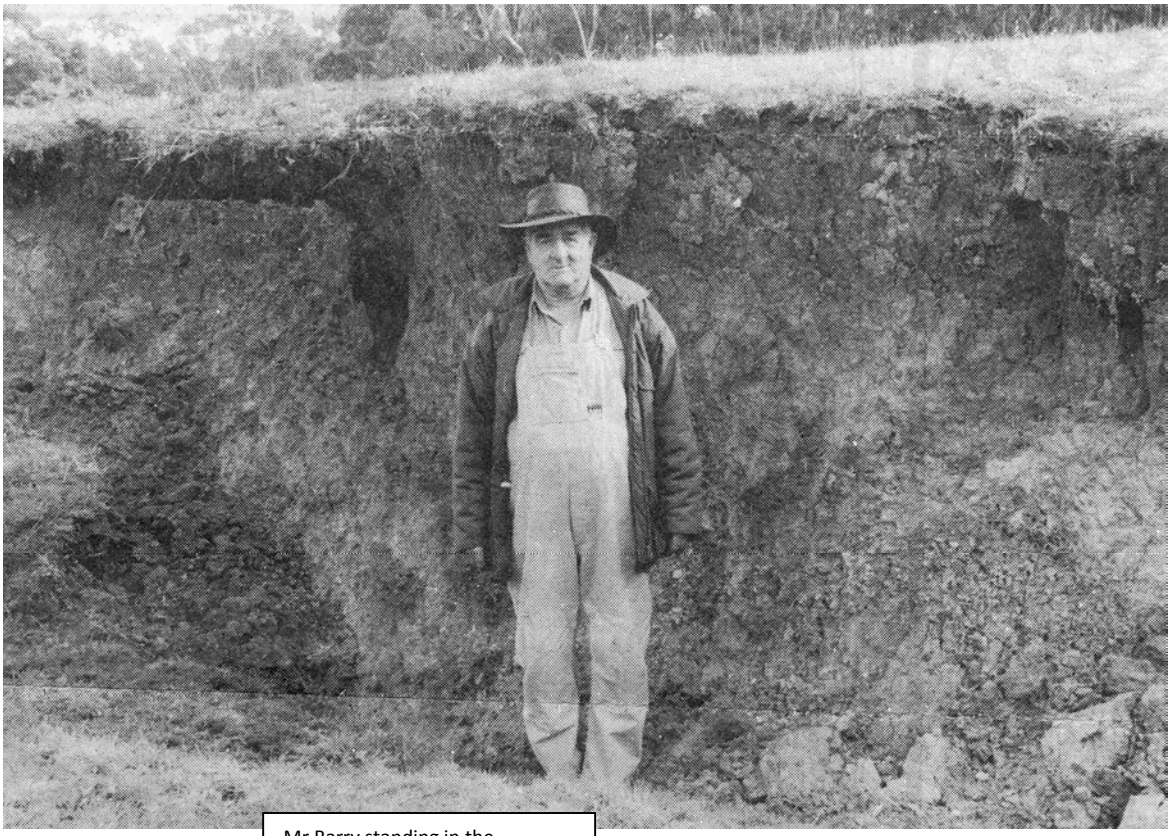
Sign warning motorists of subsidence hazard was erected after an earth fissure damaged Snyder Hill Road in Pima County, Arizona, 1981.

S.R. Anderson/U.S. Geological Survey

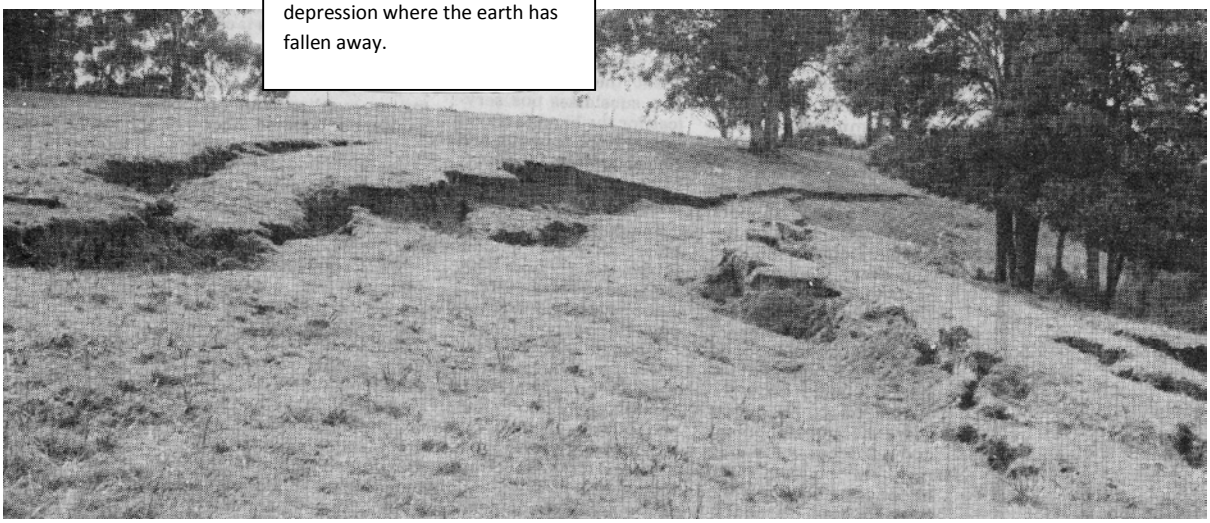
Figure 5. Earth fissure near Picacho, Arizona.

These photographs show the effects of land subsidence due to groundwater extraction in the United States of America.

These two black and white photographs were taken in September 1990. The Barry property is in the headwater area of Boundary and Ten Mile Creeks at Barongarook.
No conclusive reason for this subsidence was reached but the report in the Colac Herald makes interesting reading.



Mr Barry standing in the depression where the earth has fallen away.

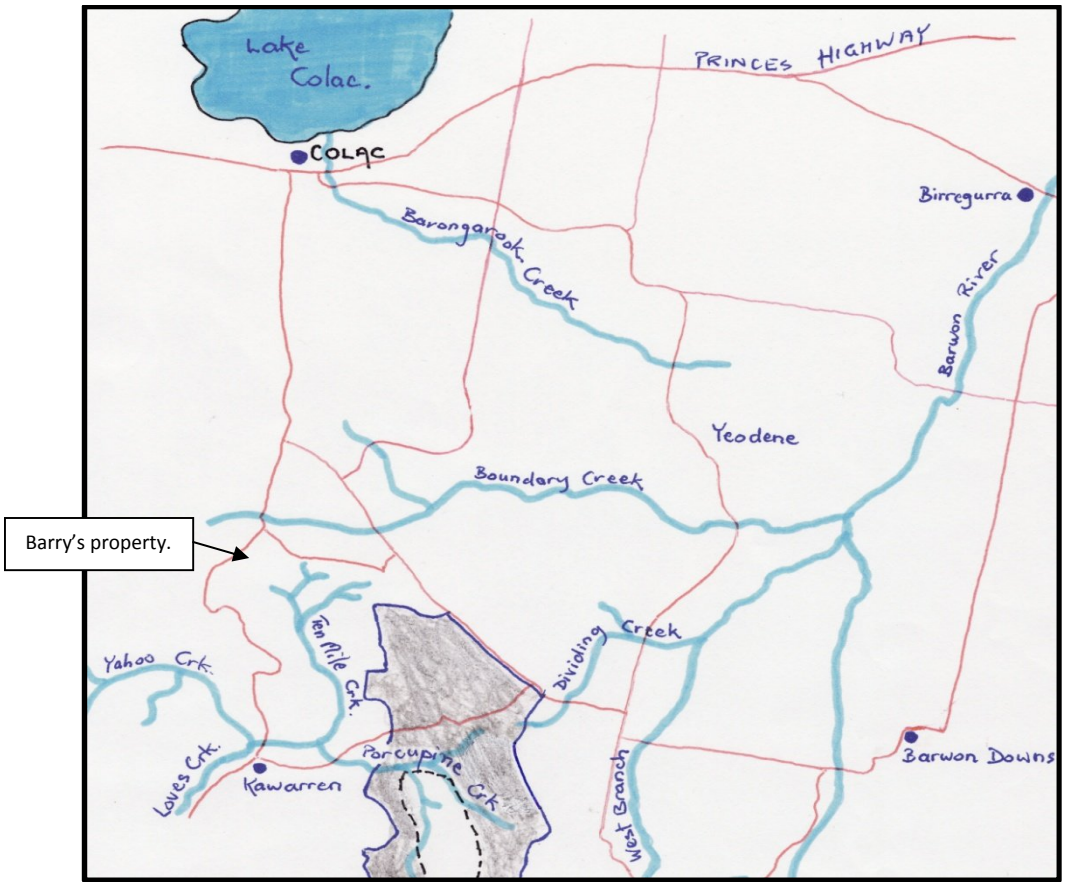


Following is a word for word account of the report by Colac Herald reporter Lyn Mahoney.

With three acres of their land collapsing before their eyes, more than two metres in some places, it is understandable the Barry's of Barongarook believe they may be sitting on some sort of fault line.
About three weeks ago, cracks appeared in sections of the paddock, which have since formed into earthen walls. The walls, surrounding collapsed ground, take on the resemblance of a crater.
"Only a month ago, I could drive the tractor over that paddock, " Mr Max Barry said. "It used to be a hill- driving the tractor down it made me quite nervous."

Now the section that used to be a hill has sunk more than two metres, and driving a tractor down it would be impossible.
At the foot of the hill, land that appears to have rolled over resembles Chinese terraced rice paddies. "We used to grow beans, peas and potatoes on that section of land," Mrs Barry said. "We couldn't possibly do it now."
A fence on one section of the land has moved considerably. "Its like the land has pulled away," Mrs Barry said.
Mrs Barry said a few nights ago, she woke to what sounded like a motorbike starting up. "Then the cows went absolutely mad," she said. "It was like they could hear something going on under the ground, or could feel a rumbling perhaps."
Ken White, Soil Conservation Officer with the Department of Conservation and Environment said he suspected the collapse could be sub soil erosion. "Between the clay and the top soil is material which can often be very poorly structured, and can be as deep as a third of a metre to 1.5 metres," he said.
"When this sub soil is of a poor quality, it can wash away, causing tunnelling and caves, and the rest of the land can collapse on top of it."
Mr White said this is common in the Otway foothills country. "But it is usually a collapse of only about a metre," he said.
He said the only way to repair the damage was to bulldoze it and resow.
"But if it's too deep, the solution may be to plant trees on it."

The bottom photograph looks very much like a slip but the description of walls surrounding collapsed ground resembling a crater suggests one section of this happening actually subsided. The reason for including this article is that 1990 was the year a three year groundwater extraction test pump at Barwon Downs was concluded. This pump extracted approximately 25 000 megalitres.



Map Seven. Location of Barry's Property.

Sometime in the 1980s subsidence benchmarking sites were established in the Barwon Downs borefield sphere of influence. Approximately 20 years later another and more sophisticated subsidence measuring network was established. It would be most interesting to be able to gain comprehensive records and reports of the subsidence results over this 20 year period.

CONCLUSION

The Gerangamete Flats Landcare Group claimed in 2000 that Barwon Water would not provide its group with reports on the monitoring program for subsidence.[16] Two years later the same Landcare group was still asking for a subsidence report[16] that was still not forthcoming. Taking this into consideration and the fact that Barwon Water would not provide data for groundwater drawdown figures (Chapter One) outside the "licence requirements," there is no reason to assume that Barwon Water would provide subsidence data that falls outside the "licence requirement." It seems superfluous to wait an indefinite period for data that has already been supplied as "licence requirements" under Freedom Of Information.

Consequently Barwon Water has not been asked to provide subsidence data outside the "licence requirements." In a similar fashion of not being able to access groundwater drawdown data, the gaining of a comprehensive and clear understanding of the extent of subsidence would seem as impossible.

One can only speculate as to the effect of subsidence and one wonders whether Barwon Water is doing the same.

CHAPTER 4

Possible Drawdown Effects-Acid Sulfate Soils (ASS)

Simply put, when dried out some water saturated soils become acidic. Boundary Creek and Dividing Creek are two possible sites of Potential Acid Sulfate Soils (PASS) being changed to Actual Acid Sulfate Soils (AASS) as a result of groundwater extraction causing these permanent streams to dry out, particularly over the summer period. Once disturbed ASS (Acid Sulfate Soils) are very environmentally unfriendly.[22]

The common name of soils containing iron sulphides are Acid Sulfate Soils (ASS).

In an anaerobic condition (see diagram 5 below) certain bacteria in organically rich water saturated soils convert sulfate and iron from the sediments into iron sulfide and pyrite. In the saturated state the acid sulfate soils are relatively harmless and are called Potential Acid Sulfate Soils. However, as the Potential ASS are exposed to air due to drainage, groundwater extraction (see diagrams 6, 7 below), drought or disturbance, the exposed iron sulfides oxidise and produce sulfuric acid. As the sulfuric acid moves through the soil it liberates iron, aluminium and sometimes manganese from the soil. It can also dissolve other heavy metals. Many reactions take place and products such as Jarosite can be produce. Jarosite is a yellow coloured bi product of the oxidation process. Once this process takes place the soils are called Actual Acid Sulfate Soils (AASS).

This oxidation process can continue for many years. In some areas of Australia[25] Acid Sulfate soils drained a hundred years ago are still releasing acid.

Pyrite[24,26] is formed when there is:

- rotting organic matter which acts as an energy source for bacteria
- a source of iron
- temperature greater than 10^0C
- a relatively oxygen depleted condition, and
- a supply of sulphur.

Boundary Creek has soils in conditions that match these indicators.
Saline Groundwater containing sulfates can also be a contributing factor. Considering the salinity problems now being encountered in the immediate area there is every possibility that saline groundwater is a source of sulfates.

Diagram 5 to 7 describe how Potential Acid Sulfate Soils are exposed to the oxidation process & turn to Actual Acid Sulfate Soils.

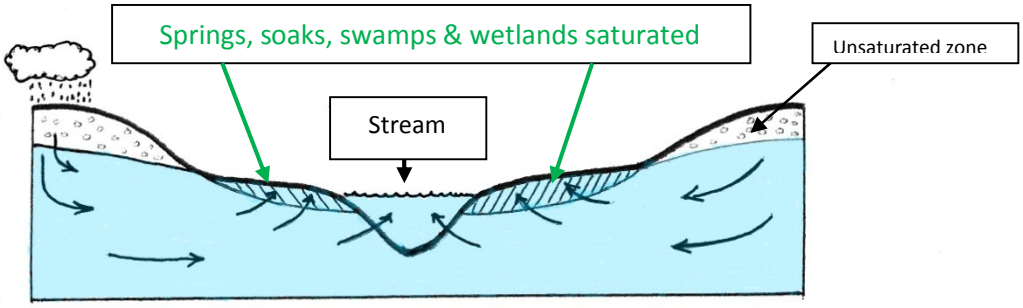


Diagram 5. Wetlands and stream interaction with groundwater & in this situation they are covered or saturated with water – aquifer overflows.

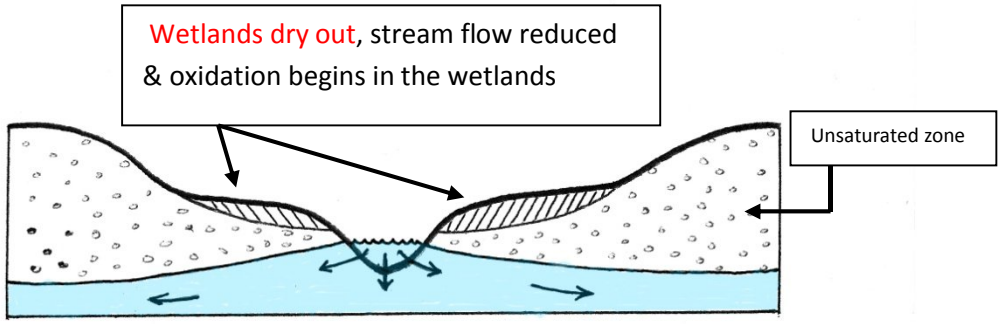


Diagram 6. Lower the water table by extracting groundwater and the wetlands and stream are affected when the watertable is dropped as a result of groundwater extraction. The stream becomes a losing stream and recharges the aquifer.

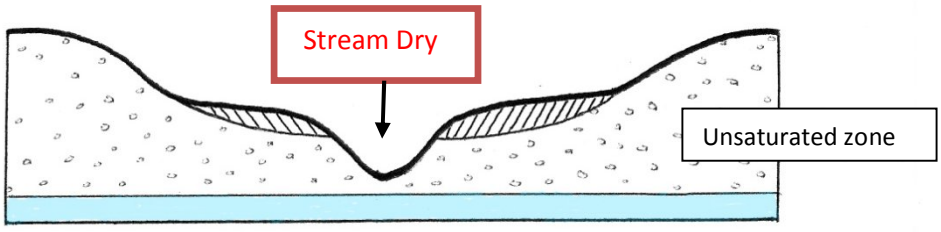


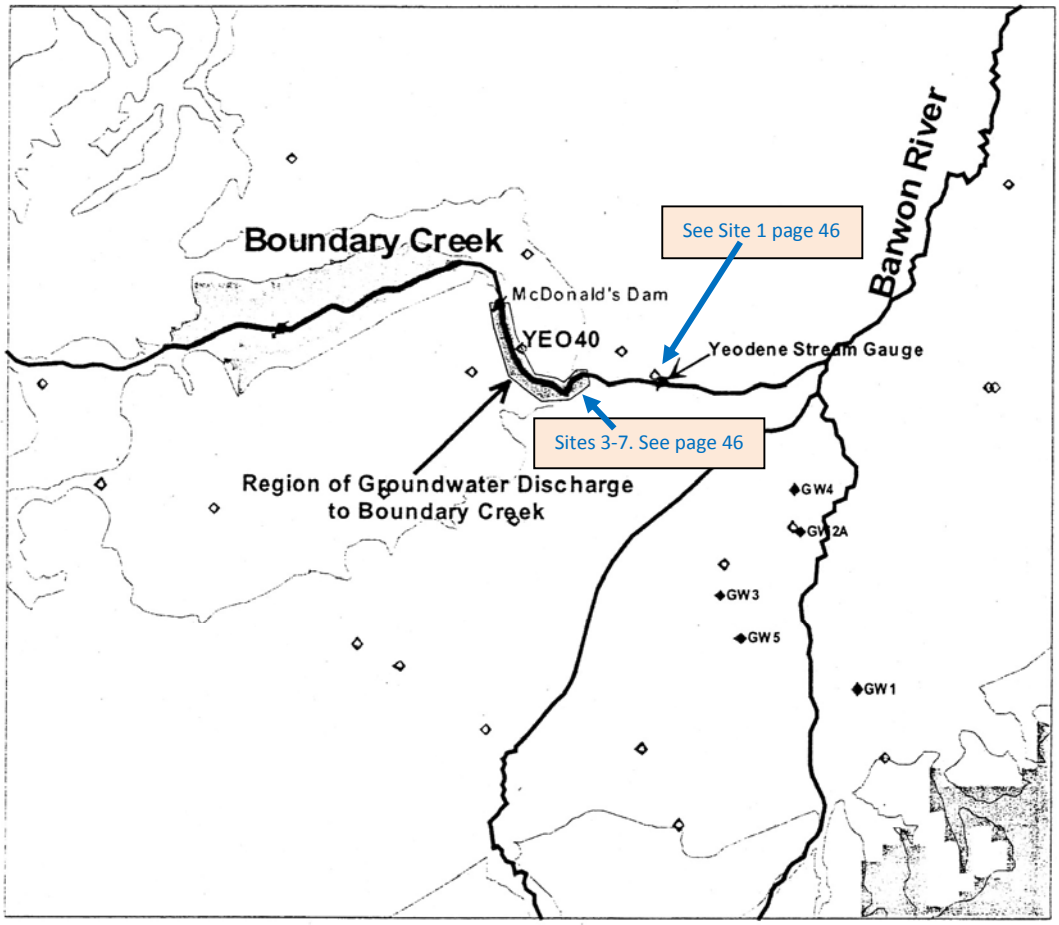
Diagram7. Lower the water table to this degree and the stream will cease to flow in periods of no rain – the baseflow from the aquifer is totally eliminated and the stream bed. ASS also, if present, begin to oxidise. With a return of flows and or saturation the Potential Acid Sulfate Soils becomes Actual Acid Sulfate Soils and the results can be catastrophic.

The process described above appears to have taken place along Boundary Creek. Farmar-Bowers[11] in 1986 and Witebsky et al.[28] in 1995, clearly established the fact that Boundary Creek had never run dry in living memory before there was large scale groundwater extraction that took place at Barwon Downs in the drought of 1982-83.

SKM

Barwon Water
Recommendations for Groundwater Licence Conditions
14 May, 2003

■ **Figure 3-1 Region of groundwater discharge to Boundary Creek**



The area in the map above marked as "*Regional Groundwater Discharge to Boundary Creek,*" encompasses the Big Swamp area. This groundwater discharge area was always saturated until one year after the 1982-83 pumping began. The Boundary Creek stream and wetlands below this point were also always saturated as the aquifer discharged from this area.

SKM determined that this area would dry out if the watertable dropped below 158 Australian Height Datum (AHD). A trigger level in the Yeo 40 bore (see above) was set at 158.5 AHD. The AHD in this observation bore has been consistently below this for years. Consequently the peat in the wetlands has been dried out to a considerable depth and Boundary Creek has run dry on numerous occasions[14][17].

When ASS remain saturated and in an anaerobic condition they are relatively stable and the surrounding soil pH is often close to neutral.[(12)] ASS may range from dark grey muds to grey sands, gravel and peat. In this state they are referred to as Potential Acid Sulfate Soils (PASS).

Upstream of the location of these photographs is the Big Swamp, extensive peat wetlands that have been dried out as a result of groundwater extraction.

The oxidising acid sulfate soils can cause rust coloured stains and slimes as an orange-red iron oxide scum. This scum can smother stream beds destroying aquatic habitat.

These are photographs of Boundary Creek just after the first rains following a long dry period. This creek used to flow at an average flow of 3.2 ML/day before groundwater extraction took place.

This site is at the stream flow gauging station site code number 233228 on the Colac to Forrest Road, Yeodene.

The water in this photograph turned a red rusty colour once the flow over the weir at the Forest Road bridge ceased.

There would appear to be evidence of concrete corrosion on the bridge pylons.

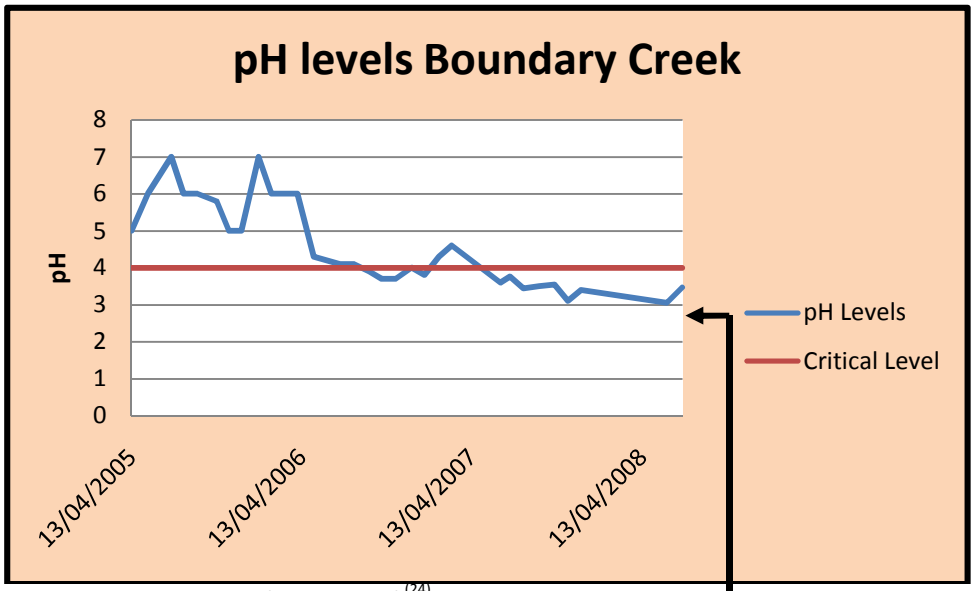
Acidity

Most aquatic life needs a minimum pH of 6 to survive. Anything below a pH of 4 and a stream would in effect be devoid of all normal stream life.

The pH scale and indicators of the range from alkaline to acid.

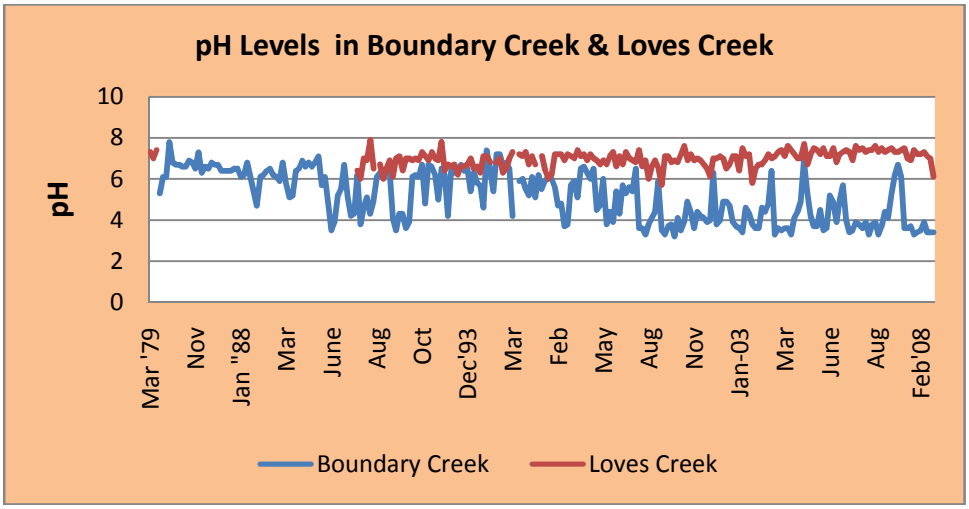
- **14** **MOST ALKALINE**
- 13 caustic soda pH 13.8
- 12
- 11 ammonia
- 10
- 9
- 8
- **7** **NEUTRAL**
- 6
- 5
- 4 beer
- 3 vinegar
- 2
- 1
- **0** **MOST ACID**

The graph below shows Boundary Creek has been under a pH reading of 4 on numerous occasions since September 2006.[21]



Source: Upper Barwon Landcare Network[24].

September 2008 a test done on the opaque "slug" seen below, was 2.7 done by Deakin University, see page 62.

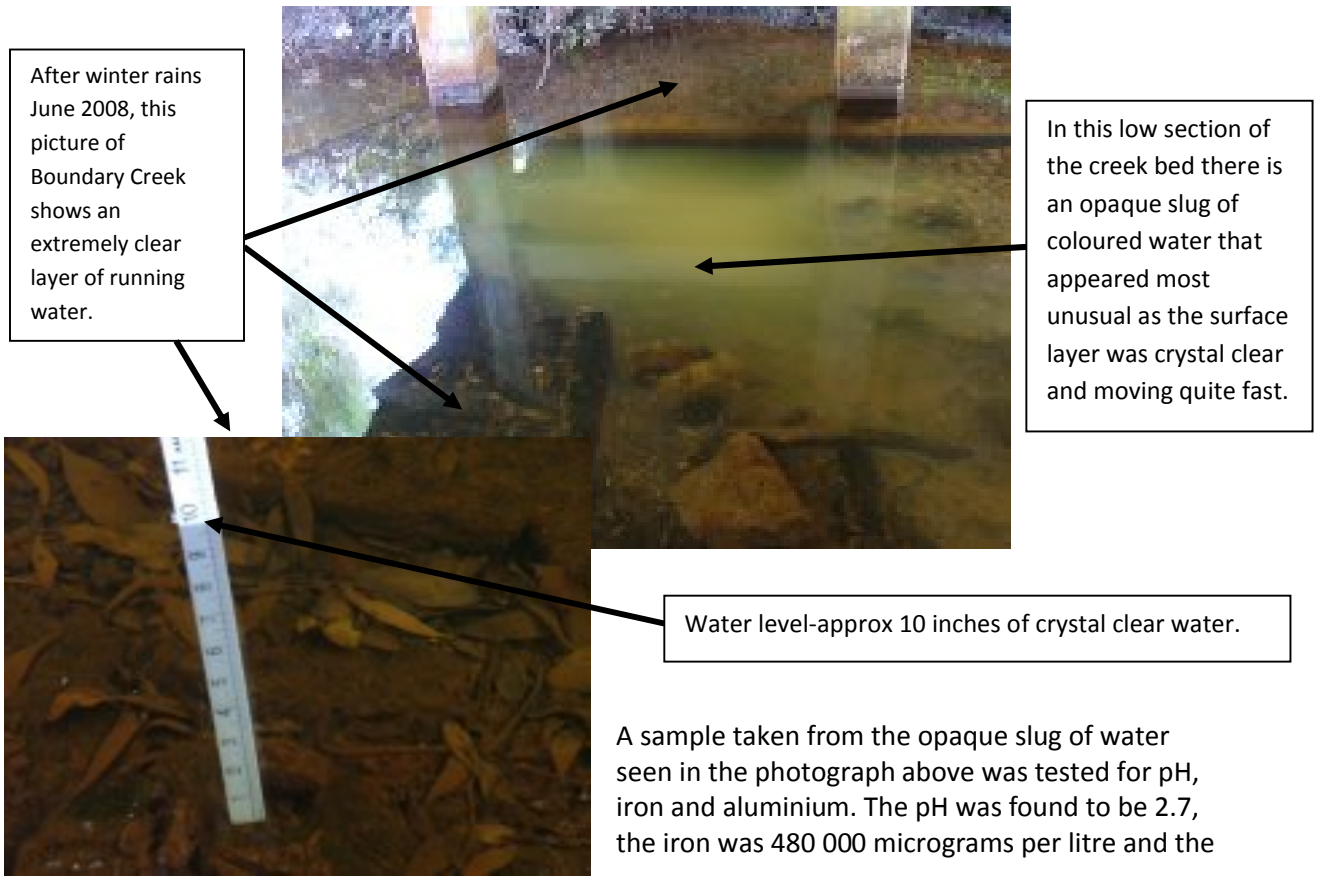


Source: www.vicwaterdata.net Boundary Creek@Yeodene Site Code 233228. Loves Creek@ Kawarren Site Code 235234.

This graph depicts acid problems since the late 1980s. The latest water tests suggest the pH has not stopped falling. Loves Creek has remained relatively stable and healthy throughout the same period.

Aluminium

Aluminium in acid water is toxic to most water organisms.[25] For humans high aluminium levels would most probably be un palatable and not consumed as a result. Cloudy green-blue water is an indicator of the presence of aluminium. High levels of aluminium can cause particles floating in the water to join together and precipitate to the bottom of a stream. This leaves a top layer of crystal clear water that looks deceptively healthy.[25]



A sample taken from the opaque slug of water seen in the photograph above was tested for pH, iron and aluminium. The pH was found to be 2.7, the iron was 480 000 micrograms per litre and the

aluminium content was 980 micrograms per litre. It is interesting to note that the 1992 ANZECC [2] freshwater and marine guidelines, quoted in a CSIRO report[22] suggests that an acceptable aluminium level is 5 micrograms per litre. This Boundary Creek sample is 196 times this ANZECC[2] level. For iron the acceptable level in this report was set at 500 micrograms per litre.
Another CSIRO report[8] states that a main effect of high acidity on plants can be via aluminium toxicity, one effect of which is to injure root tips and prevent root growth.

One sample such as this can only be regarded as indicative of the need for further investigation. Considering the numerous other indicators the high aluminium content should be regarded as serious.

The creating of Actual Acid Sulfate Soils (AASS) can result in a toxic brew being released into the environment and can cause significant harm to the ecosystems, agriculture, engineering structures, groundwater and even human health. The problems associated with production of sulphuric acid and other nasties through disturbing and or exposing ASS, are often long term and difficult to reverse.

Indicators of ASS

Indicators of Potential Acid Sulfate Soils[8] that are present along Boundary Creek

- Waterlogged soils
- Peat soil
- Dark sediment black ooze
- Water pH close to neutral
- Oily looking bacterial surface scum

This is oily bacterial scum in Boundary Creek. The scum would not adhere to a stick being placed into it.

Indicators of Actual Acid Sulfate Soils[8] that are present along Boundary Creek

- Water of pH less than 5.5
- Unusually clear or milky blue-green water
- Extensive iron stains and ochre deposits
- Corrosion of concrete and steel
- Sulphurous smell.
- Oily bacterial scum.

If Actual Acid Sulfate Soils are present in the Boundary Creek catchment the likelihood of sulfuric acid and the other toxic products of Acid Sulfate Soils leaching into and polluting the aquifer, is an extremely strong possibility.

The 2007 CSIRO study[26] of the Corangamite Catchment Management Authority area looking into coastal and inland acid sulfate soils had this to say about possible economic impacts from the result of disturbing acid sulfate soils,

> *"... the documented potential of sulfidic material disturbance to destroy wetlands, acidify and deoxygenate waterways and estuaries, increase the incidence of fish kills and disease, contaminate valuable groundwater resources and public park space, facilitate the mobility and accumulation of heavy metals, corrode, attack and destabilise roads, concrete and steel infrastructure, stimulate blooms of marine blue-green algae, decrease the agricultural productivity of land, increase odour problems and increase mosquito and arbovirus incidence...,"*

are realistic outcomes and that this awareness is a critical natural resource management issue. This same study stated that the increase in solubility of metals under acidic conditions may be more harmful to biota than the low pH.

Subsidence

An earlier chapter dealt with subsidence that occurs as a result groundwater extraction from a deep aquifer where the sediments above and in this aquifer compact and the overlaying land formations drops. The subsidence discussed here is a direct result of groundwater extraction but the effect is apparent in the wetlands when they are caused to become dry.

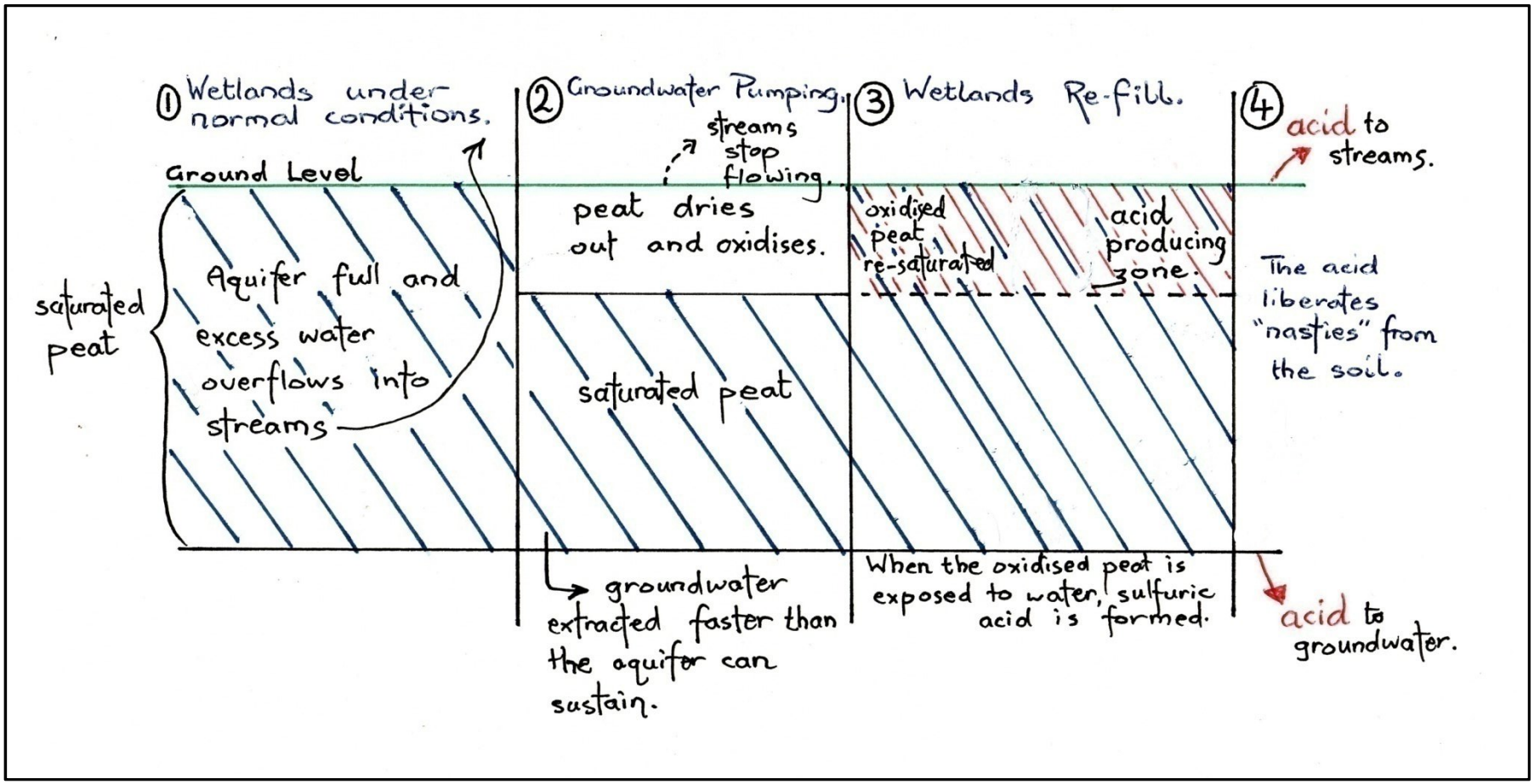
As the groundwater is extracted the normally saturated wetlands change from a gaining wetland that flows over into a creek, into an area that loses water to the depleted aquifer below. As this happens the wetlands begin to shrink and compact.[22,25] Quite often the pre-pumping hydrological conditions are extremely difficult to restore.

Fire

Fire in the Big Swamp peat wetlands along Boundary Creek has been dealt with in some detail [14,16,17] however, when researching Acid Sulfate Soils effects in the 1983 CSIRO book on "Soils an Australian Viewpoint,"[8] it mentions the problems associated with peat drying out and the difficulty dealing with peat fires.

Carbon Loss

Wetlands in an undisturbed state are natural accumulators of carbon. Once the area is dried out and oxidation begins to take place the emissions of carbon dioxide result. The wetlands can then move from an accepting to a negative state of carbon release.


① Wetlands under normal conditions.
② Groundwater Pumping.
③ Wetlands Re-fill.
④
acid to streams.
Ground Level
streams stop flowing.
peat dries out and oxidises.
oxidised peat re-saturated
acid producing zone.
The acid liberates "nasties" from the soil.
saturated peat
Aquifer full and excess water overflows into streams
saturated peat
groundwater extracted faster than the aquifer can sustain.
When the oxidised peat is exposed to water, sulfuric acid is formed.
acid to groundwater.

Laypersons' Investigation Along Boundary Creek & the Big Swamp.

One of the hardest things to deal with regarding the issues of groundwater extraction in the Barwon Downs and Kawarren districts of the Otways has been finding a government body prepared to take the concerns of the "local landholder and residents" seriously. As a consequence a multitude of residents had taken the decision to attempt to carry out work that government statutory bodies have failed to do. The following few pages give a brief overview of *some* of this work undertaken.

Because of the apparent low pH and extremely high levels of aluminium in the water at the Stream Flow Gauging Station Number 233228, it was decided that there was most likely an area along Boundary Creek that had gone from a Potential Acid Sulfate Soil state to an Actual Acid Sulfate Soil state. On 13/14 September 2008 an effort was mounted to discover this area.

Farmar Bowers[11] in 1986 didn't mention anything about Acid Sulfate Soils in his Boundary Creek report but he did have these important things to say:

- The pumping of the Barwon Downs wellfield is likely to create changes in groundwater levels of the order of 25 to 50 metres at the site.
- Aquifer pumping during droughts, as is proposed, would tend to exacerbate the effect of natural variation by extending the effects of drought.
- If there is a deficit of natural flow into wetlands over an extended period some of the environmental changes will have become entrenched and will not be easily reversed.
- Changes may occur quite rapidly within a few years.
- Some of the Boundary Creek riparian area is swamp with fine mud, rich in organic matter several metres deep.
- The dense swamp vegetation prevents floods occurring.
- The saturated zone may shrink in size.
- Aquatic vegetation at spring and swampy areas may be affected as these areas dry out.
- In most of the areas, the change may be gradual, one habitat being replaced by another, however in the wetter areas, (riparian zones adjacent to springs and wet areas), the change may be quite rapid.
- The area has a low agricultural and timber production value as soil fertility is low and some low lying areas are often waterlogged.
- From an agricultural aspect the lowering of the water table in the water logged areas may allow this land to be utilised for agricultural production.

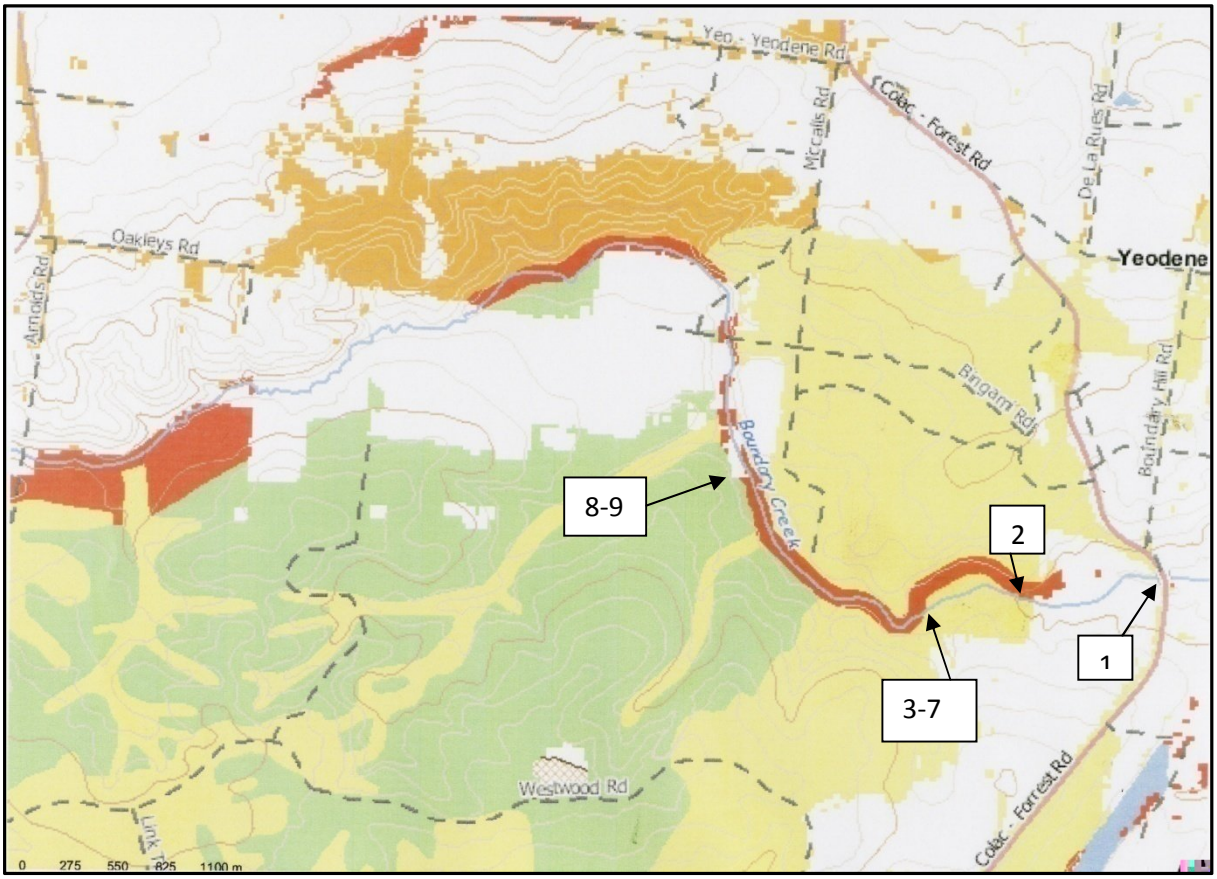
From these comments and observations made by Farmar-Bowers it can be safely said that there were areas that never dried out and the vegetation in the swamps and wetlands was dense, vigorous and healthy. This area was unsuitable for agriculture because of the water logging. The 2007 fire in the peat on McDonald's farm paddock along Boundary Creek was a complete surprise as this area had never been able to be utilised for agriculture previously.[17] Farmar-Bowers completed his work before the commencement of the extensive 1987 test pump at the Barwon Downs borefield. The brief for this report was to determine what environmental studies should be completed before this test began and also attempt to assess the likely environmental impacts. The importance of this report is the descriptive nature of the wetlands abounding Boundary Creek pre the 25 000 mega litres extracted in the test pump period.

With this impression of a vibrant, dense and healthy wetland ecosystem in mind an "expedition" was planned for exploration along Boundary Creek west of the Colac to Forest Road. From anecdotal discussion with the fire fighters that fought the 1996, 97 and 1998 fires in this area, it was anticipated that this would not be an easy task to carry out. As it turned out the opposite was the case.

A four wheel drive vehicle had to be used traversing overgrown fire tracks. The first site visited (see below) was difficult to access. Because of the acid activity sites 3 to 7 were much easier to access and walk through.

It is readily admitted that the manner in which the following samples from these sites have been collected and tested, may not satisfy strict scientific procedure, however, the results of this sampling do throw up some interesting points of discussion that cannot be ignored.

A Garmin Etrex 12 Channel GPS was used for the recording of the co-ordinates.



Map showing the sites visited. (Source Department of Sustainability and Environment.)See the Map on page 38.

SITE ONE – 15 August 2008 the analysis of water that prompted the upstream investigation.
Twenty metres upstream of the Stream Flow Gauging Station Number 233228 the greeny slug of water was still present in a deep hole with crystal clear water flowing over the top. A water sample was taken from this hole and the analysis was as follows.

Date	Water tested for...	ANZECC[2] Guideline Levels	Results	Times above guideline ANZECC[2] levels	NHMRC[29] Health Levels
15/08/2008	pH		2.7		Insufficient data
15/08/2008	aluminium	0.005 mg/l At pH levels over 6.5	0.98 mg/l	196	<0.1mg/l desirable. Lower levels for renal dialysis.
15/08/2008	iron	0.5 mg/l	480 mg/l	960	Taste threshold 0.3 mg/l

Sample tested by Deakin University Water Quality Laboratory. See page 62.

SITE ONE – a month later.

These three samples of water were taken at the stream flow gauging station 233228 on the 14 September 2008. There had been 31 mm of rainfall, since the 15 August sample was taken. The rain fall was measured at Nellie Shalley's property which is just east of the 233228 stream flow gauging station. With this amount of rainfall in the Boundary Creek catchment it would have been reasonable to suggest that the creek should have been at least partially flushed out. From the results below this does not seem to be the case.

Water tested for ...	ANZECC[32] TriggerLevels at 80% protection (mg/l)	Result Sample A (mg/l)	Sample B (mg/l)	Sample C (mg/l)	Highest sample above ANZECC[32] guidelines by a factor of...
Aluminium	0.15 above pH 6.5	29	14.8	15.3	193
Iron		104	40.5	28.2	
Sodium		170	170	160	
Potassium		3.7	3.8	3.6	
Sulfate		270	470	440	
Arsenic	0.36[c]	0.018	0.002	0.003	0.05
Cadmium	0.0008[c]	0.0006	0.0005	0.0006	0.75
Chromium		0.012	<0.001	<0.001	
Copper	0.0025[c]	0.154	0.463	0.165	185.2
Lead	0.0094[c]	0.022	0.024	0.016	2.6
Manganese	3.6[c] above pH 6.5	0.565	0.526	0.508	0.16
Nickel	0.017[c]	0.182	0.171	0.159	10.7
Zinc	0.031[c]	0.782	0.586	0.52	25.2
Boron	1.3[c]	<0.05	<0.05	<0.05	
pH		3.2	4.2	3.3	
EC		1900	2060	1960	

Samples tested by Deakin University Water Quality Laboratory. This laboratory is an independent laboratory accredited by the National Association of Testing Authorities (NATA).See page 63.

The ANZECC 2000[32] trigger levels for freshwater stated above are for the protection of 80% of species and it must be noted that these levels will vary from circumstance to circumstance. However, they can be used as a "rough" guide.
C = Figure may not protect key species from chronic toxicity (Refer to ANZECC 2000 guidelines).

In relation to animal welfare, aluminium at these levels would cause severe diarrhoea. Copper being hard to digest orally should not be a problem. Zinc at these levels may well be beneficial on the feet of cattle inhibiting epithelthelum growth. Lead on the other hand is always a worry. Even small amounts can accumulate and is deleterious to all animals, humans included. Young animals are especially susceptible to lead poisoning. Stock can show neurological symptoms and can suffer incredible head pain (Michael Rhodes, veterinarian, Colac, Victoria. Pers. Com. 2008).

SITE TWO –Start of the Big Swamp area.
S 38.42159
E 143.70054

Lat/Long
S $38^0$25 295
E $143^0$42033

Boundary Creek at this site had a pH of 3 and EC of 530.

Soil from a dry area in the peat 20 metres from this picture was tested using a simple pH soil test. At 45 mm the peat was dry. At one metre it was moist and between 1.2 metres and 2.2 metres it was wet. These samples tested between 4 and 5 pH.

The pH in this backwater was 2.3 and the EC was 650.
At first glance this area appeared to be relatively healthy. However, there was much fallen vegetation and signs of stress - as evident in this photograph.

A little further from Boundary Creek and this fern site had a pH of 2.7 and an EC of 750.

This photograph is looking down over Site two.
S 38 42088 E 143 70062
The fern in the middle of the photograph has its tips dying and the ferns around it have died.

The vegetation in this section of the peat swamp area is struggling to survive. Much of the area is dry on the surface. Considering that these photographs have been taken at the end of September 2008 and after considerable rains, this is quite surprising.

SITE THREE

S 38.42319 E 143.69336 Lat/Long S $38^0$25 091 E $143^0$41 620

Boundary Creek was running at a pH of 4.1 and an EC of 420 at the site in this photograph. Along this section of the creek first appearances gave the impression that it is a healthy stream. On closer inspection the algae blooms don't appear to be kept under control from algae grazing life forms.

By the end of October 2008 all surface waters in the wetlands between sites 2 and 7 had dried out. The water in this picture is approximately 20 cm deep.

SITE FOUR - the Big Swamp

Looking down over Site Four from a considerable height.

S 38 42144 E 143 69350

In the middle of this picture the dead and dying wetlands are quite evident. This area should be as rich and vibrant looking as the rest of the vegetation skirting this wetlands area.

Site Four –The Big Swamp

S 38.42288 E 143.69452 (Lat/Long S 38^{0}25 373 E 143^{0}41 671).

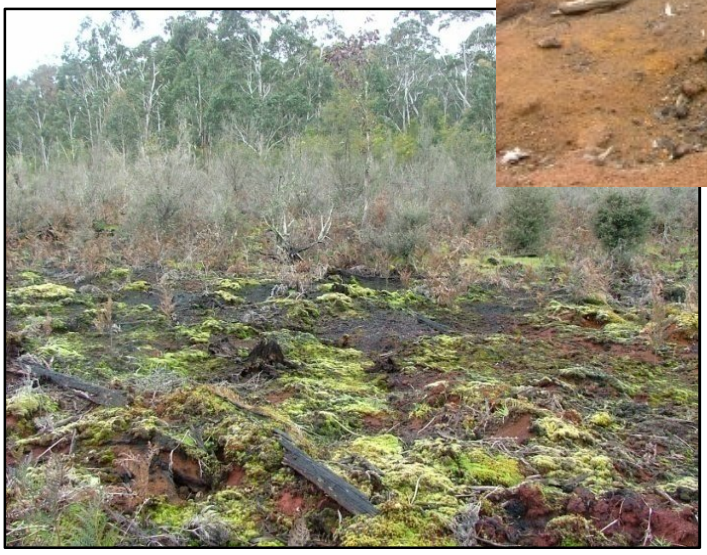
The elevation of this area was recorded at 154 metres (GarminGPS). The critical trigger level for water releases into Boundary Creek is set at 158.5 AHD.

A hole was hand dug through the dry peat until

moisture was located at 75 cm and left for 45 minutes before the water sample was extracted from the hole. The sample tested was 2.5 pH (15 Sep. 2008).

This site within 50 metres of the creek shows absolutely no sign of animal life in the soil. Logs and peat alike can be turned over and searched minutely and no animal life form can be found. The surface peat is dry, bracken fern struggles to survive and to find any fungi is a most difficult task.

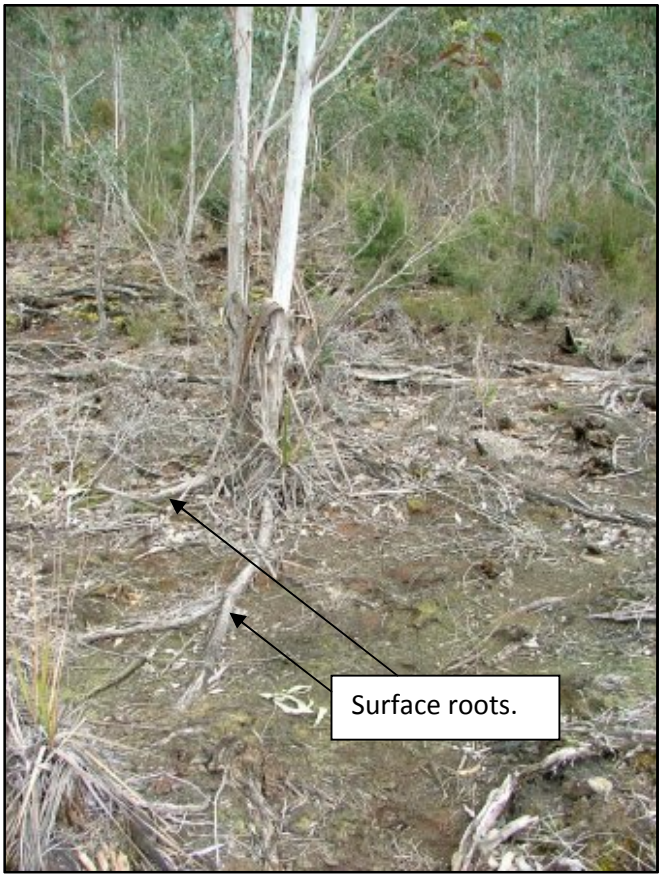
There is little evidence of mycorrhizal association. Mycorrhiza is a mutualistic symbiotic association that forms between the plants and fungi



active in the root zone. The roots of at least 95% of higher order plants form this mutualistic association. Any natural ecosystem normally contains a mixture of types of mycorrhizal associations. These associations are critical, complex and vary widely in form and function. Without these mycorrhizal root-fungal association, plant strategies for efficient

functioning break down and the plant struggles and often does not survive.

Trees on the edges of the affected area struggling to survive, have no tap root and the roots spread out across the surface. The trees are easily pushed over.



Tea- tree attempting to grow is stunted and in most cases dies off.
This area has had ten years to regenerate and these photographs depict how this has not happened.

Mosses, algae and stunted tea-tree appear to be the dominant growth in this peat area.

There are areas of the peat displaying hydrophobic reaction to water. This means that the peat and water repel one other. This is quite unusual considering this whole area was water logged pre groundwater pumping. The soil being hydrophobic also creates a problem for any seed germination.

SITE FIVE – The Big Swamp
Close to Site Four. S 38.25370 E 143.41662
A similar hole to site 4 was dug under where a stump had been pulled out. The water tested at 2.7 pH (15 September 2008).

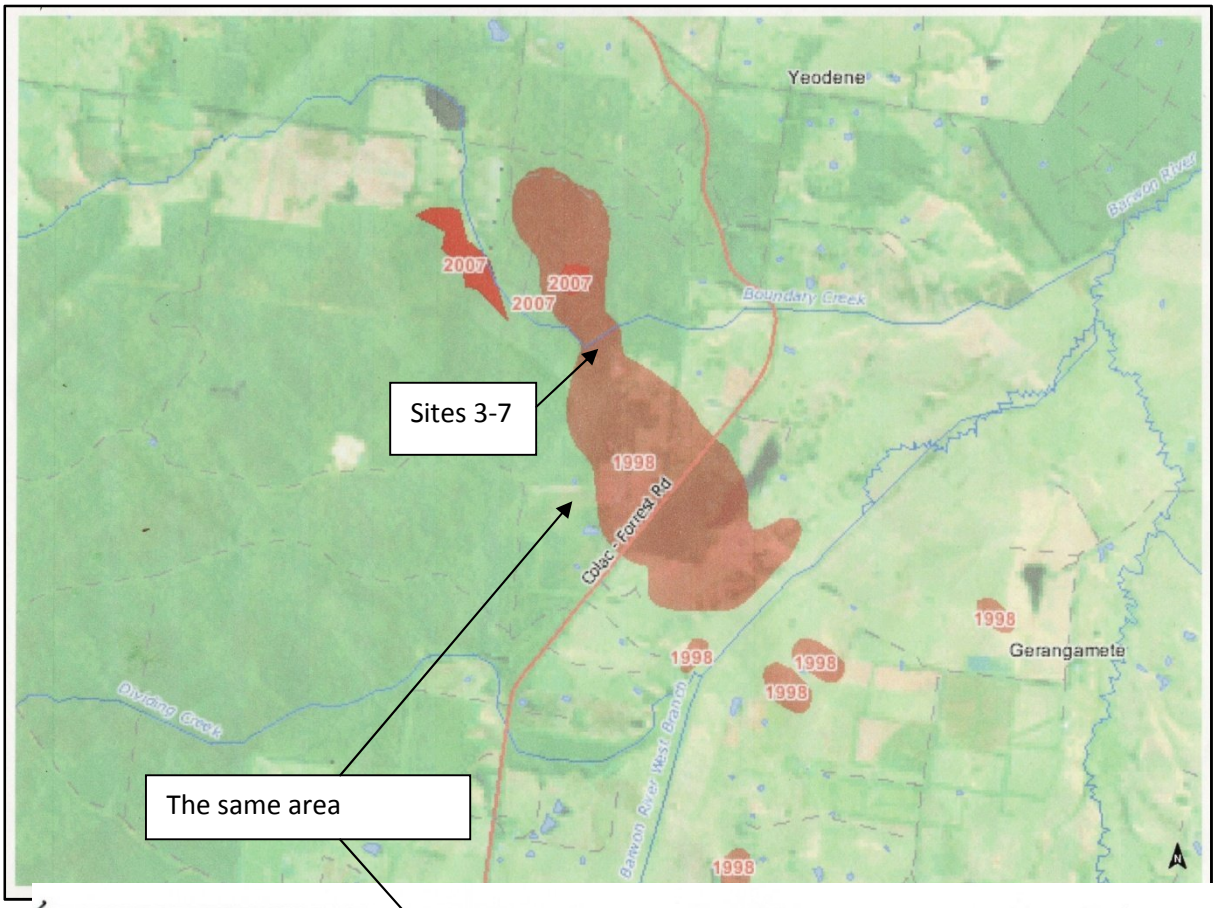
Any regeneration that has attempted to grow in this area has hugged the surface layer of peat and in most cases has succumbed to the acid levels as the

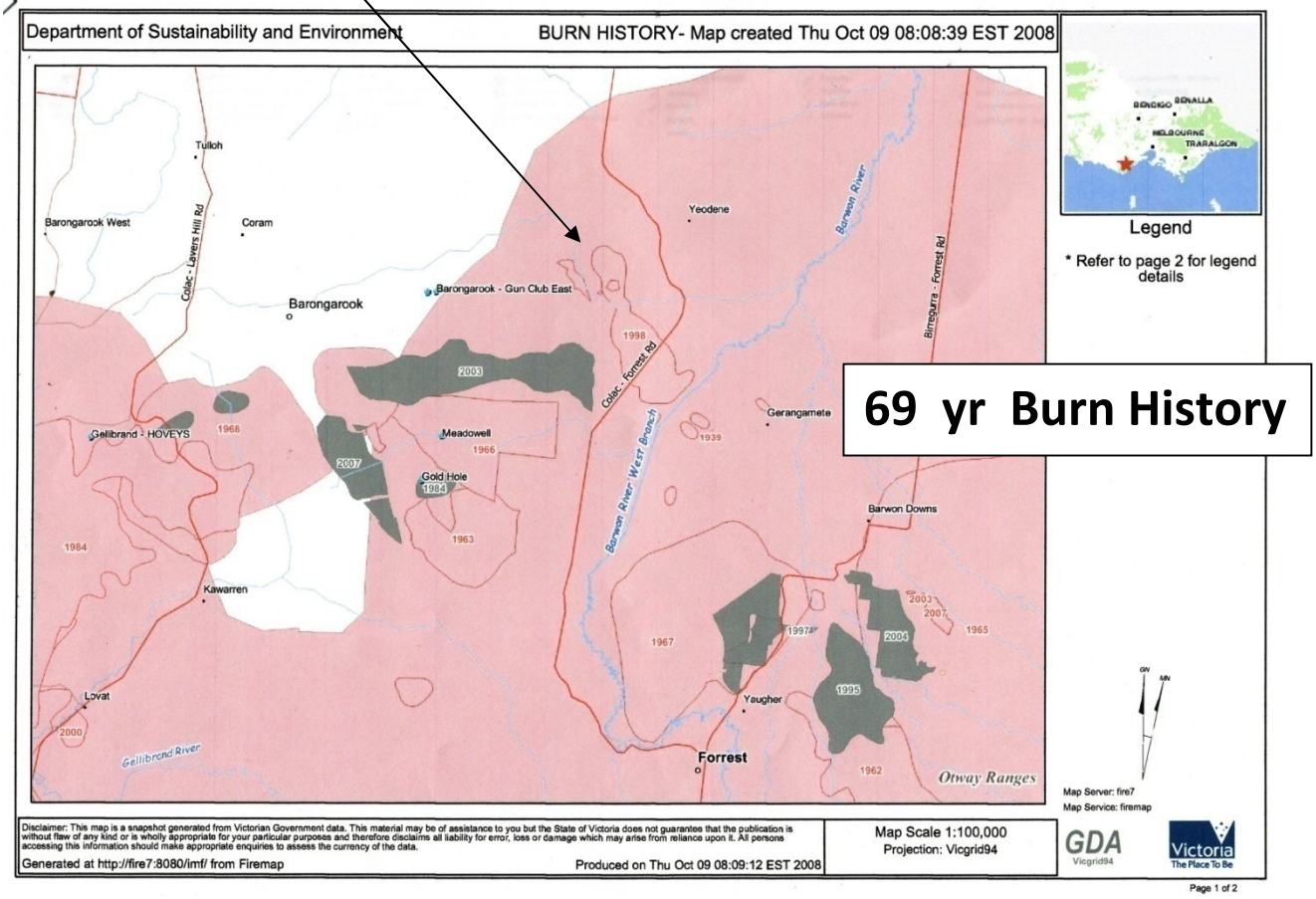
water table rises. Any living vegetation is struggling and would appear to have little chance of surviving.

The fires in this area were over ten years ago and it can safely be assumed that vegetation and animals should have re-established by this stage, especially in an area that was previously a vibrant and densely vegetated wetland.

When the fire fighters fought the blazes at this site they knick named the site in the peat swamp, Jurassic Park because of the dense, wilderness nature of the area. In 2008 there is no evidence of a wilderness in this peat swamp area.

Map showing the 1998 and 2007 burnt out areas. (Source Department of Sustainability and Environment.)





The Big Swamp area is estimated to occupy 60 hectares. The earliest wildfire in the Big Swamp area that the Department of Sustainability and Environment records show is the 1939 fire. Over the next 69 years the only wildfires in the area have been when the peat was alight in 1996, 1997, 1998 and 2007.

Jim Speirs an Otway forester who started with the Forest Commission of Victoria in 1954, was involved in fire hazard reduction burns in the Boundary Creek Big Swamp area. Jim retells that throughout the period up to 1991, when he retired, the foresters would do fuel reduction burns in the Big Swamp area in rubber boots. The foresters would be working in water. Leaves, grass and other matter would burn off down to the water level. (J. Speirs. Pers. Com. October 2008)

SITE SIX

Looking down over Site Six from up on the northern ridge.
S 38 42119
E 143 69512.

Site Six

S 38.42185 E 143.69638

A hole was hand dug through the dry peat until moisture was located at 50 cm and left for several minutes. By this stage the water had risen to the 30 cm mark in the hole. A sample was taken for testing. It tested out at 2.6 pH (15 September 2008).

This site is downstream of the "moonscape" 1996 fire area (Sites 4, 5) and has no evidence of any fire. Much of the dead vegetation is still standing whereas the rest has fallen in the direction of the prevailing winds. This area could have been scorched by the peat fires and consequently died but it could also have died as a result of the acid in the soil slowly leaching downstream killing the vegetation as it spreads into the root zone.

SITE SEVEN

S 38 42147 E 143 69571 (Lat/Long S $38^0$25 288 E $143^0$41 743)

This site had a pH reading of 1.9 but was not lab tested as this site was visited after the other samples had been sent off.

This site presented another variation of the impacts found in the area and was quite unexpected.

Both of these photographs were taken from the same location. One facing east and the other facing west.

SITE EIGHT - the site of the 2007 Peat Fire.
S 38.41528
E 143.68307
This site is a man made channel on the edge of a formerly saturated peat[16] creating Boundary Creek and was running at a pH level of 4.8 and EC of 530.
This is a considerable way upstream from site four and does appear to be much healthier.

SITE NINE
However, 150 metres west of site 8 in a water pond the pH reading was 2.9. This would suggest that there could be a problem at this level as well. This is the area of the 2007 peat fires that were a complete revelation to the owner of this land as his family had attempted unsuccessfully for decades to drain this land.

In Summary...

Before groundwater extraction in the early 1980's the Boundary Creek wetlands and creek was a vital, thriving and healthy environment. Once the watertable under this area was progressively lowered the wetlands have dried with several disastrous results.

- The water that over flowed from the aquifer replenishing Boundary Creek has ceased to flow on numerous occasions. The platypus colonies, the blackfish and other water dependent species have died out.
- The lush water dependent wetlands vegetation has been dieing.
- As the 2-8 metres[11] of peat in the wetlands dries out it begins to oxidise. When wet this peat acts as a carbon sink but when it begins to dry out it releases this otherwise locked in carbon to the atmosphere.
- Dry peat is then extremely susceptible to fire. Once on fire it is one of the most difficult fires to put out and can smoulder and reignite as a wild fire for decades.
- When it rains and or the oxidised peat is wetted a potent mix of sulfuric acid is produced. So potent that vegetation can't survive and the majority of life forms such as ants, lizards, beetles and the like die out.
- As this sulfuric acid moves through the peat and soil it begins to liberate a toxic mix of heavy metals and other nasties.
- This deadly water is then released from the affected area in two alarming ways.
    1. It runs off as surface water and flows down Boundary Creek.
    2. It begins to soak down into the depleted aquifer creating untold problems for the life forms in the aquifer and the ability of the aquifer to resist pollution.
- As long as the wetlands are exposed the area of contamination and potential to continue producing these affects and influencing an ever increasing area, will be present.
- Ecosystems (above and below ground), farmers, aquifer water users and the atmosphere will be seriously compromised.

CONCLUSION

There would appear to be an extremely convincing case for further investigation along Boundary Creek for Potential and Actual Acid Sulfate Soils and the possible effects on the ecosystems, agriculture

and the quality of the water recharging the aquifer.

If the diagram on page 43 is even close to representative of what is taking place along Boundary Creek then the implications are enormous considering that Geelong relies heavily on the groundwater that is being polluted with acid water. The Water Act 1989 under Section 163 says that

Barwon Water has a duty to *"...provide, manage, operate and protect water supply systems"* in so far as they apply to its area of "*water districts."*

NOTE:

- The similarities between the headwaters of Boundary Creek and those of Loves Creek in the adjoining catchment are extremely similar. The peat swamps in the headwaters of Ten Mile Creek, Yahoo Creek and Porcupine Creek all tributaries of Loves Creek are under a similar threat from groundwater extraction as has happened at Boundary Creek. The Gellibrand River flats east of the Gellibrand township also have significant peats not to mention the peats all the way along the Gellibrand River to the sea. Potential Acid Sulfate Soils must be taken into consideration when investigating the development of extraction of groundwater for urban use from the aquifers that sustain these peat and wetlands.

- Considering that surface water in the Loves Creek and Gellibrand River catchments is already fully allocated any thought of extracting groundwater would be disastrous. Extracting groundwater would reduce the natural overflow into these surface waters reducing the ability to keep Potential Acid Sulfate Soils throughout the catchment, in a neutral water saturated state.

- Princetown is at the mouth of the Gellibrand River and the flow from the Ten Mile Creek catchment forms part of the Gellibrand River catchment. The 2007 CSIRO report[13] on ASS found that the wetlands at Princetown have a very high ASS risk and they must not be disturbed or it will result in high environmental or ASS management costs. Being disturbed in this case refers to the lowering of the groundwater and or reduction in river flows that will expose the Potential Acid Sulfate Soils.

Ten Mile Creek wetlands, saturated, vibrant and healthy.

Boundary Creek wetlands under considerable stress.

It must also be kept in mind that the Porcupine Creek, has its headwaters in a National Park and also has a Reference Area designated in it as well. This area is also under threat.

State of Victoria – Evidence Act 1958

[JP/DOJ.1/2000]

STATUTORY DECLARATION

I, MALCOLM JOHN GARDINER
[full name]

of 1805 COLAC BEECH FOREST RD. KAWARREN VICTORIA 3249.
[address]

RETIRED.
[occupation], do solemnly and sincerely declare that:-

After Boundary Creek at Yeodene began to flow for the first time after being dry for many months at the Stream Flow Gauging Station Number 233228 in late May 2008, I did a taste and sip test of the clear water flowing over the notch weir. I had asked Nellie Shalley to inform me when the creek began to flow.
The water was foul tasting causing me to spit as much as it out of my mouth as I could. Because it was so clear and healthy looking I had swallowed some before reacting to the taste. The next day I had a small case of diarrhoea and the skin on the hand I had cupped the water out with developed that skin catching on garments symptom that one gets after concreting without gloves. My other hand had not been subjected to this water and did not suffer the same symptoms.

I rang Nellie to alert her and warned her not to use the water. She said she never did in the last few years until four to five inches of rain had fallen to flush the creek out.

This started me thinking about causes of this degradation. I had read a little on Acid Sulfate Soils(ASS) and began to research it. Returning to the Station Number 233228 on occasions I noticed the crystal clear surface water with pockets of greeny/bluey/yellow opaque water hugging the stream bottom in depressions. In August 2008 my enquiries and readings of ASS indicated that this may be caused by high levels of aluminium. I captured a bottle of this deep water and had it tested for aluminium. I knew the pH was extremely low from tests done by the Upper Barwon Landcare Group and Thiess. I had the pH tested anyway and the iron was also tested. The following sheet marked MGardiner No. 3249 is the result of this testing.

On the 12 September 2008 the opaque "slug" had cleared from under the bridge at the Steam Flow Gauging Station Number 233228 but was still present in a deep hole four metres to the west of the bridge. The water was crystal clear right to the bottom of the creek under the bridge.

I acknowledge that this declaration is true and correct, and I make it with the understanding and belief that a person who makes a false declaration is liable to the penalties of perjury.

Declared at COLAC

in the State of Victoria, this 18th day of

September 2008

Signature of person making this declaration
[to be signed in front of an authorised witness]

Before me,

Signature of authorised witness

PRINCIPAL COLAC P.S.

One can only imagine what the pH level would have been if it had been tested in late May/early June. After a considerable flushing from rain in August it was 2.7 (see page 62).

WATER QUALITY LABORATORY

Test Report

Lab. Ref. No. 08/307

2 September, 2008

Mr. MGardiner No. 3249

GELLIBRAND Vic., 3239

Dear Sir,

The following results were obtained on a sample as received on 15 August, 2008.

Parameter	**Unit**	**Results**
Iron	$g.m^{-3}$	480
Aluminum	$g.m^{-3}$	0.98
pH		2.7

All Tests have been conducted within the recommended holding period.

Yours sincerely,

Kate Hill
Approved Signatory

MALCOLM JOHN GARDINER

PO Box 423, Warrnambool, Victoria, 3280, Australia. Telephone: (03) 5563 3481 Fax: (03) 5563 3462

Allan J Wallwork
PRINCIPAL COLAC P.S.
18TH SEP 2008

$g.m^{-3}$ = milligrams per litre.

S

WATER QUALITY LABORATORY

Test Report **Lab. Ref. No.** 08/347

1 October, 2008

Mr. Malcom Gardiner,
18/05 Colac-Lavers Hills Rd,
KAWARREN Vic., 3249

Page 1 of 1

Dear Sir,

The following results were obtained on samples as received on 15 September, 2008.

Method	Parameter	Unit	Sample 1-A 14/9	Sample 1-B 14/9	Sample 1-C 14/9
4500-H^+ B	pH		3.3	4.2	3.3
2510 B	Elec. Conductivity	$\mu S.cm^{-1}$	1,900	2,060	1,960
3500-Na B	Sodium	mg/L	170	170	160
3500-K B	Potassium	mg/L	3.7	3.8	3.6
4500-$SO_4^{=}$ E	Sulfate	mg/L	270	470	440
EG005T #	Iron	mg/L	104	40.5	28.2
EG020T #	Aluminum	mg/L	29.0	14.8	15.3
EG020T #	Arsenic	mg/L	0.018	0.002	0.003
EG020T #	Cadmium	mg/L	0.0006	0.0005	0.0006
EG020T #	Chromium	mg/L	0.012	<0.001	<0.001
EG020T #	Copper	mg/L	0.154	0.463	0.165
EG020T #	Lead	mg/L	0.022	0.024	0.016
EG020T #	Manganese	mg/L	0.565	0.526	0.508
EG020T #	Nickel	mg/L	0.182	0.171	0.159
EG020T #	Zinc	mg/L	0.782	0.586	0.520
EG020T #	Boron	mg/L	<0.05	<0.05	<0.05

Analysis performed by Accredited Laboratory No. 825 and shown on report No. EM0807047.
All Tests have been conducted within the recommended holding period.

Yours sincerely,

Kate Hill
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

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Accredited Laboratory No. 2457

PO Box 423, Warrnambool, Victoria, 3280, Australia Telephone: (03) 5563 3481 Fax: (03) 5563 3462

Water samples tested 15 September 2008 at Sites 4, 5 and 6.

WATER QUALITY LABORATORY

Test Report Lab. Ref. No. 08/347b

22 October, 2008

Mr. Malcom Gardiner,
1805 Colac-Lavers Hills Rd,
KAWARREN Vic., 3249

Page 1 of 1

Dear Sir,

The following results were obtained on samples as received on 15 September, 2008.

Method	Parameter	Sample 2-A 13/9	Sample 2-B 13/9	Sample 3 13/9
4500-H^+ B	pH	2.7	2.5	2.6

All Tests have been conducted within the recommended holding period.

Yours sincerely,

Kate Hill
Approved Signatory

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Accredited Laboratory No. 2457

PO Box 423, Warrnambool, Victoria, 3280, Australia Telephone: (03) 5563 3481 Fax: (03) 5563 3462

Water samples tested 31 October 2008 at Sites 4 and 5.

WATER QUALITY LABORATORY

Test Report Lab. Ref. No. 08/388

31 October, 2008

Mr. Malcom Gardiner,
1805 Colac-Lavers Hills Rd,
KAWARREN Vic., 3249

Page 1 of 1

Dear Sir,

The following results were obtained on samples as received on 9 October, 2008.

Method	Parameter	Unit	Sample 1.	Sample 2.
4500-H^+ B	pH		2.6	2.6
2510 B	Elec. Conductivity	$\mu S.cm^{-1}$	2,160	2,140
3500-Na B	Sodium	mg/L	90	90
3500-K B	Potassium	mg/L	4.8	12
4500-$SO_4^=$ E	Sulfate	mg/L	390	325
EG005T #	Iron	mg/L	372	354
EG020T #	Aluminum	mg/L	6.93	12.6
EG020T #	Arsenic	mg/L	0.193	0.222
EG020T #	Cadmium	mg/L	0.0020	0.0026
EG020T #	Chromium	mg/L	0.010	0.012
EG020T #	Lead	mg/L	0.017	0.016
EG020T #	Manganese	mg/L	0.339	0.384
EG020T #	Nickel	mg/L	0.091	0.140
EG020T #	Zinc	mg/L	0.854	1.08
EG020T #	Boron	mg/L	<0.05	<0.05

Analysis performed by Accredited Laboratory NO. 825 and shown on report No. EM0808632
All Tests have been conducted within the recommended holding period.

Yours sincerely,

Kate Hill
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

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CHAPTER 5

Possible Drawdown Effects – Lake Colac

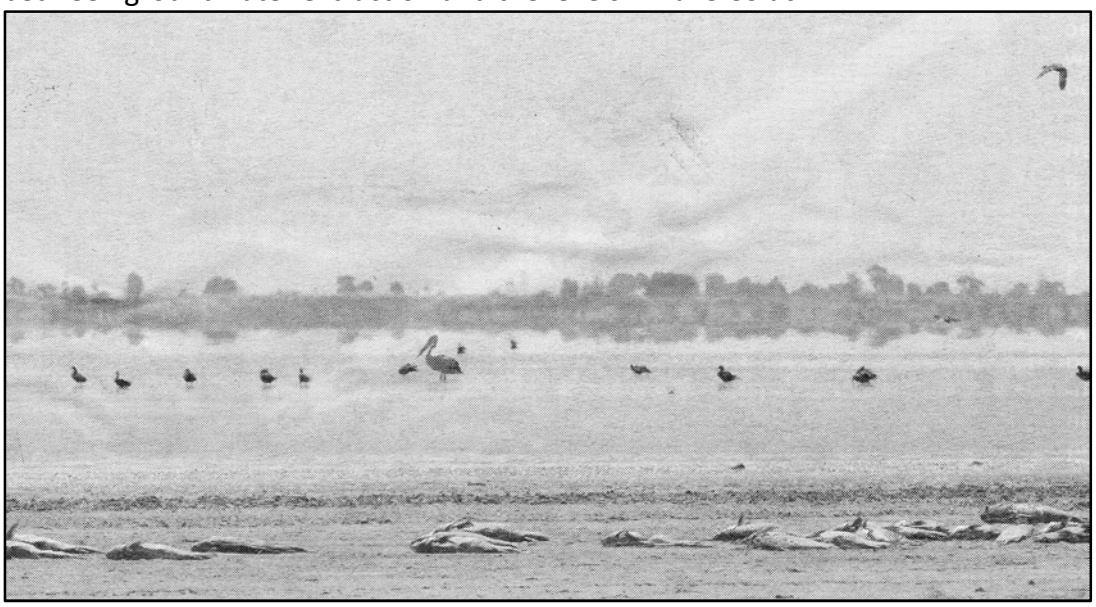
It was hoped that Barwon Water would provide the drawdown sphere on influence from the Barwon Downs borefield. This has not been the case and being a critical set of data, any discussion in regard to drawdown effects on Lake Colac have to be somewhat speculative. The best that can be expected is that this limited discussion prompts further, thorough examination.

From the map on page 22 it would appear that the influence on the deep water aquifer in the Colac region was quite significant. Considering this was in the year 2000 and that there has been extensive groundwater extraction since this period, it is more than reasonable to assume that the influence is even greater.

In 2002, as previously stated in Chapter 1, Peter Greig, the present Chairperson of the Corangamite Catchment Management Authority, was concerned that the drawdown was affecting the flows in Barongarook Creek in a similar fashion to the effects experienced along Boundary Creek. Barongarook Creek flows into Lake Colac. As discussed in detail the effects on Boundary Creek up to 2002 have been profound.[16][17]

Thompson[27] indicated that there is an extremely strong possibility that there is a sizeable groundwater flow into Lake Colac. He also stated seepage losses of lakes in the area to groundwater could range between 12 and 20% in drier periods. In 1995 Blake[7] was that convinced there is a groundwater connection with Lake Colac that he recommended the amount of groundwater flow be quantified.

Considering this limited information and putting the drought influence aside there would appear to be ample indication justifying the notion that there is in fact a connection between groundwater extraction and the levels in Lake Colac.



Photograph – Colac Herald 12 March 2008

Lake Colac is slowly drying up and groundwater extraction is a possible contributing factor. (Note the dead fish in the foreground.)

CHAPTER 6

Outcomes of Kawarren Borefield Test Pump Extraction Licence

Barwon Water had planned to carry out a three month test pump at the Kawarren borefield starting in December 2007. The local residents of the Kawarren and Gellibrand district voiced a number of serious concerns.[17] As a result the test is still awaiting Southern Rural Water endorsement.

Barwon Water also required Environment Protection Authority(EPA) endorsement. The Environmental Protection Authority had to delay giving its agreement after local resident back in November 2007 found a multitude of problems with Barwon Water's application. Since this time Kawarren/Gellibrand residents have been excluded by Barwon Water from any further involvement. Reports and correspondence between Barwon Water and the EPA have been requested through the Freedom Of Information process. As with earlier requests this is expected to take a considerable time.

The Kawarren Groundwater extraction site waits forlornly for a decision.

CHAPTER 7

Outcome of Formal Complaint to Southern Rural Water Re: Licence 893889

When researching the issues involved with groundwater extraction from the Otways numerous non compliance and glaring discrepancies became apparent with Licence 893889. This licence deals with the groundwater extraction at the Barwon Downs borefield. Not being able to have the issues with this licence resolved in what might be called the "normal" fashion, the Water Energy and State Ombudsman's offices were asked to assist. The best way to tell this story is to include the material sent to the State Ombudsman in October.

3 October Formal Complaint to the State Ombudsman

Level 9 North tower

459 Collins Street
MELBOURNE
Vic 3000
3 October 2008

Dear Sir,

Re: Southern Rural Water's scrutiny and enforcement of Barwon Water's Licence No. 893889.

I am a member of the LAWROC Landcare Group that is affiliated with the VFF and am lodging this document on behalf of LAWROC (Land and Water Resources Otway Catchment). This Group is convinced that every reasonable effort has been made to resolve this issue through normal channels with no success and ask for your help to resolve this issue.

At this point it is interesting to note that in the 2004 document "Securing Our Water Future Together" (Department of Sustainability and Environment) it discusses...

- ***Improving compliance and accountability, and***
- ***Improved clarity and allocation of roles and responsibilities.***

In the quest to resolve the issues being dealt with here neither of these things is readily apparent.

Barwon Water has an extremely poor record of maintaining the integrity of the environment as a result of groundwater extraction in the Boundary Creek region. Barwon Water plans to investigate the Kawarren borefield and has not demonstrated that it will carry that investigation out any better than the investigation and follow up work done in the Barwon Downs area. The detrimental sphere of influence from the Barwon Downs pumping has already had a social impact on the Kawarren/Gellibrand community.

Attempting to gain information on the Kawarren borefield investigation has not been open and transparent. Our President, Charlie Kohout, has been unsuccessful gaining information from Barwon Water through the Energy Water Ombudsman.

Barwon Water has not been fully complying with the groundwater extraction licence conditions set down for the Barwon Downs borefield and the regulatory body, Southern Rural Water, has denied this fact.

Chapter 23 of the book "Otway Water – the Summaries, Part 3," pages 205 to 238 (CD included), clearly demonstrates that Barwon Water have failed to comply with the Licence conditions for groundwater extraction at the Barwon Downs borefield under Licence 893889. This chapter also raises into question many other aspects of the scrutinising and "policing" of this licence. As a result there is a compelling case to have the Licence reviewed as there does not appear to be any responsible authority enforcing the licence conditions as set out in Licence 893889.

These revelations began to appear middle 2007 after reading Barwon Water reports on this licence.

On 11 October 2007, I phoned Chairperson Jan Greig of Southern Rural Water (SRW) and told her of my concerns. She said that she would pass these on to the appropriate person in SRW and named Dr. Martin Kent.

Having heard nothing within the month I registered the following mail to Dr. Martin Kent, 9 November 2007.

Mr. Martin Kent
Managing Director
Southern Rural Water
PO Box 153
MAFFRA
Vic 3860

9/11/2007

Dear Martin,
I am following up on a phone conversation I had with Jan Greig on the 11-10-2007. Jan assured me that she would approach you and ask you to contact me regarding some serious concerns that I have in relation to the way Southern Rural Water are scrutinising and ensuring the correct compliance to the Licence No 893889.
I would appreciate some contact in the near future.

Regards,
Malcolm Gardiner
otwaywater@yahoo.com.au

Registered Post – Customer Receipt 9/11/07
Please tear off and retain. Enquiries: please call 13 13 18.
Item addressed to:
Mr. Martin Kent
Southern Rural Water
PO Box 153 MAFFRA 3860

I have read the information on the reverse side of this receipt.
Sender's Signature
RD271012 60
WARNING: This envelope is not suitable for sending jewellery or precious stones. Small rigid items such as keys or coins should be securely packed to avoid loss or damage.

I also sent an email, 10 November 2007, containing the same wording.

Receiving no reply from either the "snail" mail or the email, I sent a copy of the email, 9 December 2007.

From: Mal Gardiner (otwaywater@yahoo.com.au)
To: martin.kent@srw.vic.gov.au
Date: Sunday, 9 December, 2007 5:13:54 PM
Subject: Re: Re;Talk with Jan Greig

----- Original Message ----
From: Mal Gardiner <otwaywater@yahoo.com.au>
To: martin.kent@srw.vic.gov.au
Sent: Saturday, 10 November, 2007 12:29:49 AM
Subject: Re;Talk with Jan Greig

Dear Martin,
I am following up a phone coversation I had with Jan Greig on the 11-10-2007. Jan assured me that she would approach you and ask you to contact me regarding some serious concerns that I have in relation to the way Southern Rural Water are scrutinising and ensuring the correct compliance to the licence No 893889 Barwon Water has.
I would appreciate some contact in the near future.
Regards,
Malcolm Gardiner.

(Yahoo did not send a message saying this email could not be delivered.)

I assume the registered post arrived but could not be as sure of the email so I sent a copy via the SRW email site. However I incorrectly addressed it "frw" instead of "srw" and received a reply from Yahoo saying the address could not be found.

I readdressed the email and resent the email for a fifth try.

From: Mal Gardiner (otwaywater@yahoo.com.au)
To: srw@srw.com.au
Date: Monday, 10 December, 2007 10:22:03 AM
Subject: Re: Re;Talk with Jan Greig

----- Original Message ----
From: Mal Gardiner <otwaywater@yahoo.com.au>
To: frw@srw.com.au ← sent again as I had "frw@" instead of "srw@"
Sent: Monday, 10 December, 2007 9:53:32 AM
Subject: Re: Re;Talk with Jan Greig

Dear Martin,
Back in November this email supposedly arrived as no report came to me saying otherwise. However the email address below is now not accepting email.
Consequently I am sending this one again with another to follow.
Regards,
Malcolm.

----- Original Message ----
From: Mal Gardiner <otwaywater@yahoo.com.au>
To: martin.kent@srw.vic.gov.au
Sent: Saturday, 10 November, 2007 12:29:49 AM
Subject: Re;Talk with Jan Greig

Dear Martin,
I am following up a phone coversation I had with Jan Greig on the 11-10-2007. Jan assured me that she would approach you and ask you to contact me regarding some serious concerns that I have in relation to the way Southern Rural Water are scrutinising and ensuring the correct compliance to the licence No 893889 Barwon Water has.
I would appreciate some contact in the near future.
Regards,
Malcolm Gardiner.

Rang SRW - Maffra and asked for Dr. Martin Kent's email address and was told to send it to srw@srw.com.au

This was the first response to my concerns, nearly three months later. By this time, and from a multitude of verbal broken promises etc. from a number of statutory bodies over the Kawarren groundwater extraction proposal, I was in no frame of mind to accept a verbal "runaround," with no paper trail to refer to.

From: Martin Kent (MartinK@SRW.com.au) ← martink@srw.com.au
To: otwaywater@yahoo.com.au
Date: Friday, 28 December, 2007 12:29:36 PM
Subject: Re talk with Jan Greig

Dear Mr Gardiner

Thank you for your email of 10 December 2007 seeking:

1. An answer to your email dated the 10-11-2007.
2. a copy of the conditions, reasons and permit allowing Barwon Water to do a preliminary pump at Kawarren Yaugher 51 bore in July 2007.

The first point relates to your concerns regarding our enforcement of Barwon Water's compliance with their Groundwater Licence No 893889 - which provides for the taking of groundwater from the Barwon Downs borefield.

I understood that one of our staff had discussed this matter with you following your conversation with our Chairperson, Ms Jan Greig. However, if this is not the case, please let me know (email is fine) your preferred phone number and best time of day to catch you and I will call. It was not the case – no one contacted me.

With regard to the second point, I am advised that Barwon Water's consultants undertook a pump test between around 2pm on 18 July 2007 and midday on 20 July 2007, and that some 6 ML of groundwater was pumped during the test.

The purposes of the test were to:

- 'develop the bore in preparation for the inspection with down-hole tools, and in readiness for the longer term test;
- assess bore integrity (based on pumping performance and recovery performance);
- assist in determining the rate at which to pump in the longer term test; and
- obtain bore chemistry samples to design any required treatment works in the long term test.'

NO APPROVAL GIVEN for Kawarren preliminary 48 hr. pump.

I am advised that SRW did not issue an approval for the pump test. However, given the small volume of groundwater extracted, our attention is focussed on the proposed, and far more significant, three month pump test.

At this point, we are in discussions with the Department of Sustainability & Environment regarding the approval process for the three month pump test but have yet to finalise the approach to be used. We will advise interested parties once this is settled. Needless to say, SRW is keen to ensure that the process meets the objectives outlined in the Sustainable Water Strategy for Victoria's Central Region (the feasibility study for Geelong's longer term water needs), assesses the impacts in accordance with the Water Act, and ensures that interested parties and the wider community have the opportunity to have their say.

Regards

(Dr) Martin Kent
Managing Director

Phone: 0409 875 653

Please consider the environment before printing this e-mail

It seems unbelievable that Dr. Martin Kent did not follow up with the unnamed staff member to check out the outcome of discussions with me and the degree of seriousness of this matter, especially when it had been referred to him from the Chairperson of the Board of Management.

On 6 February I rang the Energy Water Ombudsman and spoke to Fiona McLeod and another gentleman whom I think was named Patrick, and was told that they could only attempt to get with- held information – they did not "police" non compliance issues and had no authority to insist that the correct things be done. Consequently they referred me to the State Ombudsman. I rang your office the same day, 6 February 2008 and was told that I had to give Southern Rural Water the opportunity to deal with the issue. This I have done and have been told in no uncertain manner that there are no problems.

In April 2008 at the hearings in Colac in regard to the granting of a groundwater extraction licence for Barwon Water to pump at the Kawarren borefield, officer Mike Fennessy was handed a copy of the chapter on non compliance. When the topic was being raised at this hearing, Mike made it clear that he believed the non compliance of the Licence 83889 had nothing to do with the issue of the Kawarren borefield. However, Mike Fennessy of SRW was given a copy of the areas of concern regarding non compliance as part of my follow up verbal submission at this hearing in Colac.

Being extremely busy "fighting" the water issue on many fronts, four months slipped by and SRW hadn't appeared to have done anything so I sent off a formal complaint (see below). It was unfortunate that I said it was "an official complaint," however, the intention was the same – deal with my concerns.

Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN
Vic 3249

15-05-2008

Dr. Martin Kent
Southern Rural Water
PO Box 153
Maffra
Vic 3860

Dear Dr. Kent,
This is an official complaint that I would like you to investigate and report back to me in a written format.

Since September 2004 Barwon Water has on numerous occasions failed to fulfil the conditions as set out in the 2004 groundwater extraction Licence No. 893889.

Numerous examples are found in the 2004/05, 2005/06 and the 2006/07 reports that have been submitted to Southern Rural Water after each of those financial years.

These reports also contain numerous examples of conflicting and confusing data.

If SRW officers scrutinise these documents I would like to know how this situation has persisted and what will be done to rectify this non compliance and inaccurate data reporting. I would also like to know what safeguards will be put into place to ensure this does not continue.

I would especially like to know why hasn't Licence No. 893889 been reviewed as a result of the poor way in which the groundwater extraction at Barwon Downs has been managed.

I trust that this matter will be investigated and looked into with some urgency.

Sincerely yours,

Malcolm Gardiner.

My complaint was "officially" recognised some few days later.

SOUTHERN
Rural Water

27 May 2008

Mr Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN VIC 3249

Dear Mr Gardiner

BARWON WATER GROUNDWATER EXTRACTION LICENCE NO 893889

Thank you for your letter dated 15 May 2008 in relation to Barwon Water's Groundwater Extraction Licence No 893889, bringing the matters you have raised to my attention.

These matters are being investigated and I will respond further once this investigation is complete.

Yours sincerely

(DR) MARTIN KENT
Managing Director

PO Box 153 MAFFRA VIC 3860
Telephone: (03) 5139 3100
Facsimile: (03) 5139 3150

ABN: 70 801 473 421
Email: srw@srw.com.au
Website: http://www.srw.com.au

However, over three months later there had been no word on progress in regard to my complaint, so when sending off this FOI, I included a query on the non compliance issue.

SOUTHERN
Rural Water

FREEDOM OF INFORMATION
REQUEST FOR ACCESS TO DOCUMENTS

TO:
Freedom of Information Officer
Southern Rural Water
PO Box 153
MAFFRA VIC 3860

Under the Freedom of Information Act 1982, I wish to gain access to the following document(s):

(1) In Regard to Licence Nº 893889 - a copy of the 2007-2008 Groundwater Gerangamete Area Report prepared by Barwon Water for Southern Rural Water.

(2) Correspondence between SRW and Barwon Water regarding my formal complaint of non compliance to licence Nº 893889 conditions.

Form of Access: (tick ☐ where appropriate)

- ☑ I request copies of the document(s) to be forwarded by mail.
- ☐ I request an inspection of the original document(s).
- ☐ I am prepared to inspect copies of the document(s) where the provision of originals would interfere unreasonably with the operations of Southern Rural Water
- ☐ Other (Please Specify) _____

I enclose an application fee of $22.70 which is payable for this application and I understand that I will be supplied with a statement of further charges if appropriate.

NAME: MALCOLM GARDINER

ADDRESS: 1805 Colac Beech Forest Road Kawarren

STATE: VIC Postcode: 3249

PHONE NO BUSINESS: ~~03~~ (03) 52 358 325 PHONE NO HOME: _____

SIGNATURE: [signature] 16/09/2008

Date Applicant Fee Received:	Receipt No:

This letter arrived some few days after the FOI had been lodged and over four months since the formal complaint was sent in writing.

SOUTHERN
Rural Water

19 September 2008

SRW reference: DWS 606147

Mr Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN VIC 3249

Dear Mr Gardiner

BARWON WATER GROUNDWATER EXTRACTION LICENCE NO 893889

I refer to your letter dated 15 May 2008 in relation to Barwon Regional Water Corporation (BRWC) Groundwater Extraction Licence No 893889.

In a letter dated 27 May 2008, it was stated that these matters were being investigated and a response once this investigation is completed would follow. I apologise that this has taken longer than anticipated, however in order to respond to your concerns we were awaiting receipt of BRWC's report for 2007/08, which was not due until 30 August 2008.

I would firstly like to assure you that SRW takes compliance with licence conditions very seriously. In instances where breaches warrant legal action we have no hesitation in prosecuting offenders and have a large number of cases before the courts in any given year. In less serious cases we may warn a licensee and require them to take corrective action to ensure any breach is not repeated.

SRW reviews the reports submitted by BRWC as they are submitted. If required we will seek additional information or clarification on specific issues, however the reports contain the necessary information and we have not identified any areas of confusion or contradiction.

In addition to the review of the annual report submitted by BRWC, we meet with them both formally and informally on a regular basis and our field officers conduct routine inspections of the bore field.

I can confirm that BRWC has, in the past, made application to SRW for temporary changes to conditions relating to Boundary Creek releases to avoid a severe water shortage. On this occasion, the application was assessed and referred to other bodies for comment on the potential impacts to other users and the environment prior to the final decision to temporarily modify the licence condition. These and other matters are then reported within the body of the annual report.

PO Box 153 MAFFRA VIC 3860
Telephone: (03) 5139 3100
Facsimile: (03) 5139 3150

ABN: 70 801 473 421
Email: srw@srw.com.au
Website: http://www.srw.com.au

S

When BRWC was permitted to reduce its flows into Boundary Creek to avoid a critical water shortage, specific conditions were imposed to ensure water users along Boundary Creek would be compensated and stringent monitoring conditions were also required under this approval to ensure appropriate protection of the environment. The reduction of flows into Boundary Creek has only been approved once since the groundwater licence was issued and it was for a period of 5 months. The reduction has now ceased.

Finally you refer to the reviewing process of licences issued by SRW, in particular why BRWC's licence for the Gerangamete Groundwater Management Area (Barwon Downs) hasn't been reviewed. Where we identify any matters of concern in the review of their annual report, these matters are then raised with BRWA to ensure that they have been addressed to our satisfaction. The evidence doesn't show an unexpected decline in groundwater levels or impact on the surfacewater resources. We believe that the current licence conditions are adequate for the responsible management of the resource and there isn't a need to review the licence or its conditions at this point in time.

If you wish to discuss any aspect of the matter further, please contact Manager Field Operations & Compliance Chris Hughes on 0418 582 763.

Yours sincerely

Clinton Rodda
Acting Chief Executive

The report, as mentioned in the second paragraph in the above letter, that SRW was waiting for (and I don't see the relevance for this) is the same report (Barwon Water's 2007/08) that I have applied for under the FOI application. It still has not been forthcoming – it is now the 31 October. Interestingly enough, the receipt to my FOI request is dated the same day as the above letter from Clinton Rodda.

SOUTHERN
Rural Water

Our Reference: 646841

19th September 2008

Mr Malcolm Gardiner
1805 Colac Beech Forest Road
KAWARREN VIC 3249

Dear Mr Gardiner

FREEDOM OF INFORMATION REQUEST

I write to acknowledge receipt of your Freedom of Information request received on 19th September 2008 and your $22.70 application fee. Please find enclosed an official receipt.

Your request is receiving attention and I will contact you as soon as possible to advise what documents exist relevant to your request, whether any of those documents are considered exempt from publication for any reasons, and the estimated costs of providing documents to you.

Please do not hesitate to contact me on (03)5139 3143 or email hayleyj@srw.com.au if you have any further queries.

Yours Sincerely

HAYLEY JOHNSON
FOI Officer

PO Box 153 MAFFRA VIC 3860
Telephone: (03) 5139 3100
Facsimile: (03) 5139 3150

ABN: 70 801 473 421
Email: srw@srw.com.au
Website: http://www.srw.com.au

As SRW has clearly demonstrated that it has no idea what is taking place in its area of sphere of influence from the groundwater extraction at Barwon Downs, it is LAWROC's belief that an authority with the possible chance of resolving this issue, being the State Ombudsman, be given the opportunity to do so.

Yours sincerely,

(Malcolm Gardiner - Vice President & Acting President of LAWROC.)

This is the end of the letter sent on 3 OCTOBER 2008 to the Ombudsman.

Unfortunately the Ombudsman was not prepared to deal with this complaint in its present format.

Chris Wade, an Ombudsman Officer, on 16 November 2008 during a phone conversation made quite clear that Southern Rural Water had to be given another chance to review, scrutinise and explain why the policing of the licence conditions were in order. This time the complaint had to be specific, itemising the concerns.

On the next page is a copy of the letter from Chris Wade confirming this phone conversation.

Ombudsman
Victoria

17 October 2008 File No: C/08/13370

Mr Malcom Gardiner
1805 Colac - Beechforest Road
KAWARREN VIC 3249

Dear Mr Gardiner

Southern Rural Water

Thank you for your correspondence dated 3 October 2008 in which you complain of Southen Rural Water not adequately enforcing licence conditions for water extraction by Barwon Regional Water Corporation in the Otways.

You may not be aware that it is not the practice of Ombudsman Victoria to become involved in a complaint until the respondent department has been given the opportunity to address or resolve the matter. I note from our conversation on 16 October 2008 that you have not taken up the invitation by Southern Rural Water to further discuss your complaints contained in their response to you dated 19 September 2008.

As I advised during our conversation you are encouraged to make contact with Southern Rural Water and articulate your specific complaints. It is advisable that any contact made be documented should further examination of this matter be required. To assist you I have enclosed fact sheets that will assist you in framing your complaint.

If you are dissatisfied with the response, you are welcome to provide Southern Rural Water's response to the Ombudsman together with a letter from you detailing your concerns about that response.

Yours sincerely

Chris Wade
Investigation Officer

Level 9 North Tower 459 Collins Street Melbourne VIC 3000 DX 210174 Melbourne Phone 03 9613 6222 Fax 03 9614 0246
Toll-free 1800 806 314 Email ombudvic@ombudsman.vic.gov.au Website www.ombudsman.vic.gov.au

As a consequence the following letter was sent off to Southern Rural Water.

Malcolm Gardiner
1805 Colac Beech Forest Road
Kawarren
Vic 3249
23-10-2008

Chris Hughes
Southern Rural Water
Manger Field Operation & Compliance
PO BOX 153
Maffra
Vic 3860

The pages denoted in red are the page numbers in the letter sent to Southern rural Water. The pages shown in blue are the equivalent pages found in this book.

e.g. 12/92 (Page 12 was the page sent to SRW. On page 92 of this book is the copy of page 12.)

Dear Chris,

This is a FORMAL COMPLAINT as a follow up to the 15 May 2008 complaint on the same topic.

BARWON WATER GROUNDWATER EXTRACTION LICENCE NO 893889

SRW Ref: DWS 606147

I refer to Clinton Rodda's letter dated 19 September 2008. I had hoped that an investigation as a result of the 15 May may have resolved this issue. However this was not to be the case. Even though I have been pursuing this issue for over 12 months the Victorian Ombudsman believes that I have to give Southern Rural Water specific areas to investigate. It is not sufficient to say that I don't believe SRW is doing its job in relation to scrutinising and policing Licence No 83889. I did try to argue the case that scrutinising, reviewing and the policing of the licence is not "my job" or area of expertise or responsibility. However the Ombudsman officer Chris Wade, would not be moved. SRW has to be given specific areas of concern and as a consequence, Chris, I have been asked to refer the matter to you.

In Clinton's letter dated 19 September 2008, he apologised for the 4 month delay in replying to my 15 May complaint. He was waiting for the Barwon Water's report for 2007/08 to arrive. On the 19 September, the same day Clinton's letter was written, I put in an FOI to SRW for this very same report. It is now one month later and I still haven't received this report. Could you look into the delay of this report being sent to me?

As my original complaint was in regard to the years 2004-07 I am puzzled why Clinton would be waiting 4 months for Barwon Water's 2007-08 annual report. Could you also look into this for me?

I have a few points I would like you to note regarding Clinton's letter that are often referred to in the substance of this letter

1. He states that SRW reviews the BRWC reports.
2. He states no areas of confusion or contradiction have been identified.
3. SRW field officers do routine inspection.
4. Temporary changes to the Licence 893889 are reported in the annual report.
5. Reductions of flows into Boundary Creek have only been for a period of 5 months.
6. The evidence doesn't show an unexpected decline in groundwater levels or impact on the surface water resources.

7. SRW believe that the current licence conditions are adequate for the responsible management of the resource and that there is no need to review the licence.

Having serious concerns with all of these matters mentioned above 1-7, I sent in an FOI to SRW asking for all changes, modifications etc to the Licence No 83889. Interesting that the only ones mentioned were that the extraction rates allowable had been increased and the 5 month reduction as mentioned in point 5 above was agreed to.

It is my contention that SRW is not doing the "job" as described by Clinton.

Before pointing out specific concerns I might add that Southern Rural Water has provided me with the following Barwon Water annual reports as sent to SRW for 2004-2005 (two copies), 2005-2006 and 2006-2007.

Chris in relation to the 1 July 2004 to the 30 June 2005 reporting period could you please explain why Barwon Water did not submit the 2004/05 Report to Southern Rural Water in the stipulated period, (licence condition sections 1.3, 3.5a, 4.5, 5.5 and 6.4.)?

Could you also explain why Barwon Water did not install a new monitoring bore at a site in the vicinity of bore Yeo 40, (bore ID 109131) as required by 31 December 2004 (licence sections 3.1 and 6.1) and did not report this in the report?

This bore was replaced in May 2005. . "*The new bore is to be used for any purpose ascribed in this Licence to bore Yeo 40 (Bore ID 109131)*." Why was there this delay?

Why was the replacement bore not put in the same location? The new bore was to be in the vicinity of the old bore Yeo 40. This 2004/05 Report states that the new Yeo 40 was installed near Boundary Road. Boundary Road is approximately 8 km away.

Why wasn't graphical formatting of weekly groundwater extractions under 4.5a included?

Under 6.2 a, the working meter was not installed at the Boundary Creek discharge point from the Otway to Colac pipeline and therefore the other conditions of monitoring and recording could not be met, (licence conditions 6.2b and 6.4a). Wasn't this a non compliance with the Licence conditions?

Why wasn't the daily stream gauging from the Yeodene stream flow gauge (233228) not presented in either tabular or graphical format, (Licence condition 6.4b)?

As many of the section 6 conditions could not be met shouldn't there have been mention of these significant developments as required under section 6.4e.

Has Barwon Water fulfilled condition 10.2 where it states "*Barwon Water will continue to engage with the local community and stakeholders regarding their operation of the Licence."*

Under an FOI I requested a second copy of 2004/05 report, received in 2008. The first copy of this report was requested and supplied in 2007. Chris, can you please explain how there were a number of items and extra data included in this second report that were not in the first? Some of these discrepancies will be covered later in this letter.

Chris, in relation to the 1 July 2005 to 30 June 2006 reporting period could you please explain how Barwon Water have a 100% compliance with the Licence conditions when the following things are apparent when reading the annual report for this period? Could you also explain why these things were not done?

- Under 4.5a graphical formatting of the weekly groundwater extractions was not provided.
- Under 6.2 a working meter at the Boundary Creek discharge point from the Otway to Colac pipeline was still not installed in the reporting period and was still not operating as per the Licence conditions. As a consequence the other conditions of monitoring and recording could not be met, (Licence conditions 6.2b and 6.4a).
- Daily stream gauging from the Yeodene stream flow gauge (233228) was not presented in either tabular or graphical format, (Licence condition 6.4b).
- As many of the section 6 conditions were still not being met there should have been mention of this significant development as required under section 6.4e.

Chris, in relation to the 1 July 2006 to 30 June 2007 reporting period can you explain why SRW's review process did not pick up the above mentioned non compliance and have it corrected in this annual report?

Could you also explain why field officer Ramsey of SRW can state at a Barwon Downs meeting this year, 2008, that Barwon Water has a 100% compliance record.

Barwon Water did not submit the 2006/07 Report to Southern Rural Water in the stipulated period, (licence condition sections 1.3, 3.5a, 4.5, 5.5 and 6.4.) The 2006/07 report was long overdue (See the email at the bottom of page 12/92). Is this not non compliance? I was sent a copy in November at least a month after it was requested.

Can you explain why there were items reported in the 2006/07 report that had never been included in earlier reports, (for example 6.4b. in graphical format)?

Why wasn't the daily stream gauging from the Yeodene stream flow gauge (233228) not presented in tabular format as per licence condition 6.4b? And why was this information presented in graphical format for the first time of three reports? Was this done because when I applied for this report under FOI, I specifically asked why earlier reports had not included this? Is this the reason for the delay in getting me the report?

Why wasn't the discharge into Boundary Creek presented in a tabular format as per Licence condition 6.2a?

Why weren't the 4.5a graphical formatting conditions of the licence of weekly groundwater extractions not provided?

Considering licence condition 10.2, why wasn't it reported in the annual report that there had been local landholder involvement?

Why were the flows in Boundary Creek at the Yeodene stream flow gauging station presented and graphed for the first time?

Why, under the second schedule point 1.3 c., didn't Barwon Water provide a map of residual drawdown for the year?

Chris, Clinton states that there are no areas of confusion or contradiction when reviewing the annual reports sent by BRWC to Southern Rural Water. Being public available annual reports and as a layperson I would have thought these reports should have been easy to read, understand and interpret. Because this has not been the case for me could you please explain and clarify the following confusion I have and the things that appear to be contradictions to me.

1. Groundwater Levels in Yeo 40.

Figures A, B & C represent data for observation bore Yeo 40 that has been taken from Barwon Water Groundwater Licence No. 893889 Gerangamete Area reports that have been sent to Southern Rural Water.

FIGURE. A . Year 2004/05 Report.

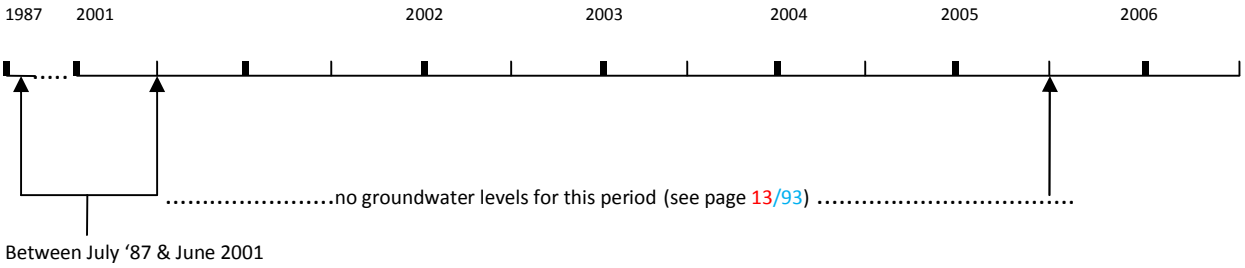


FIGURE. B. Year 2005/06 Report.

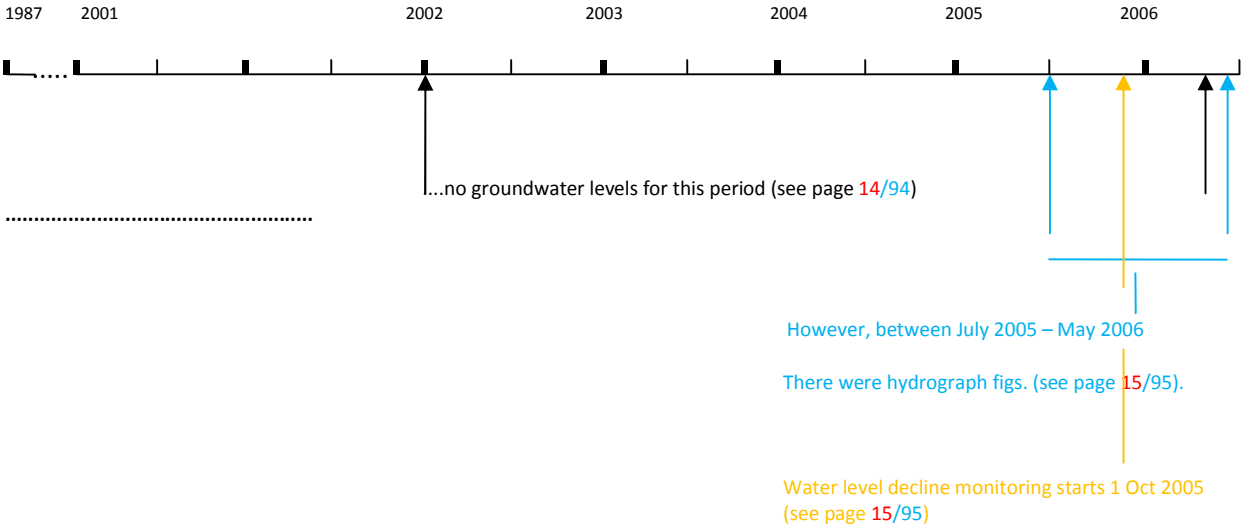


FIGURE. C. Year 2006/07 Report.

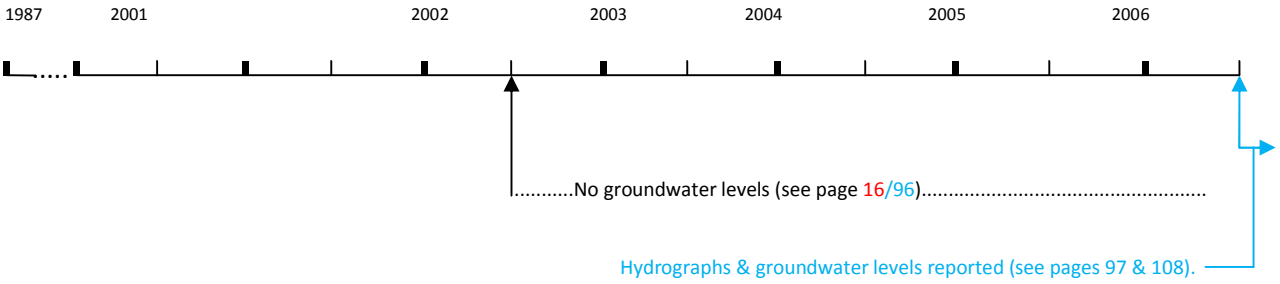


Figure A shows that the groundwater levels in Yeo 40 were taken from at least 1987 through to June 2001, (see page 13/93). For some reason there are no records shown from this date up to June 2005. Groundwater extraction at Barwon Downs took place during this period. Chris, can you explain to me why the extractions during this period are not shown?

In Figure B during the 2005/06 reporting period one set of data states there are no water levels available, (see page 14/94) yet there are hydrograph (water level) figures, (see top of page 15/95) for some of the same period. In another section of the report (see bottom of page 15) there is a different set of data. Chris, why is there a different set of data?

The water level decline monitoring graph starts in October 2005. Considering these sets of data are measuring the same water levels this also is most baffling. Could you please explain this to me as well?

The confusion continues as shown in Figure C, when the 2006/07 reports states, (see page 16/96) that no groundwater levels are recorded up to July 2006, whereas Figure B clearly shows there is data available for this period. SRW having reviewed this material and found no confusion Chris, can you explain to me why I have made a mistake?

2. Discrepancies with the Replacement of Bore Yeo 40 (Bore ID 109131)

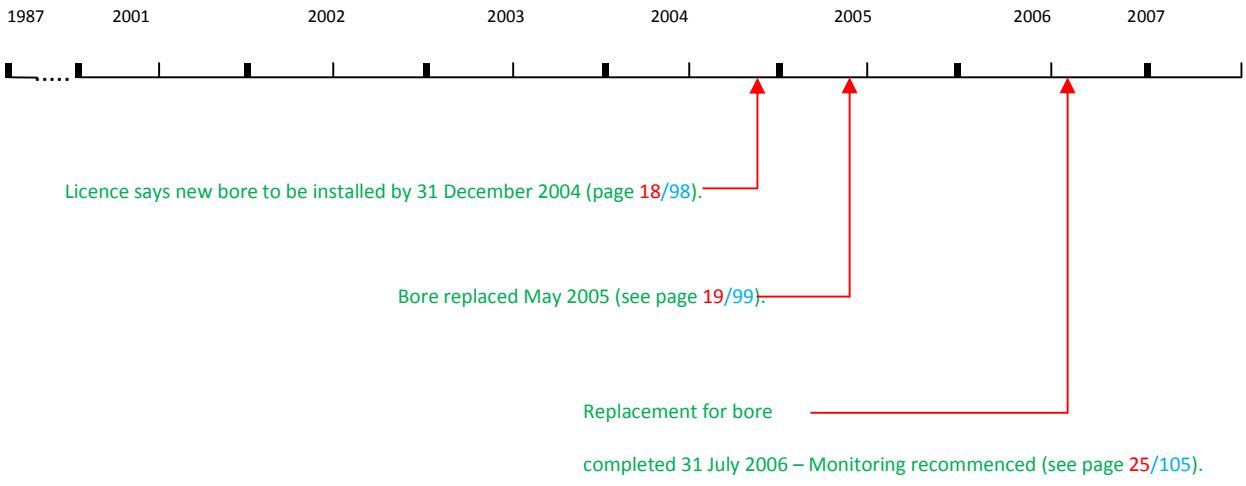
From the data contained in the Barwon Water Reports it is impossible to ascertain when Yeo 40 bore was functional. Can you tell me when Yeo 40 was replaced and when it was functional?

The Licence conditions stated that Yeo 40 had to be replaced by 31 December 2004. The 2004/05 Report stated that Yeo 40 was blocked and not repairable and was replaced in May 2005. The 2005/06 Report stated that bore 109131 had failed and was dry and was unnecessary. Yeo 40 Identification Number is 109131. The ADH levels for the water level decline chart started from October 2005. Then in the 2006/07 Report bore 109131 was still identified as dry and unnecessary for the current monitoring objectives. Also it was reported that the replacement of Yeo 40 was completed on the 31 July 2006 and that monitoring of this bore was recommenced then.(see page 25/105). I find all of this very confusing and would like you to explain it to me how it was not confusing to the person who reviewed these reports?

Is it true that not having the replacement Yeo 40 bore in and functional by the 31 December 2004 constitutes non compliance, Chris?

FIGURE. D. Data for the observation bore Yeo 40, taken from Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2004/07 Reports that was sent to Southern Rural Water.

These reports clearly state Yeo 40 as being replaced in two different years.



A clear status of the operational condition of Yeo 40 is not apparent. Chris, can you tell me what the current functional status of Yeo 40?

3. Yeo 40 Australian Height Datum Levels

Graph Two shows the trigger level of 158.5 AHD in yellow. Data from Barwon Water Reports show the AHD water level in red and the blue graph indicates data provided by Southern Rural Water (SRW).

From the data provided by Barwon Water, Chris, the following inconsistencies are most apparent to me and I would like you to explain to me where I am wrong and if this is not the case explain how it can be stated that SRW is happy with this.

3.1 From July 2005 – October 2005 Barwon Water did not provide figures for the AHD on the water decline graph (see page 15/95). Southern Rural Water was able to provide figures and stated that the AHD level was well below the trigger level of 158.8m (see page 21/101). Barwon Water should have reported the levels for this period. Chris, can you explain why they didn't?

3.2 In November 2005 Barwon Water puts the AHD at 180m (see page 15/95) when SRW places the AHD at approximately 153m (see page 21101). *Twenty seven metres* difference for the same data is notable. Chris, can you explain this and also let me know how this is scrutinised and accepted by SRW as adequate and responsible management?

3.3 Barwon Water is able to provide graphic data in May 2006 (see page 15/95) that the AHD level is metres above the trigger level when SRW states for the same period that the bore is dry (see page 31/111). If it is dry there should be no data available. Chris can you explain this to me? How can the SRW figures not match the BRWC figures and then for SRW to accept this fact as OK with no confusion or contradiction?

3.4 From June 2006 Barwon Water indicates that during this "dry" period the AHD level of Yeo 40 dropped by approximately 10 metres (see page 15/95). Presumably from groundwater extraction. When scrutinising this report was this noted? Did anyone at SRW note that this seemed to be an impossible level?

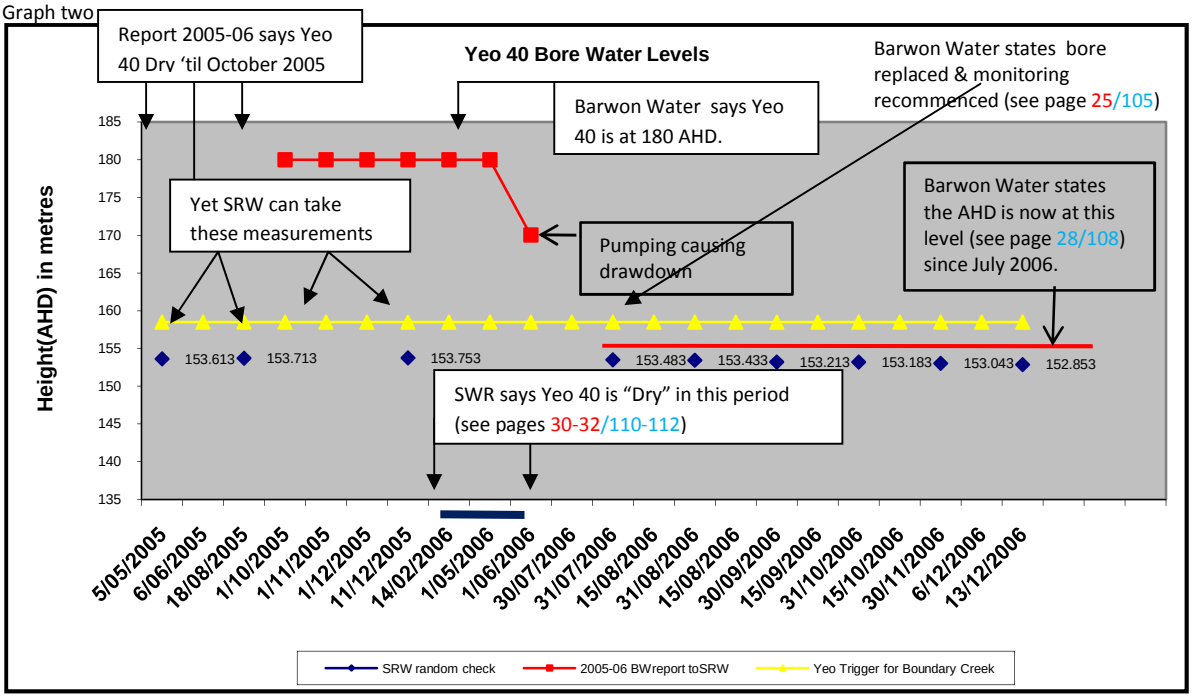
3.5 In the 2006/07 Report Barwon Water is able to provide data for the ADH level from 12 July 2006 – 25 June 2007 (see page 28/108) and in the same report it is stated that on the 31 July 2006 the replacement for Yeo 40 bore has been completed and that monitoring recommenced (see page 25/105). Chris, please explain to me how this is possible and why this was not picked up by the review of these reports?

The diagram on the next page clearly demonstrates graphically the confusion I am having with the contradictions. How did SRW review this data and how can SRW state that this is acceptable?

If, as Clinton states in his letter that evidence shows no unexpected decline in groundwater levels this is a clear admission that the drying up of Boundary Creek and the resulting peat fires and Actual Acid Sulfate Soils was to be expected. I find this alarming and would like you to justify how the extraction of groundwater at the Barwon Downs borefield is regarded as sustainable. Also if these things were expected I find it just as alarming that local residents in the area were not informed of these expected effects. Why weren't these things made public?

Data in this figure sourced from Southern Rural Water & Barwon Water Reports.

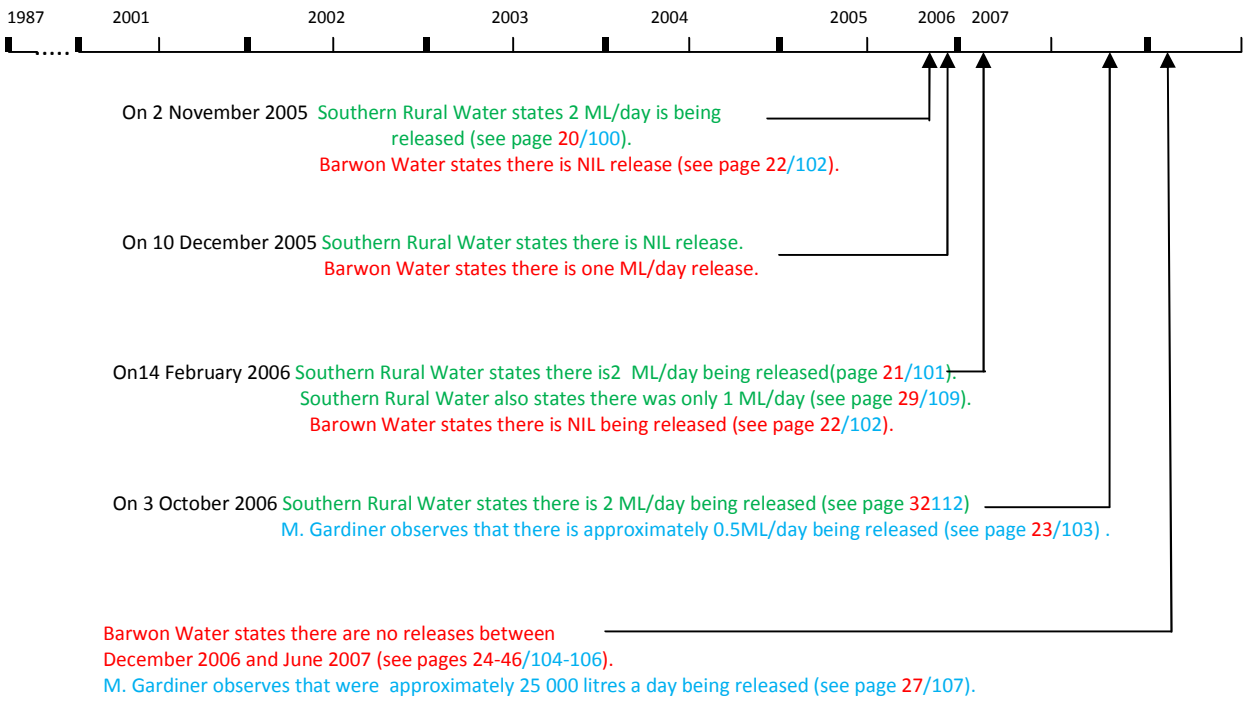
Graph two

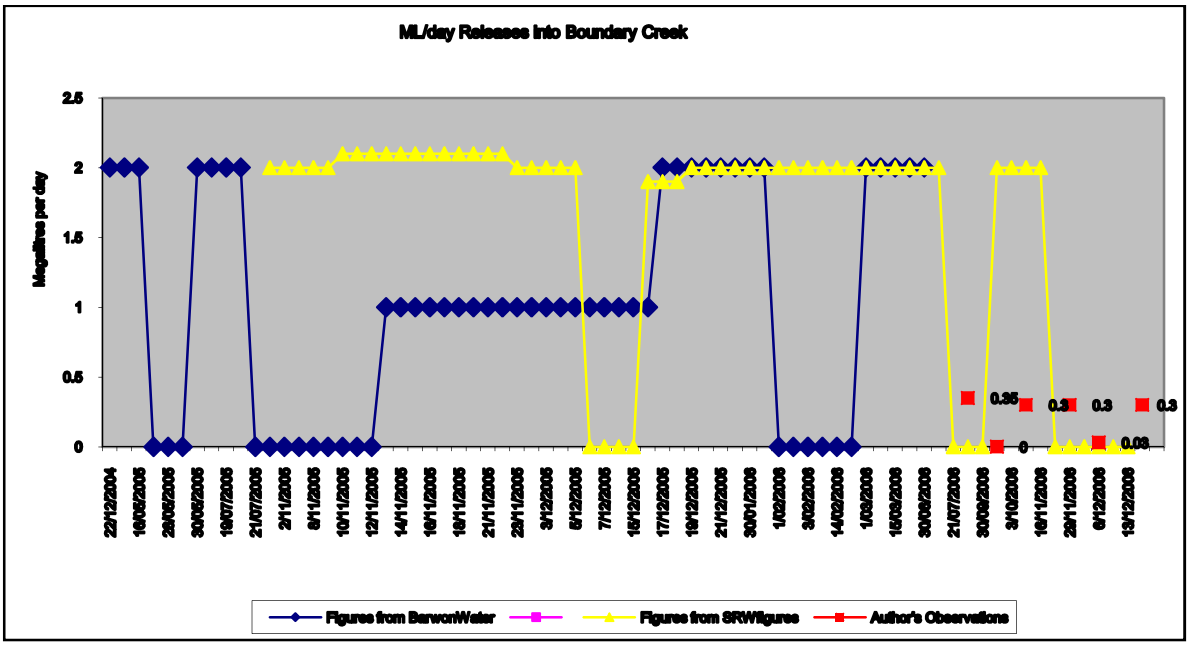


4. Releases into Boundary Creek

Figure E and the graph below clearly indicate huge discrepancies and confusion in data depicting releases of water from the Otway to Colac pipeline into a tributary of Boundary Creek.

FIGURE. E. Releases from the Colac –Otway Pipeline into the Boundary Creek System.





This graph is presenting the data in Figures E in a graphic format and is another example of non compliance with Licence No. 893889.

Chris, can you explain to me how the field officers that do regular inspections missed these discrepancies? Could you also explain to me how these figures can vary so much and then be construed as sound management practice? Where and when was the 5 month period of reductions in flows into Boundary Creek that Clinton spoke of?

6. Differences in Copies of the 2004/05 Report.

Two copies of the Barwon Water Groundwater Licence No. 893889 Gerangamete Area 2004/05 Report were obtained under FOI. One copy was gained under SRW reference number 409667, January 2007. The other copy was obtained under SRW reference number 559928, January 2008. The 2008 copy contained an additional two pages of data missing from the 2007 copy. Could you please explain this to me, Chris? And if that is not confusing enough then the following examples may clarify the reasons for my confusion and reasons for asking for a complete review of the Barwon Downs borefield operation. And I believe it is reasonable to say that SRW has not been doing its job in relation to scrutiny, review and policing of Licence No 83889.

Appendix A. "Monthly Groundwater Levels" data in the 2007 copy was significantly different to the data in the 2008 copy, (see pages 33-34/113-114).

The 2008 version of the 2004-05 reports also provided additional data in ***Appendix F, "Groundwater Extractions."***

The ***"Barwon Downs Wellfield – monthly groundwater extractions (ML) 1988- on,"*** page in the 2008 edition, included figures not found in the first edition. These figures were for groundwater extraction figures for the 2005-06 financial year. How is this possible when the 2004-05 report had to be finished and in to SRW by September 2005. Doesn't SRW find this most confusing?

The maps provided in the latest edition of the 2004-05 report are also incomplete as they do not provide the data to the extremities of the drawdown effects, sometimes stopping at 4 metres of drawdown. The extent of the drawdown is not shown and presents only a partial picture of the influence that the Barwon Downs groundwater extraction is having in the Otways, (see page 37). Could you explain how the SRW person reviewing this report was able to make sense of such a reduced map?

Does SRW have any interest in the sphere of influence exerted by the drawdown from the Barwon Downs borefield?

7. The 2004/05 and the 2005/06 Salinity sections.

The problem with these salinity reports is that they are **identical** for both reporting years (see pages 35-36/115-116). The 2004/2005 annual report covers the financial year July 2004 to June 2005. This report under the licence conditions had to be submitted to Southern Rural Water by September 2005. In this 2004-05 report, it contained the salinity levels of observation bores for 22 December 2005, four months after the report had to be submitted. Chris, could you please explain how SRW does not find this confusing? Could you also explain to me how SRW could possibly think that this is a sign of responsible management and that there is no need to review the Licence 83889?

8. Actual Acid Sulfate Soils

Being a major stake holder in the Barwon Downs borefield it amazes me that the extremely high acid levels in Boundary Creek did not spark off an immediate investigation, especially when the historical records indicate that this stream never had such dangerously high acid levels.

The Geelong branch of the EPA has been sent a formal complaint regarding the AASS possibility along Boundary Creek. Has SRW shown any interest in this eventuality and the implications this has for the management of the Barwon Downs borefield? If the high levels of acid, aluminium, copper, zinc, nickel, iron and lead are not evidence of impacts on the surface water resources I would find this quite amazing. In reviewing the annual reports of Licence 83889 and when the field officers of SRW were doing their routine inspections why weren't the acid levels in Boundary Creek investigated?

9. Further to other material stating 100% Compliance.

In February 2008 Barwon Water distributed an excellent visually presented 2006/07 Sustainability Report. However, the cosmetics of the presentation hide the blemishes that lie underneath. On page 24 it states that there was a 100% compliance with the groundwater extraction licence conditions. Do you agree with this statement?

This section of the report intimates that Barwon Water's environmental performance was improved by operating the groundwater pumping in accordance with the groundwater licence. I don't believe this is the case and unfortunately this statement of complete compliance has been told many times before. I might add that Clinton's letter substantiates this stance. The repetition of an inaccuracy told often enough will be perceived as a fact both by the teller and the listener. Has this happened in this case? It is my contention that there never has been 100% compliance.

CONCLUSION.

Yeo 40 is an extremely important bore and its status requires careful scrutiny and maintenance at all times. It would appear that Yeo 40 has not been properly maintained nor monitored appropriately.

If the annual reports submitted to Southern Rural Water are any indication, Barwon Water has never had 100% compliance in regard to Licence No. 893889. It is also most apparent that there needs to be a major reappraisal of the manner in which these reports are compiled, scrutinised and presented. The data contained in these reports must be accurate, comprehensive, factual and complete. There is little evidence of this to date.

It is also my contention that the manner in which SRW conducts its scrutiny and review of the BRWC reports be modified. Do you maintain that this is not necessary?

I would also maintain that the licence conditions are not policed by SRW. I would appreciate your comment on this statement.

This letter throws considerable doubt on the ability of Barwon Water to be capable of self regulation. In fact there would appear to be an extremely convincing case to have Licence No. 893889 reviewed immediately.

In light of this there would appear to be an even stronger case that all groundwater extraction from the Otways comes under immediate review, conducted by an independent arbitrator. Considering the difficulty the Kawarren/Gellibrand residents have had attempting to find any independent "expert" free of compromising connections to Barwon Water, it is most likely that an arbitrator would have to be sourced out of Victoria and most probably out of Australia. I would appreciate your thoughts on this.

It does appear that there may be some truth in the following rural thought pattern...

*"If a landholder or an individual citizen breaks a law with **non compliance** he or she will be prosecuted and fined or imprisoned. The same treatment is not applied to a government or semi government body breaking the same law."* Clinton did hint that "law breaking" of SRW licence conditions is pursued with some vigour. Unfortunately I have not been witness to any such action. In fact there would appear to be the exact opposite taking place in regard to this complaint.

Having discussed this letter with the landcare group LAWROC (Land And Water Resource Otway Catchment) the group has indicated an interest in this topic and endorses a request for your speedy reply. Taking four months to answer the last complaint seems to be far in excess of reasonable.

Malcolm Gardiner. Charlie Kohout.

(LAWROC, Member) (President, LAWROC)

PS We would appreciate a reply in writing.

PPS If not satisfied with your replies to the questions asked what rights of appeal are there?

45 days to obtain the 2006/07 Report through FOI (page 12)

(3)
From: Belinda Green (BelindaG@SRW.com.au)
To: 'Mal Gardiner'
Date: Friday, 21 September, 2007 8:32:46 AM
Subject: RE: Barwon Water 06/07 Groundwater Report

Hi Malcolm

You will need to request these documents under Freedom of Information. A form is attached for you to fill out and send back to Southern Rural Water with the application fee of $22.00.

Thanks

Belinda Green
Southern Rural Water
PH: (03) 5139 3100

(2)
From: Mal Gardiner [mailto: otwaywater@yahoo.com.au]
Sent: Wednesday, 19 September 2007 11:06 AM
To: Belinda Green
Subject: Re: Barwon Water 06/07 Groundwater Report

Thanks for your prompt reply, Belinda.
I will contact you at the end of the month regarding the Barwon Water Groundwater 2006-07 Report.
Would there be any reason why it is overdue?
I was wondering if I could have a copy of all the ammendments made to Licence 893889 since it was issued in 2004?
Also can you tell me why there hasn't been any reporting in the Barwon Downs Groundwater reports of 2004-05 and 2005-96 in regard to points 6.4 a and 6.4 b?
Regards,
Malcolm.

(1)
---- Original Message ----
From: Belinda Green <BelindaG@SRW.com.au>
To: " otwaywater@yahoo.com.au " < otwaywater@yahoo.com.au >
Sent: Tuesday, 18 September, 2007 1:09:07 PM
Subject: Barwon Water 06/07 Groundwater Report

Hi Malcolm

I refer to our telephone conversation today and advise that we have not yet received the 06/07 Groundwater Report from Barwon Water.

I suggest you contact us again in around 2 weeks on (03) 5139 3100.

Thanks

Belinda Green
Southern Rural Water
PH (03) 5139 3100

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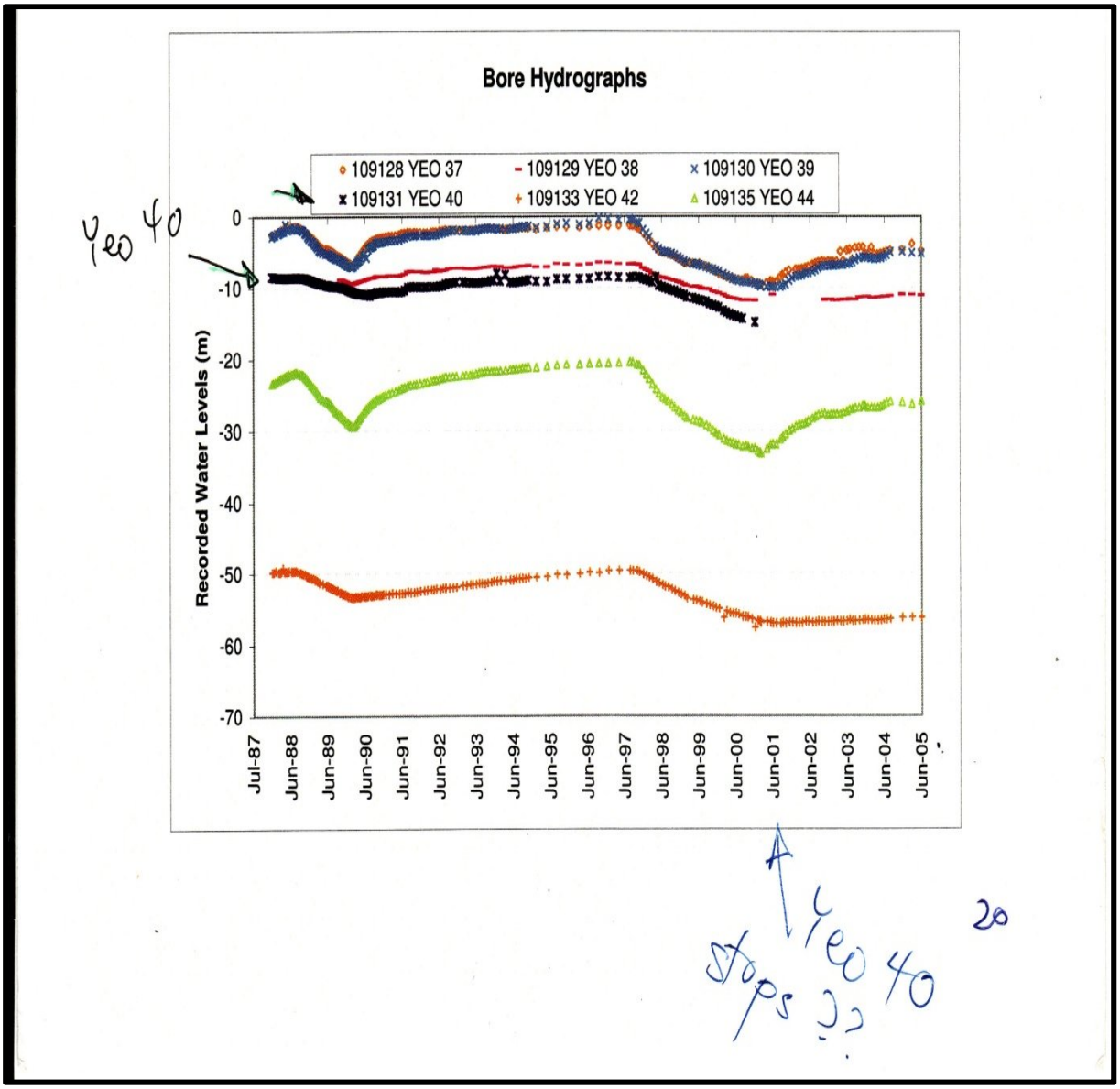
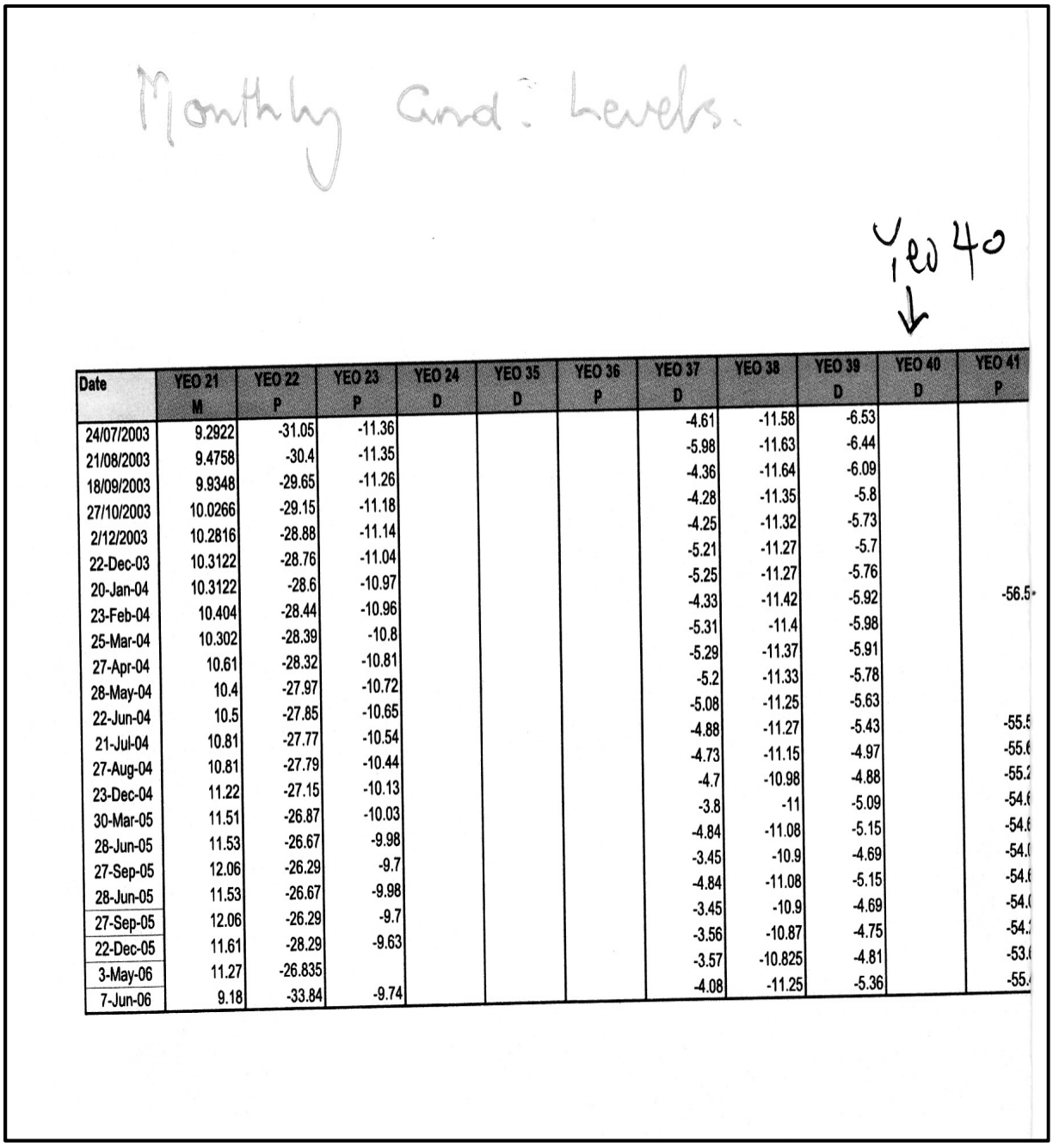

Bore Hydrographs
109128 YEO 37
109129 YEO 38
109130 YEO 39
109131 YEO 40
109133 YEO 42
109135 YEO 44
Recorded Water Levels (m)
0
-10
-20
-30
-40
-50
-60
-70
Jul-87
Jun-88
Jun-89
Jun-90
Jun-91
Jun-92
Jun-93
Jun-94
Jun-95
Jun-96
Jun-97
Jun-98
Jun-99
Jun-00
Jun-01
Jun-02
Jun-03
Jun-04
Jun-05

(page13)

Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2005/06 Report –Appendix A Monthly Groundwater Levels.(page14)

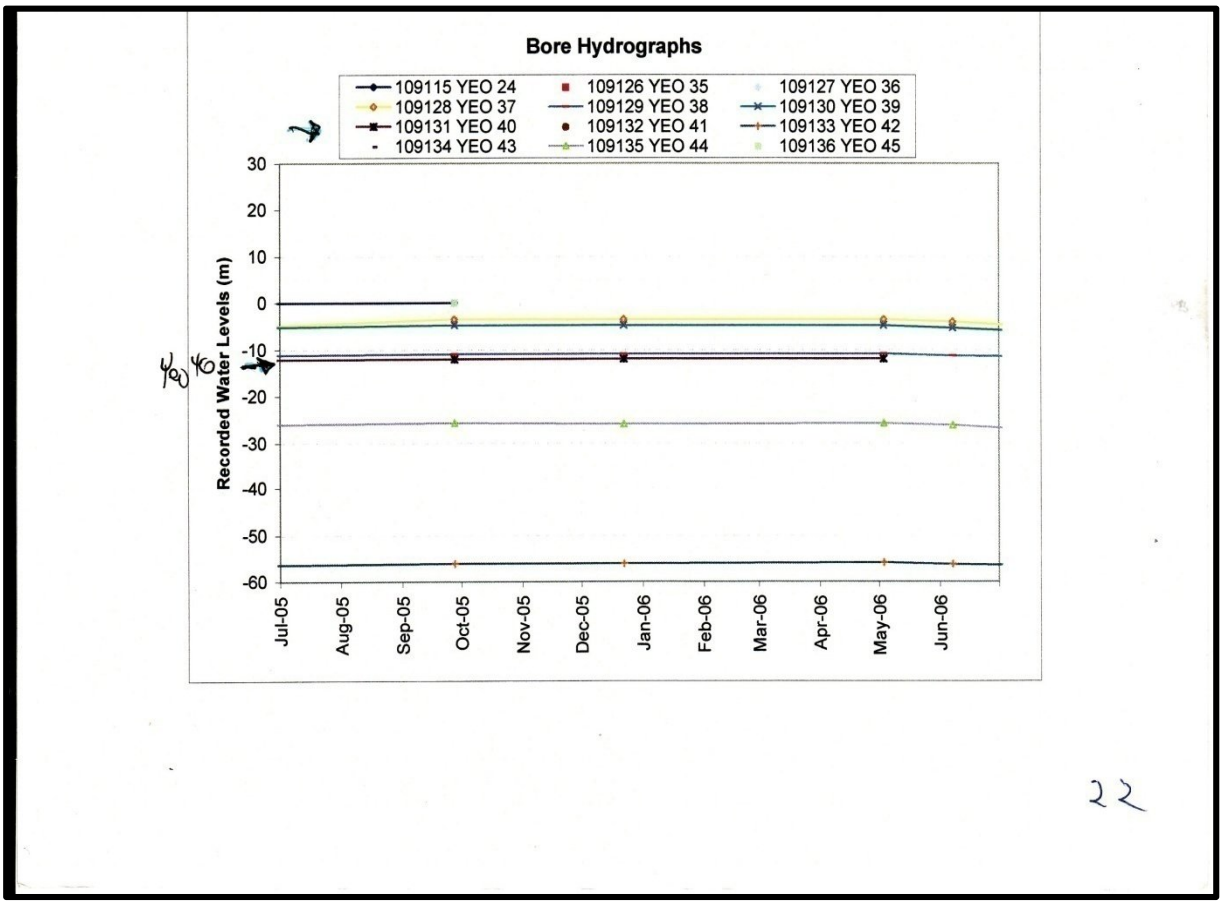


Monthly Gnd. Levels.

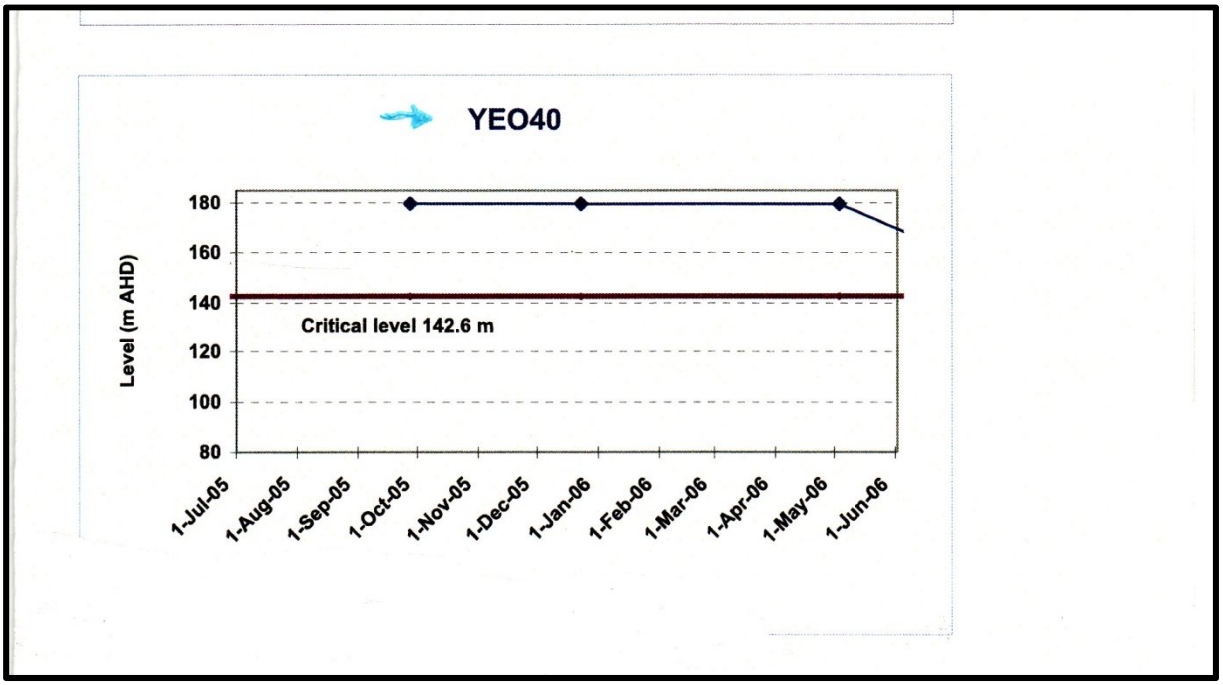
YEO 40

Date	YEO 21 M	YEO 22 P	YEO 23 P	YEO 24 D	YEO 35 D	YEO 36 P	YEO 37 D	YEO 38	YEO 39 D	YEO 40 D	YEO 41 P
24/07/2003	9.2922	-31.05	-11.36				-4.61	-11.58	-6.53		
21/08/2003	9.4758	-30.4	-11.35				-5.98	-11.63	-6.44		
18/09/2003	9.9348	-29.65	-11.26				-4.36	-11.64	-6.09		
27/10/2003	10.0266	-29.15	-11.18				-4.28	-11.35	-5.8		
2/12/2003	10.2816	-28.88	-11.14				-4.25	-11.32	-5.73		
22-Dec-03	10.3122	-28.76	-11.04				-5.21	-11.27	-5.7		
20-Jan-04	10.3122	-28.6	-10.97				-5.25	-11.27	-5.76		
23-Feb-04	10.404	-28.44	-10.96				-4.33	-11.42	-5.92		-56.5
25-Mar-04	10.302	-28.39	-10.8				-5.31	-11.4	-5.98		
27-Apr-04	10.61	-28.32	-10.81				-5.29	-11.37	-5.91		
28-May-04	10.4	-27.97	-10.72				-5.2	-11.33	-5.78		
22-Jun-04	10.5	-27.85	-10.65				-5.08	-11.25	-5.63		
21-Jul-04	10.81	-27.77	-10.54				-4.88	-11.27	-5.43		-55.5
27-Aug-04	10.81	-27.79	-10.44				-4.73	-11.15	-4.97		-55.6
23-Dec-04	11.22	-27.15	-10.13				-4.7	-10.98	-4.88		-55.2
30-Mar-05	11.51	-26.87	-10.03				-3.8	-11	-5.09		-54.6
28-Jun-05	11.53	-26.67	-9.98				-4.84	-11.08	-5.15		-54.8
27-Sep-05	12.06	-26.29	-9.7				-3.45	-10.9	-4.69		-54.0
28-Jun-05	11.53	-26.67	-9.98				-4.84	-11.08	-5.15		-54.8
27-Sep-05	12.06	-26.29	-9.7				-3.45	-10.9	-4.69		-54.0
22-Dec-05	11.61	-28.29	-9.63				-3.56	-10.87	-4.75		-54.2
3-May-06	11.27	-26.835					-3.57	-10.825	-4.81		-53.6
7-Jun-06	9.18	-33.84	-9.74				-4.08	-11.25	-5.36		-55.4

Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2005/06 Report –Appendix C Bore Hydrographs.(page15)



Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2005/06 Report –Appendix E Water Decline Monitoring.



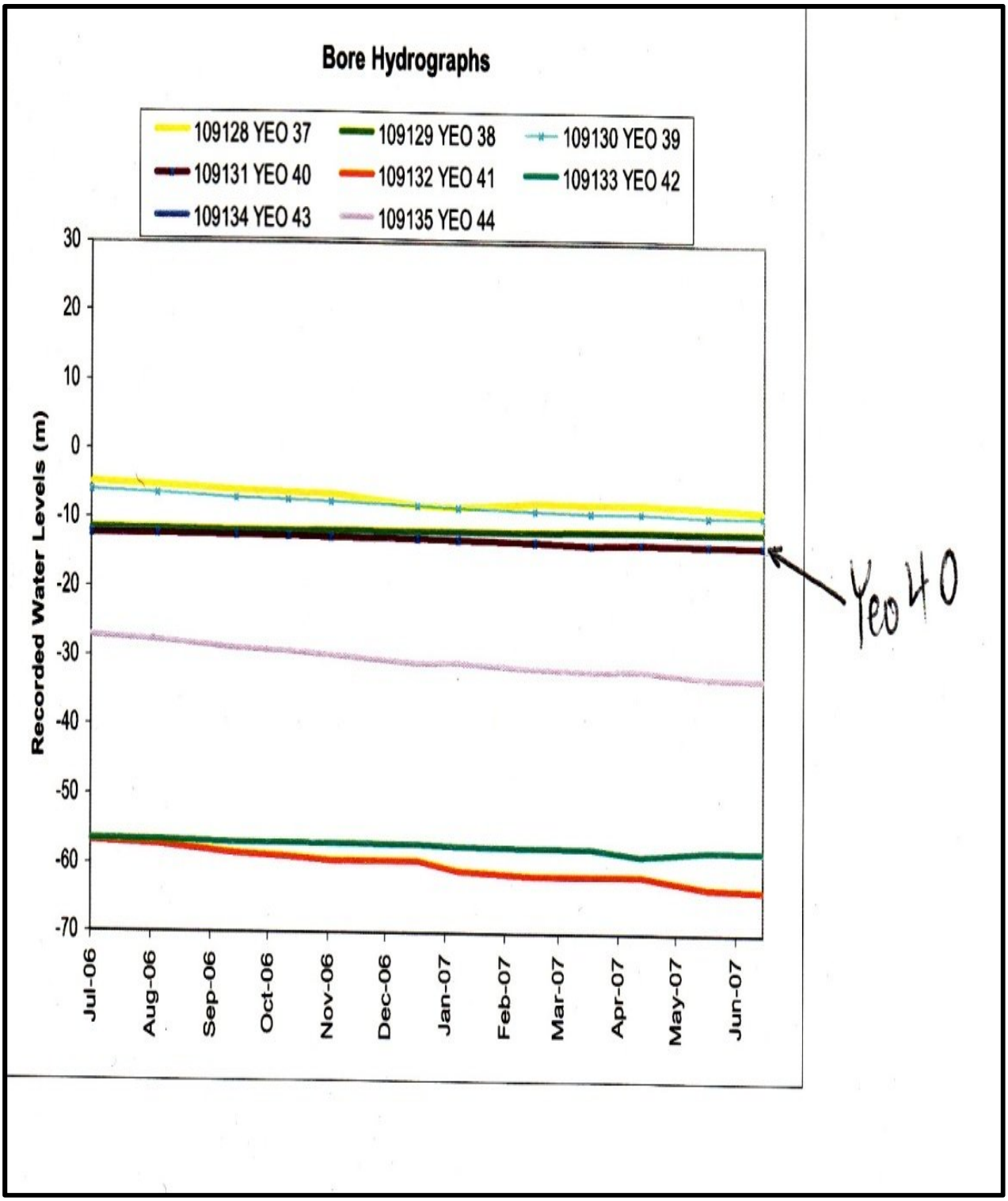
Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2006/07 Report –Appendix A Monthly Groundwater Levels.(page 16)

Groundwater Level Data 2003-2007

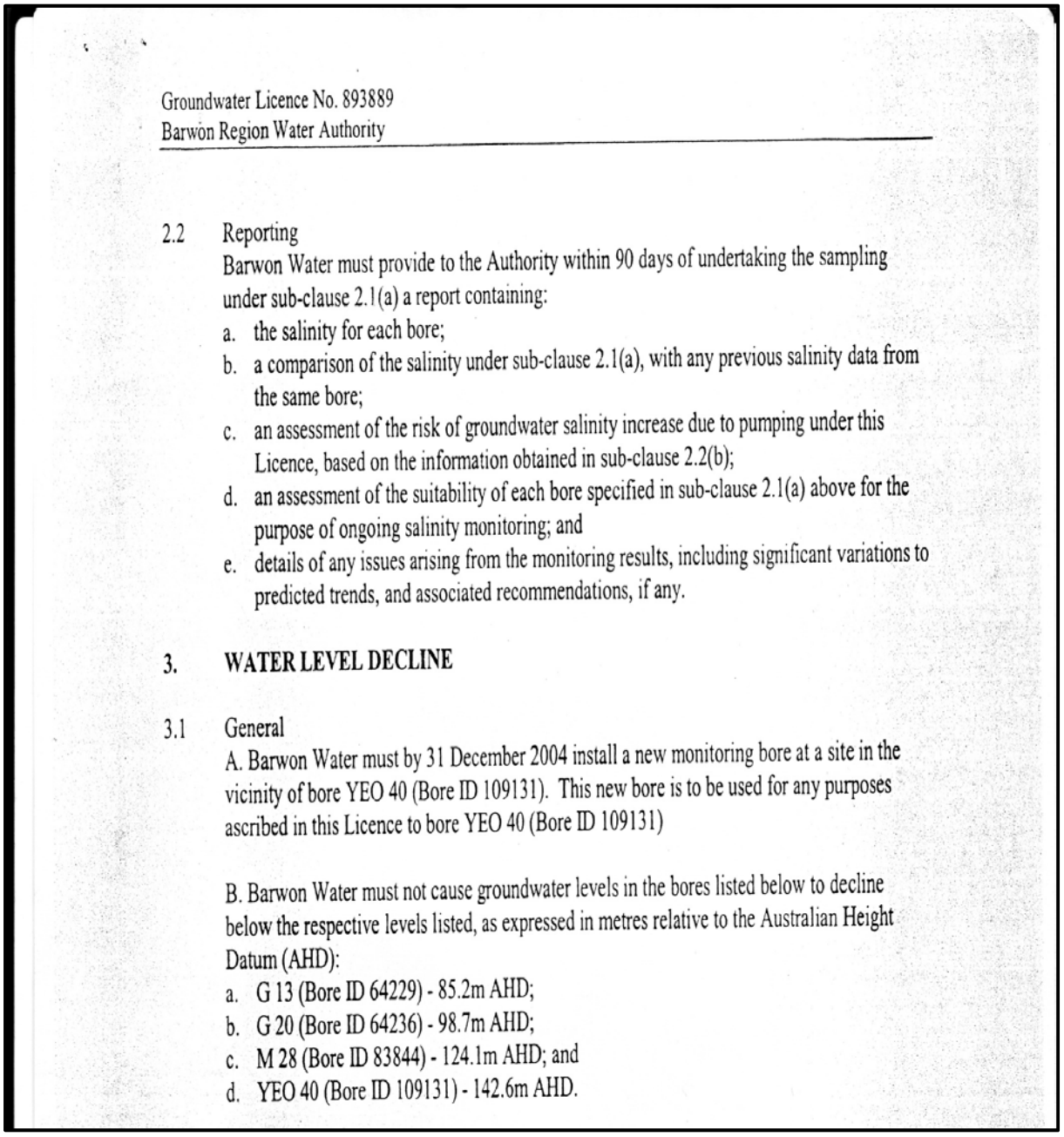
**Levels taken from top of casing*

Date	YEO 39 D	YEO 40 D	YEO 41 P	YEO 42 D	YEO 44 M	YYG 217	YYG 218	YYG 221	W 4 M/D
24/07/2003	-6.53			-56.6	-27.08	-51.7	-32.26	9.486	-0.04
21/08/2003	-6.44			-56.75	-27.04	-51.71	-32.28	9.486	-0.02
18/09/2003	-6.09			-56.76	-26.82	-51.84	-32.24	9.537	-0.4
27/10/2003	-5.8			-56.72	-26.84	-51.78	-32.15	9.5064	-0.6
2/12/2003	-5.73			-56.68	-26.54	-51.75	-32.12	9.4656	-0.6
22-Dec-03	-5.7			-56.57	-26.57	-51.75	-32.14	9.6594	-0.5
20-Jan-04	-5.76			-56.6	-26.83	-51.68	-32.13	9.7104	-0.7
23-Feb-04	-5.92		-56.59	-56.68	-26.81	-51.83	-32.2	9.384	-0.09
25-Mar-04	-5.98			-56.72	-26.81	-51.67	-32.16	9.7308	-0.15
27-Apr-04	-5.91			-56.65	-26.81	-51.65	-32.2	9.57	-0.75
28-May-04	-5.78			-56.61	-26.66	-51.62	-32.2	9.78	-0.55
22-Jun-04	-5.63			-56.54	-26.44	-51.58	-32.17	9.76	-0.05
21-Jul-04	-5.43		-55.56	-56.54	-26.16	-51.76	-32.21	9.74	-0.45
27-Aug-04	-4.97		-55.61	-56.46	-25.95	-51.77	-32.15	9.8	-0.05
23-Dec-04	-4.88		-55.24	-56.29	-26.05	-51.69	-32.1	10.06	-0.03
30-Mar-05	-5.09		-54.62	-56.28	-26.34	-51.79	-32.16	9.96	-0.11
28-Jun-05	-5.15		-54.69	-56.31	-25.91	-51.83	-32.19	9.84	-0.09
27-Sep-05	-4.69		-54.02	-56.09	-25.63	-51.84	-32.12	9.28	-0.05
28-Jun-05	-5.15		-54.69	-56.31	-25.91	-51.83	-32.19	9.84	-0.09
27-Sep-05	-4.69		-54.02	-56.09	-25.63	-51.84	-32.12	9.28	-0.05
22-Dec-05	-4.75		-54.28	-56.08	-25.87	-51.88	-32.11	9.95	-0.08
3-May-06	-4.81		-53.66	-55.845	-25.71	-51.84	-32.1	9.6236	-0.05
7-Jun-06	-5.36		-55.45	-56.23	-26.16	-51.91	-32.19	10.02	-0.55
12-Jul-06	-5.99	-12.22	-56.74	-56.41	-26.95	-51.96	-32.18	9.91	-0.08
15-Aug-06	-6.39	-12.27	-57.21	-56.51	-27.5	-51.94	-32.17	10.16	-0.06
25-Sep-06	-7.04	-12.49	-58.41	-56.82	-28.72	-51.96	-32.21	10.03	-0.07
22-Oct-06	-7.32	-12.52	-58.93	-56.87	-29.11	-51.96	-32.21	10.01	-0.07
13-Nov-06	-7.51	-12.66	-59.43	-56.93	-29.66	-51.96	-32.22	9.91	-0.08
28-Dec-06	-8.06	-12.85	-59.47	-57.06	-30.84	-51.98	-32.26	9.83	-0.1
18-Jan-07	-8.3	-13	-60.93	-57.39	-30.81	-51.98	-32.29	9.64	-0.08
27-Feb-07	-8.69	-13.17	-61.56	-57.49	-31.49	-51.96	-32.32	9.39	-0.12
28-Mar-07	-9	-13.55	-61.63	-57.61	-31.78	-51.97	-32.36	9.37	-0.13
23-Apr-07	-8.97	-13.41	-61.58	-58.71	-31.75	-51.96	-32.36	9.35	-0.14
28-May-07	-9.43	-13.57	-63.35	-57.88	-32.75	-51.97	-32.39	9.21	-0.1
25-Jun-07	-9.47	-13.66	-63.67	-57.93	-32.96	-51.97	-32.45	9.12	-0.09
30-Jul-07	-10.01	-13.83	-64.8	-58.22	-33.64	-52.06	-32.42	8.89	-0.05

Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2006/07 Report –Appendix C Bore Hydrographs.(page 17)



Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area(page 18)



Groundwater Licence No. 893889
Barwon Region Water Authority

2.2 Reporting

Barwon Water must provide to the Authority within 90 days of undertaking the sampling under sub-clause 2.1(a) a report containing:

a. the salinity for each bore;
b. a comparison of the salinity under sub-clause 2.1(a), with any previous salinity data from the same bore;
c. an assessment of the risk of groundwater salinity increase due to pumping under this Licence, based on the information obtained in sub-clause 2.2(b);
d. an assessment of the suitability of each bore specified in sub-clause 2.1(a) above for the purpose of ongoing salinity monitoring; and
e. details of any issues arising from the monitoring results, including significant variations to predicted trends, and associated recommendations, if any.

3. WATER LEVEL DECLINE

3.1 General

A. Barwon Water must by 31 December 2004 install a new monitoring bore at a site in the vicinity of bore YEO 40 (Bore ID 109131). This new bore is to be used for any purposes ascribed in this Licence to bore YEO 40 (Bore ID 109131)

B. Barwon Water must not cause groundwater levels in the bores listed below to decline below the respective levels listed, as expressed in metres relative to the Australian Height Datum (AHD):

a. G 13 (Bore ID 64229) - 85.2m AHD;
b. G 20 (Bore ID 64236) - 98.7m AHD;
c. M 28 (Bore ID 83844) - 124.1m AHD; and
d. YEO 40 (Bore ID 109131) - 142.6m AHD.

NOTE point 3. 3.1 A. Yeo 40 to be replaced.

Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2004/05 Report –Appendix C Bore Hydrographs.(page 19)

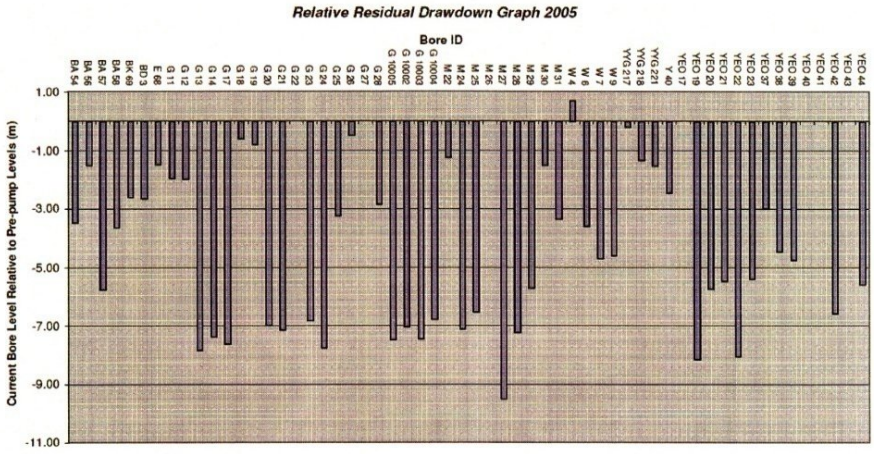


Figure 1: Graph of monitoring bore depth, relative to the pre-pumping levels measured in 1997.

3.5 Bore Failures (Clause 1.3d)

Bores 109131, 109108 and 109134 have previously been identified as failed. The first two are dry and the third has a broken lid and is blocked with cans at approximately seven metres depth. These bores have been assessed as being unnecessary for the current monitoring objectives and after further review an amendment may be sought for the decommissioning of these bores.

The key monitoring bores were inspected by SKM in early 2005, their condition assessed and recommendations made for repair or replacement where necessary.

This exercise involved technical staff from SKM visiting the relevant sites and visually assessing the external casing and wellhead condition. Where appropriate, the internal casing of the wells was logged by sending cameras down into the borehole.

The key monitoring bores listed in the licence are recognised as being of critical importance in determining water level decline. These bores were prioritised accordingly for repair and replacement.

In response to SKM's findings the wellheads at Murroon 28 and G13 were immediately replaced. Yeo 40 was found to be blocked and not repairable, so it was replaced in May 2005.

Figures supplied by Southern Rural Water 2006 – discharges into the Boundary Creek System (two pages included).(page 20)

supplied by Southern Rural Water to M. Gardiner 2006 from Angus Ramsey

Boundary Creek Release and Yeo 40 Bore Reading

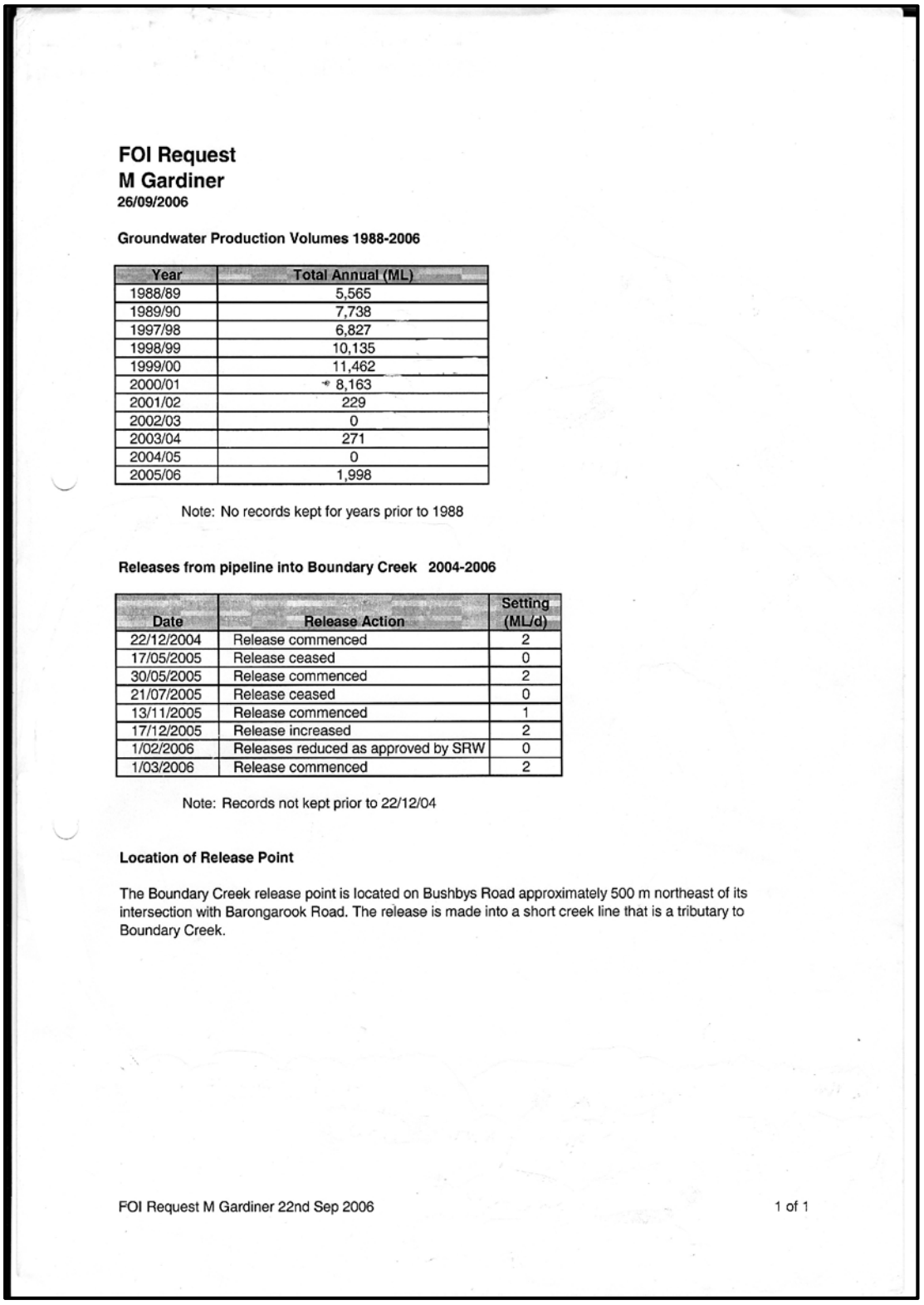
		Yeo 40 trigger level	158.5m AHD		
Date	Boundary Ck Release	Bore reading date	05/05/2005	18/08/2005	11/12/2005
	(ML/D)	**Yeo 40** water level	12.09	11.99	11.95
01/11/2005	2	**Yeo 40 AHD water level**	**153.613**	**153.713**	**153.753**
02/11/2005	2				
03/11/2005	2				
04/11/2005	2				
05/11/2005	2				
06/11/2005	2				
07/11/2005	2				
08/11/2005	2				
09/11/2005	2				
10/11/2005	2.1				
11/11/2005	2.1				
12/11/2005	2.1				
13/11/2005	2.1				
14/11/2005	2.1				
15/11/2005	2.1				
16/11/2005	2.1				
17/11/2005	2.1				
18/11/2005	2.1				
19/11/2005	2.1				
20/11/2005	2.1				
21/11/2005	2.1				
22/11/2005	2.1				
23/11/2005	2				
24/11/2005	2				
25/11/2005	2				
26/11/2005	2				
27/11/2005	2				
28/11/2005	2				
29/11/2005	2				
30/11/2005	2				
01/12/2005	2				
02/12/2005	2				
03/12/2005	2				
04/12/2005	2				
05/12/2005	2				
06/12/2005	0				
07/12/2005	0				
08/12/2005	0				
09/12/2005	0				
10/12/2005	0				
11/12/2005	0				
12/12/2005	0				
13/12/2005	0				
14/12/2005	0				
15/12/2005	0				
16/12/2005	1.9				
17/12/2005	1.9				
18/12/2005	1.9				
19/12/2005	2				
20/12/2005	2				

REPAIR WORK ON BASIN PIPELINE

Supplied to M. Gardiner
by Southern Rural Water
2006
by Angus
Ramsey

21/12/2005	2
22/12/2005	2
23/12/2005	2
24/12/2005	2
25/12/2005	2
26/12/2005	2
27/12/2005	2
28/12/2005	2
29/12/2005	2
30/12/2005	2
31/12/2005	2
01/01/2006	2
02/01/2006	2
03/01/2006	2
04/01/2006	2
05/01/2006	2
06/01/2006	2
07/01/2006	2
08/01/2006	2
09/01/2006	2
10/01/2006	2
11/01/2006	2
12/01/2006	2
13/01/2006	2
14/01/2006	2
15/01/2006	2
16/01/2006	2
17/01/2006	2
18/01/2006	2
19/01/2006	2
20/01/2006	2
21/01/2006	2
22/01/2006	2
23/01/2006	2
24/01/2006	2
25/01/2006	2
26/01/2006	2
27/01/2006	2
28/01/2006	2
29/01/2006	2
30/01/2006	2
31/01/2006	2
01/02/2006	2
02/02/2006	2
03/02/2006	2
04/02/2006	2
05/02/2006	2
06/02/2006	2
07/02/2006	2
08/02/2006	2
09/02/2006	2
10/02/2006	2
11/02/2006	2
12/02/2006	2
13/02/2006	2
14/02/2006	2

Figures supplied by Barwon Water 2006 – discharges into the Boundary Creek System.



FOI Request
M Gardiner
26/09/2006

Groundwater Production Volumes 1988-2006

Year	Total Annual (ML)
1988/89	5,565
1989/90	7,738
1997/98	6,827
1998/99	10,135
1999/00	11,462
2000/01	8,163
2001/02	229
2002/03	0
2003/04	271
2004/05	0
2005/06	1,998

Note: No records kept for years prior to 1988

Releases from pipeline into Boundary Creek 2004-2006

Date	Release Action	Setting (ML/d)
22/12/2004	Release commenced	2
17/05/2005	Release ceased	0
30/05/2005	Release commenced	2
21/07/2005	Release ceased	0
13/11/2005	Release commenced	1
17/12/2005	Release increased	2
1/02/2006	Releases reduced as approved by SRW	0
1/03/2006	Release commenced	2

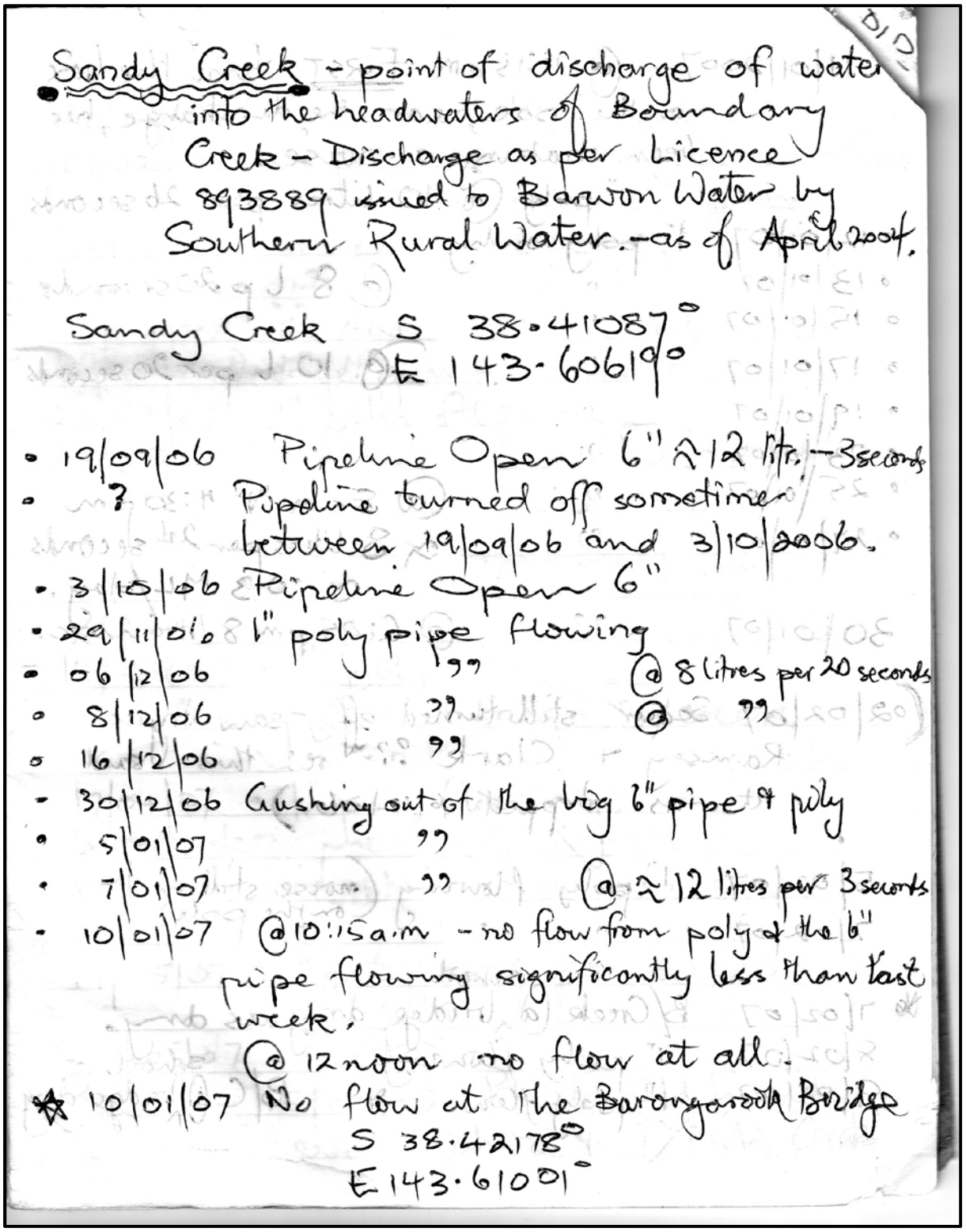
Note: Records not kept prior to 22/12/04

Location of Release Point

The Boundary Creek release point is located on Bushbys Road approximately 500 m northeast of its intersection with Barongarook Road. The release is made into a short creek line that is a tributary to Boundary Creek.

FOI Request M Gardiner 22nd Sep 2006 1 of 1

(page 22)



Sandy Creek - point of discharge of water into the headwaters of Boundary Creek - Discharge as per Licence 893889 issued to Barwon Water by Southern Rural Water. - as of April 2004.

Sandy Creek S 38.41087°
E 143.60619°

- 19/09/06 Pipeline Open 6" ≈ 12 litr. - 3 seconds
- ? Pipeline turned off sometime between 19/09/06 and 3/10/2006.
- 3/10/06 Pipeline Open 6"
- 29/11/06 1" poly pipe flowing
- 06/12/06 " @ 8 litres per 20 seconds
- 8/12/06 " @ "
- 16/12/06 "
- 30/12/06 Gushing out of the big 6" pipe & poly
- 5/01/07 "
- 7/01/07 " @ ≈ 12 litres per 3 seconds
- 10/01/07 @ 10:15 a.m - no flow from poly & the 6" pipe flowing significantly less than last week.
  @ 12 noon - no flow at all.

★ 10/01/07 No flow at the Barongarook Bridge
S 38.42178°
E 143.61001°

Taken from the Barwon Water's Groundwater Licence No. 893889 Gerangamete Area 2006/07 Report (three pages included).(page 24)

7. SUBSIDENCE (Clause 5)

7.1 Land Subsidence Measurement (Clause 5.5a)

Measurements were carried out and compared to previous readings for the subsidence-monitoring network specified in the Fourth Schedule. Readings were conducted by the Spatial Information Services section of Barwon Water and are presented below.

Station ID	Ellipsoid Ht Differences			
Primary Control	2004 - 2003	2005 - 2003	2006-2003	2007-2003
20790040	0	0	0	0
20880024	-8	-2	-8	-18
20590052	-6	0	6	-3
39780106	-1	0	3	-27
Monitoring Stations				
32390045	-9	4	-8	-39
32390046	3	1	-8	-20
26470027	-6	2	-2	6
26470032	-5	5	-1	-43
26470033	-8	3	-13	-40
26470036	5	10	1	-32
39870025	-1	-4	-5	-15
39870026	-3	0	2	-9
38090024	-4	-3	12	8
38090025	-5	-5	9	-12
38090026	-5	0	6	-15

The measurements show an increase in settlement from previous years but still well within licence limits.

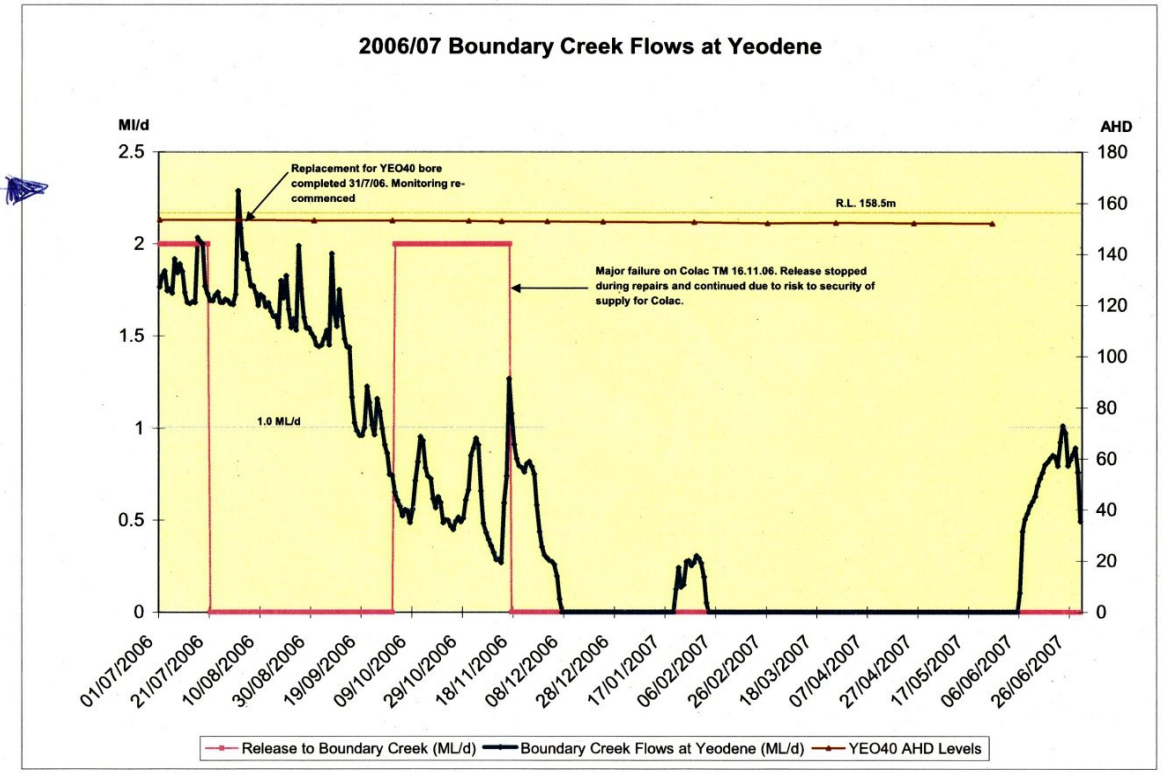
8. FLOW IN BOUNDARY CREEK (Clause 6)

8.1 Discharge to Boundary Creek

Approximately 132 ML was discharged into Boundary Creek during the 2006/07 year. The chart below shows the daily releases along with daily stream gauging on Boundary Creek (at the Yeodene gauge) and groundwater levels in Bore YEO 40.

In November 2006, Barwon Water applied to temporarily cease discharges into Boundary Creek due to the likelihood of critically low levels in the Colac storages over the summer period. The risk to supply was caused by increased demands during the dry spring period and a major failure on the Colac pipeline. This failure prevented transfer of water from the catchment to the city's service basins for several weeks due to repairs and replacement works.

Yeo 40 bore completed 31/07/2006



9

The application was approved by SRW under the condition that water would be carted to properties that normally have a right to access water from Boundary Creek. This condition was honoured with 100 tanker loads at 25,000 litres per load delivered between December 8, 2006 and April 10, 2007.

In response to the drought conditions and pipeline failure, Barwon Water declared Stage 2 restrictions in Colac and district and these remained in place for the remainder of 2006/07. The cessation of discharges to Boundary Creek continued during this time to maintain security of supply to Colac.

9. PROTECTION OF RIPARIAN VEGETATION (Clause 7)

Floral surveys are required at several sites within the first five years of the licence (by July 2009). No surveys have been carried out to date.

10. PROTECTION OF FLOW IN THE BARWON & TRIBUTARIES (Clause 9)

10.1 East Barwon River (Clause 9.1)

Agreement has been formed with SRW for six-monthly manual monitoring program of flow measurement in the East Barwon at 3 locations.

Gauging was again conducted during the 2006/07 year. The results are shown below:

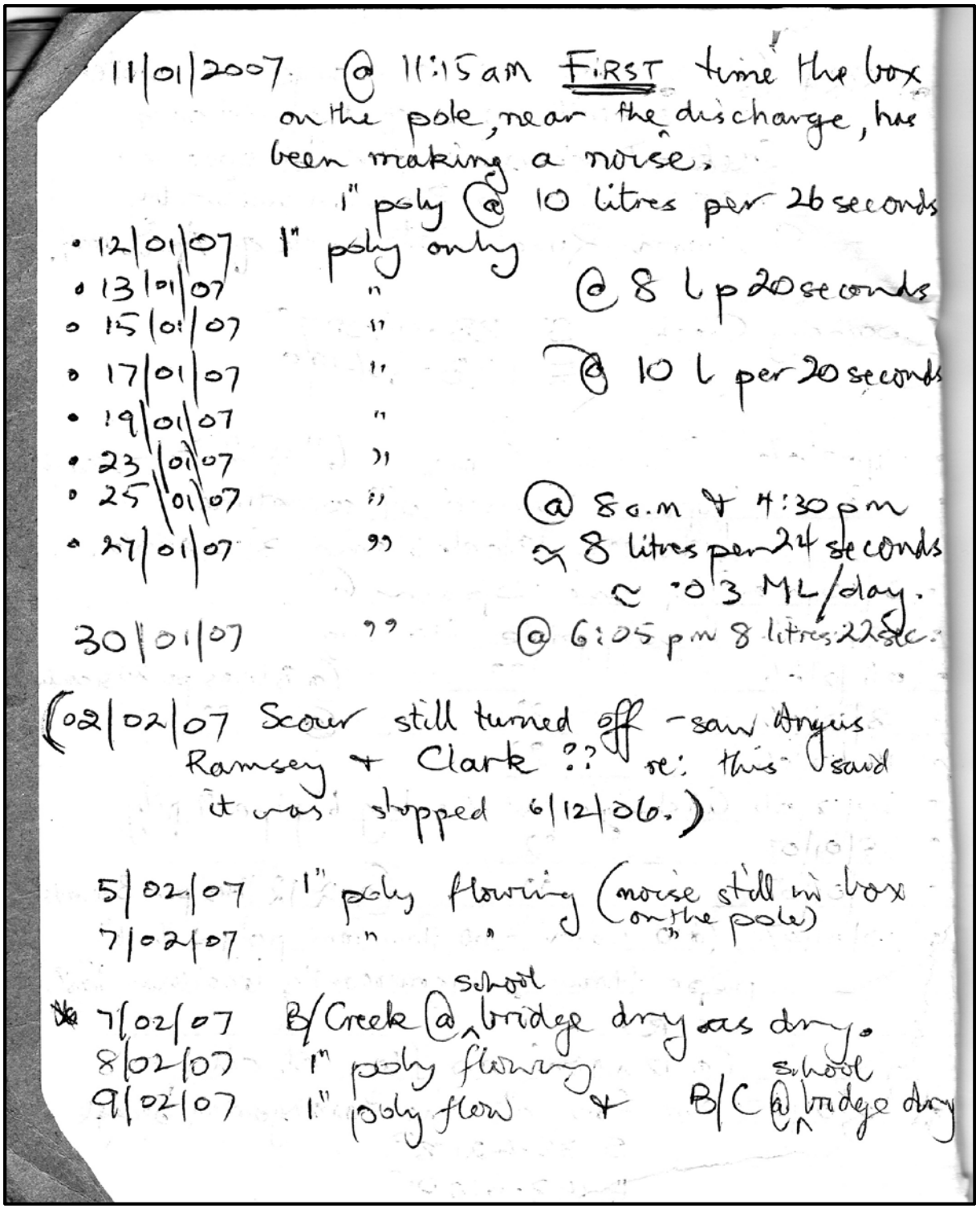
		Flow at Site (ML/d)			
Measurement No.	Date	1*	2*	3*	Borefield Pumping ?
1	14/12/06	0.25	0.38	0.6	Yes
2	28/5/07	0.28	0.38	1.16	Yes

*Measurement Sites
1 Monitoring site 233253A – East Barwon Gauge
2 Approx 1 km downstream of the East Barwon Gauge
3 Approx 250m upstream of the Kings Creek junction

The gauging results indicate there is no loss of river flow to the aquifer despite the level of pumping over the last twelve months.

(page 26)

Notes taken by M. Gardiner – discharges into the Boundary Creek System.(page 27)



11/01/2007 @ 11:15 am FIRST time the box on the pole, near the discharge, has been making a noise.
1" poly @ 10 litres per 26 seconds

- 12/01/07 1" poly only
- 13/01/07 "
- 15/01/07 "
- 17/01/07 "
- 19/01/07 "
- 23/01/07 "
- 25/01/07 "
- 27/01/07 "

@ 8 L p 20 seconds
@ 10 L per 20 seconds
@ 8 a.m & 4:30 pm
≈ 8 litres per 24 seconds
≈ ·03 ML/day.

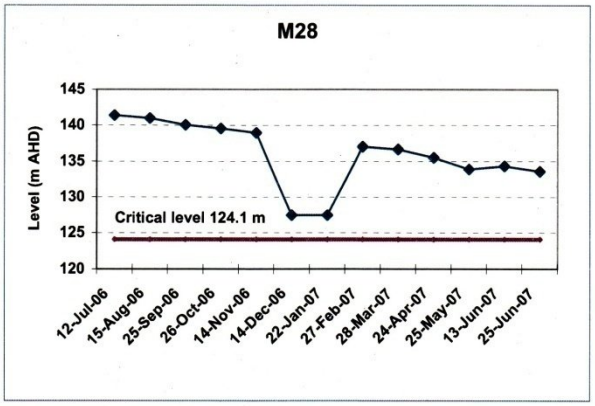
30/01/07 " @ 6:05 pm 8 litres 22 sec.

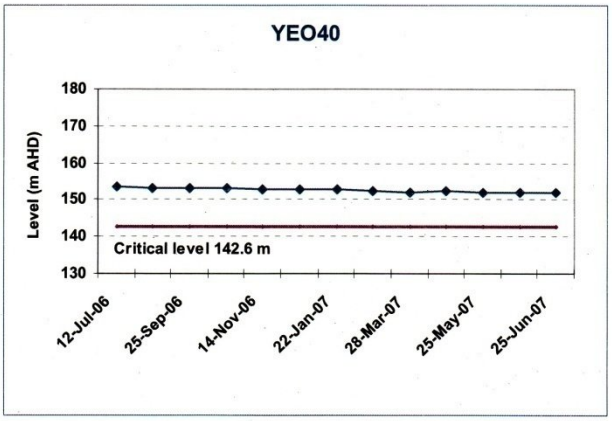
(02/02/07 Scour still turned off - saw Angus Ramsey & Clark ?? re: this said it was stopped 6/12/06.)

5/02/07 1" poly flowing (noise still in box on the pole)
7/02/07 " "

* 7/02/07 B/Creek @ school bridge dry as dry.
8/02/07 1" poly flowing
9/02/07 1" poly flow & B/C @ school bridge dry

Taken from the 2006/07 Report(page 28)





5.2 Maintenance of Key Monitoring Bores

A casing condition assessment of the four observation bores was undertaken during 2003. Recommended works include the refurbishment of two observation bores, Gerangamete 13 and Gerangamete 20, and the decommissioning and re-drilling of Murroon 28 observation bore. Subject to availability of suitable contractors, the works have been scheduled for 2007/08 and will include a further casing condition assessment to clarify the works required.

6. METERING (Clause 4)

Pumping continued throughout 2006/07 as the Barwon System surface water storage levels continued to fall and Geelong moved to Stage 4 water restrictions in December, 2006. By the end of 2006/07, a total of 11,807 ML was extracted in accordance with daily licence limits. Monthly extraction totals and yearly totals are included in Appendix D.

Taken from FOI No. 449537 from Southern Rural Water 23 April 2007 (three pages included).(page 29)

Sent from SRW. Ref. N° 449537 (under F.O.I.) 23rd April 2007

B/W under F.O.I said this is when 2ML/d releases started again.

BOUNDARY CREEK RELEASE-YEO40 AHD LEVELS

Date	Release (ML/d)	YEO40 AHD Levels
14/02/2006	1	Dry
15/02/2006	1	Dry
16/02/2006	2	Dry
17/02/2006	2	Dry
18/02/2006	2	Dry
19/02/2006	2	Dry
20/02/2006	2	Dry
21/02/2006	2	Dry
22/02/2006	2	Dry
23/02/2006	2	Dry
24/02/2006	2	Dry
25/02/2006	2	Dry
26/02/2006	2	Dry
27/02/2006	2	Dry
28/02/2006	2	Dry
1/03/2006	2	Dry
2/03/2006	2	Dry
3/03/2006	2	Dry
4/03/2006	2	Dry
5/03/2006	2	Dry
6/03/2006	2	Dry
7/03/2006	2	Dry
8/03/2006	2	Dry
9/03/2006	2	Dry
10/03/2006	2	Dry
11/03/2006	2	Dry
12/03/2006	2	Dry
13/03/2006	2	Dry
14/03/2006	2	Dry
15/03/2006	2	Dry
16/03/2006	2	Dry
17/03/2006	2	Dry
18/03/2006	2	Dry
19/03/2006	2	Dry
20/03/2006	2	Dry
21/03/2006	2	Dry
22/03/2006	2	Dry
23/03/2006	2	Dry
24/03/2006	2	Dry
25/03/2006	2	Dry
26/03/2006	2	Dry
27/03/2006	2	Dry
28/03/2006	2	Dry
29/03/2006	2	Dry
30/03/2006	2	Dry
31/03/2006	2	Dry
1/04/2006	2	Dry
2/04/2006	2	Dry
3/04/2006	2	Dry
4/04/2006	2	Dry
5/04/2006	2	Dry
6/04/2006	2	Dry
7/04/2006	2	Dry
8/04/2006	2	Dry
9/04/2006	2	Dry
10/04/2006	2	Dry
11/04/2006	2	Dry
12/04/2006	2	Dry
13/04/2006	2	Dry
14/04/2006	2	Dry
15/04/2006	2	Dry
16/04/2006	2	Dry
17/04/2006	2	Dry

Sent under F.O.I. from SRW Ref No 449537 23/04/07

BOUNDARY CREEK RELEASE-YEO40 AHD LEVELS

Date	Release (ML/d)	YEO40 AHD Levels
18/04/2006	2	Dry
19/04/2006	2	Dry
20/04/2006	2	Dry
21/04/2006	2	Dry
22/04/2006	2	Dry
23/04/2006	2	Dry
24/04/2006	2	Dry
25/04/2006	2	Dry
26/04/2006	2	Dry
27/04/2006	2	Dry
28/04/2006	2	Dry
29/04/2006	2	Dry
30/04/2006	2	Dry
1/05/2006	2	Dry
2/05/2006	2	Dry
3/05/2006	2	Dry
4/05/2006	2	Dry
5/05/2006	2	Dry
6/05/2006	2	Dry
7/05/2006	2	Dry
8/05/2006	2	Dry
9/05/2006	2	Dry
10/05/2006	2	Dry
11/05/2006	2	Dry
12/05/2006	2	Dry
13/05/2006	2	Dry
14/05/2006	2	Dry
15/05/2006	2	Dry
16/05/2006	2	Dry
17/05/2006	2	Dry
18/05/2006	2	Dry
19/05/2006	2	Dry
20/05/2006	2	Dry
21/05/2006	2	Dry
22/05/2006	2	Dry
23/05/2006	2	Dry
24/05/2006	2	Dry
25/05/2006	2	Dry
26/05/2006	2	Dry
27/05/2006	2	Dry
28/05/2006	2	Dry
29/05/2006	2	Dry
30/05/2006	2	Dry
31/05/2006	2	Dry
1/06/2006	2	Dry
2/06/2006	2	Dry
3/06/2006	2	Dry
4/06/2006	2	Dry
5/06/2006	2	Dry
6/06/2006	2	Dry
7/06/2006	2	Dry
8/06/2006	2	Dry
9/06/2006	2	Dry
10/06/2006	2	Dry
11/06/2006	2	Dry
12/06/2006	2	Dry
13/06/2006	2	Dry
14/06/2006	2	Dry
15/06/2006	2	Dry
16/06/2006	2	Dry
17/06/2006	2	Dry
18/06/2006	2	Dry
19/06/2006	2	Dry

Sent under FOI from SRW Ref. Nº 449537 (449537)

BOUNDARY CREEK RELEASE-YEO40 AHD LEVELS

Date	Release (ML/d)	YEO40 AHD Levels
20/06/2006	2	Dry
21/06/2006	2	Dry
22/06/2006	2	Dry
23/06/2006	2	Dry
24/06/2006	2	Dry
25/06/2006	2	Dry
26/06/2006	2	Dry
27/06/2006	2	Dry
28/06/2006	2	Dry
29/06/2006	2	Dry
30/06/2006	2	Dry
1/07/2006	2	Dry
2/07/2006	2	Dry
3/07/2006	2	Dry
4/07/2006	2	Dry
5/07/2006	2	Dry
6/07/2006	2	Dry
7/07/2006	2	Dry
8/07/2006	2	Dry
9/07/2006	2	Dry
10/07/2006	2	Dry
11/07/2006	2	Dry
12/07/2006	2	Dry
13/07/2006	2	Dry
14/07/2006	2	Dry
15/07/2006	2	Dry
16/07/2006	2	Dry
17/07/2006	2	Dry
18/07/2006	2	Dry
19/07/2006	2	Dry
20/07/2006	2	Dry
21/07/2006	0	Dry
22/07/2006	0	Dry
23/07/2006	0	Dry
24/07/2006	0	Dry
25/07/2006	0	Dry
26/07/2006	0	Dry
27/07/2006	0	Dry
28/07/2006	0	Dry
29/07/2006	0	Dry
30/07/2006	0	Dry
31/07/2006	0	153.483
1/08/2006	0	
2/08/2006	0	
3/08/2006	0	
4/08/2006	0	
5/08/2006	0	
6/08/2006	0	
7/08/2006	0	
8/08/2006	0	
9/08/2006	0	
10/08/2006	0	
11/08/2006	0	
12/08/2006	0	
13/08/2006	0	
14/08/2006	0	
15/08/2006	0	
16/08/2006	0	
17/08/2006	0	
18/08/2006	0	
19/08/2006	0	
20/08/2006	0	
21/08/2006	0	

BOUNDARY CREEK RELEASE-YEO40 AHD LEVELS

Sent under FOI from SRW Ref No 449537

Date	Release (ML/d)	YEO40 AHD Levels
22/08/2006	0	
23/08/2006	0	
24/08/2006	0	
25/08/2006	0	
26/08/2006	0	
27/08/2006	0	
28/08/2006	0	
29/08/2006	0	
30/08/2006	0	
31/08/2006	0	153.433
1/09/2006	0	
2/09/2006	0	
3/09/2006	0	
4/09/2006	0	
5/09/2006	0	
6/09/2006	0	
7/09/2006	0	
8/09/2006	0	
9/09/2006	0	
10/09/2006	0	
11/09/2006	0	
12/09/2006	0	
13/09/2006	0	
14/09/2006	0	
15/09/2006	0	
16/09/2006	0	
17/09/2006	0	
18/09/2006	0	
19/09/2006	0	
20/09/2006	0	
21/09/2006	0	
22/09/2006	0	
23/09/2006	0	
24/09/2006	0	
25/09/2006	0	
26/09/2006	0	
27/09/2006	0	
28/09/2006	0	
29/09/2006	0	
30/09/2006	0	153.213
1/10/2006	0	
2/10/2006	2	
3/10/2006	2	
4/10/2006	2	
5/10/2006	2	
6/10/2006	2	
7/10/2006	2	
8/10/2006	2	
9/10/2006	2	
10/10/2006	2	
11/10/2006	2	
12/10/2006	2	
13/10/2006	2	
14/10/2006	2	
15/10/2006	2	
16/10/2006	2	
17/10/2006	2	
18/10/2006	2	
19/10/2006	2	
20/10/2006	2	
21/10/2006	2	
22/10/2006	2	
23/10/2006	2	

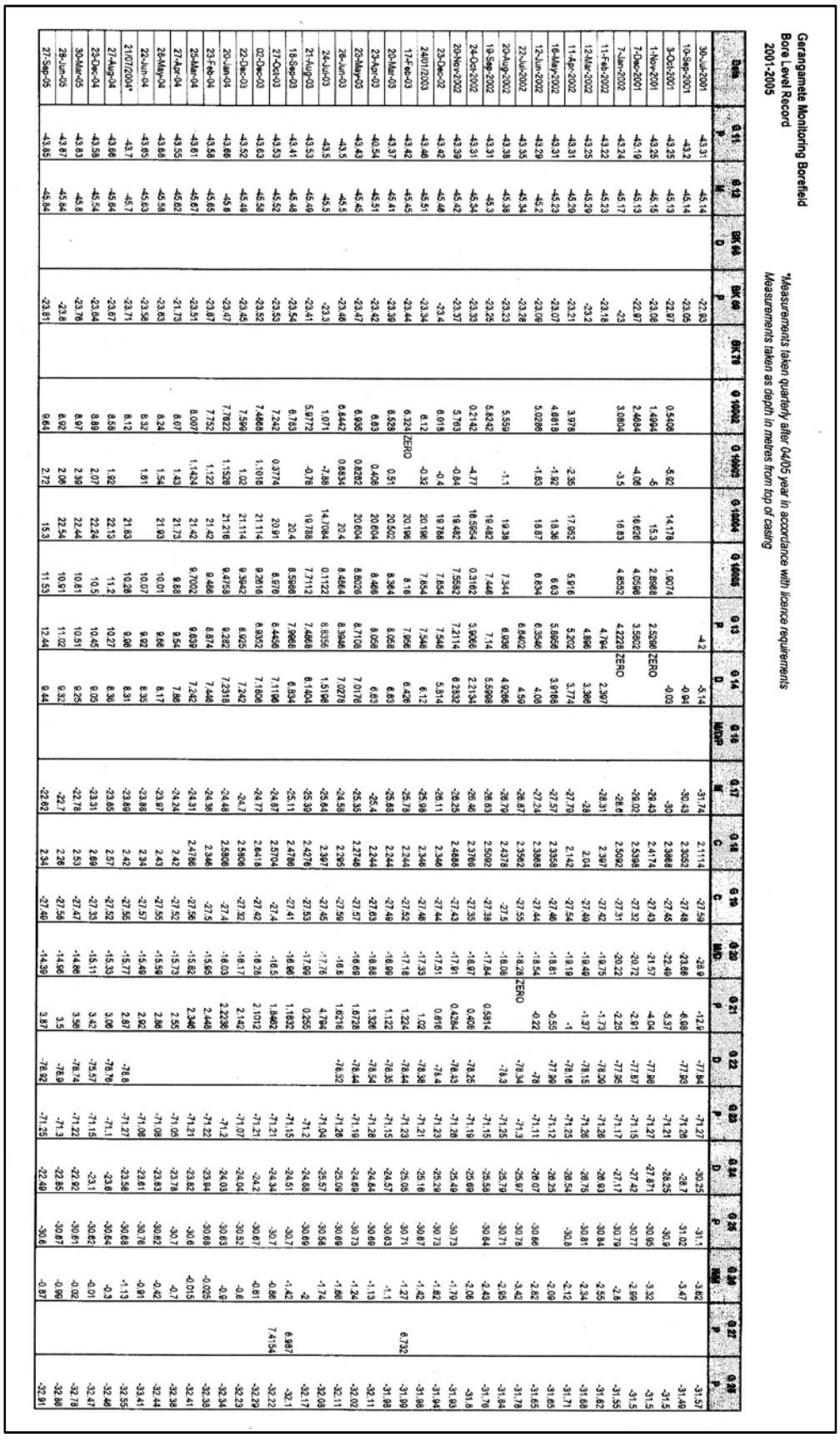
First page of the Appendix A. 2004/05 Report obtained in 2007.(page 33)

Groundwater Level Data 2003-2005

**Levels taken from top of casing*

Date	G 11	G 12	BK 66	BK 69	BK 70	G 10002	G 10003	G 10004	G 10005	G 13	G 14	G 16	G 17	G 18	G 19	G 20	G 21	G 22	G 23
	P	M	D	P						P	D	M/D/P	M	C	C	M/D	P	D	P
24/07/2003	-43.5	-45.5		-23.3		1.071	-7.88	14.7084	0.1122	8.8356	1.5198		-25.64	2.397	-27.45	-17.76	4.794		-71.04
21/08/2003	-43.53	-45.49		-23.41		5.9772	-0.78	19.788	7.7112	7.4868	6.1404		-25.39	2.4276	-27.53	-17.99	0.255		-71.2
18/09/2003	-43.41	-45.48		-23.54		6.783		20.4	8.5986	7.9968	6.834		-25.11	2.4786	-27.41	-16.96	1.1832		-71.15
27/10/2003	-43.53	-45.52		-23.53		7.242	0.3774	20.91	8.976	8.4456	7.1196		-24.87	2.5704	-27.4	-16.5	1.8462		-71.21
2/12/2003	-43.63	-45.58		-23.52		7.4868	1.1016	21.114	9.2616	8.8352	7.1808		-24.77	2.6418	-27.42	-16.28	2.1012		-71.21
22-Dec-03	-43.52	-45.49		-23.45		7.599	1.02	21.114	9.3942	8.925	7.242		-24.7	2.5806	-27.32	-16.17	2.142		-71.07
20-Jan-04	-43.66	-45.6		-23.47		7.7622	1.1526	21.216	9.4758	9.2282	7.2318		-24.48	2.5806	-27.4	-16.03	2.2236		-71.2
23-Feb-04	-43.58	-45.65		-23.67		7.752	1.122	21.42	9.486	8.874	7.446		-24.36	2.346	-27.5	-15.95	2.448		-71.22
25-Mar-04	-43.61	-45.67		-23.51		8.007	1.1424	21.42	9.7002	9.639	7.242		-24.31	2.4786	-27.56	-15.82	2.346		-71.21
27-Apr-04	-43.55	-45.62		-21.73		8.07	1.43	21.73	9.88	9.54	7.86		-24.24	2.42	-27.52	-15.73	2.55		-71.05
28-May-04	-43.68	-45.58		-23.63		8.24	1.54	21.93	10.01	9.66	8.17		-23.97	2.43	-27.55	-15.59	2.86		-71.08
22-Jun-04	-43.65	-45.63		-23.58		8.32	1.61		10.07	9.92	8.35		-23.88	2.34	-27.57	-15.49	2.92		-71.06
21-Jul-04	-43.7	-45.7		-23.71		8.12		21.83	10.26	9.96	8.31		-23.89	2.42	-27.55	-15.77	2.87	-78.8	-71.27
27-Aug-04	-43.66	-45.64		-23.67		8.58	1.92	22.13	11.2	10.27	8.36		-23.85	2.57	-27.52	-15.33	3.06	-78.76	-71.1
23-Dec-04	-43.58	-45.54		-23.64		8.89	2.07	22.24	10.5	10.45	9.05		-23.31	2.69	-27.33	-15.11	3.42	-75.57	-71.15
30-Mar-05	-43.83	-45.8		-23.76		8.97	2.39	22.44	10.81	10.51	9.25		-22.78	2.53	-27.47	-14.86	3.56	-78.74	-71.22
28-Jun-05	-43.87	-45.84		-23.8		8.92	2.06	22.54	10.91	11.02	9.32		-22.7	2.26	-27.58	-14.96	3.5	-78.9	-71.3
27-Sep-05	-43.85	-45.84		-23.81		9.64	2.72	15.3	11.53	12.44	9.44		-22.62	2.34	-27.49	-14.39	3.87	-78.92	-71.25

First page of the Appendix A. 2004/05 Report obtained in 2008(page 34)



Gerangamete Monitoring Borefield
Bore Level Record
2001-2005

**Measurements taken quarterly after 04/05 year in accordance with licence requirements*
Measurements taken as depth in metres from top of casing

Date	G 11 P	G 12 M	BK 08 D	BK 09 P	BK 10	G 14002	G 14003	G 14004	G 14005	G 13 P	G 14 D	G 16 MWP	G 17 M	G 18 C	G 19 C	G 20 MD	G 21 P	G 22 D	G 23 P	G 24 D	G 25 P	G 26	G 27 P	G 28 P
30-Jul-2001	-43.31	-45.14		-22.83							-5.14		-31.74	2.1114	-27.59	-28.9	-12.9	-77.84	-71.27	-30.25	-31.1	-3.62		-31.57
10-Sep-2001	-43.2	-45.14		-23.05							-0.94		-30.43	2.3052	-27.48	-23.66	-6.66	-77.83	-71.26	-28.7	-31.02	-3.47		-31.49
3-Oct-2001	-43.25	-45.19		-22.87		0.5436	-5.82	14.178			-0.03		-30	2.3868	-27.45	-22.49	-5.37	-77.88	-71.21	-28.25	-30.9			-31.5
1-Nov-2001	-43.25	-45.16		-23.08		1.4094	-6	15.3					-28.43	2.4174	-27.43	-21.57	-4.04	-77.88	-71.27	-27.871	-30.85	-3.32		-31.5
7-Dec-2001	-43.19	-45.19		-22.87		2.4694	-4.06	19.626					-28.02	2.5398	-27.32	-20.72	-2.91	-77.87	-71.15	-27.42	-30.77	-2.99		-31.5
7-Jan-2002	-43.24	-45.17		-23		3.0804	-3.5	18.83					-28.6	2.5092	-27.31	-20.22	-2.25	-77.95	-71.17	-27.17	-30.79	-2.8		-31.55
11-Feb-2002	-43.22	-45.23		-23.16									-28.31	2.3972	-27.42	-19.75	-1.73	-78.09	-71.26	-28.93	-30.84	-2.55		-31.62
12-Mar-2002	-43.25	-45.29		-23.2									-28	2.04	-27.49	-19.49	-1.37	-78.15	-71.28	-28.75	-30.81	-2.34		-31.68
11-Apr-2002	-43.31	-45.29		-23.21		3.978	-2.35	17.952	5.916	5.202	3.774		-27.76	2.142	-27.54	-19.19	-1	-78.16	-71.25	-28.54	-30.8	-2.12		-31.71
16-May-2002	-43.31	-45.23		-23.07		4.8818	-1.92	18.36	6.63	5.8656	3.9186		-27.57	2.3358	-27.46	-19.81	-0.55	-77.89	-71.12	-28.25		-2.09		-31.65
12-Jun-2002	-43.29	-45.2		-23.09		5.0286	-1.63	18.87	6.834	6.3546	4.08		-27.24	2.3868	-27.44	-18.54	-0.22	-78	-71.11	-28.07	-30.86	-2.82		-31.65
22-Jul-2002	-43.35	-45.34		-23.28						6.8402	4.59	ZERO	-26.87	2.3562	-27.55	-18.28	ZERO	-78.34	-71.3	-25.87	-30.78	-3.42		-31.78
20-Aug-2002	-43.38	-45.38		-23.23		5.559	-1.1	19.38	7.344	6.896	4.9286		-28.79	2.4378	-27.5	-18.08		-78.3	-71.25	-25.79	-30.71	-2.65		-31.84
19-Sep-2002	-43.31	-45.3		-23.25		5.8242		19.482	7.448	7.14	5.5866		-28.83	2.5092	-27.38	-17.84	0.5814		-71.15	-25.58	-30.64	-2.43		-31.76
24-Oct-2002	-43.31	-45.34		-23.33		0.2142	-4.77	16.5654	0.3162	5.8066	2.2134		-26.46	2.3766	-27.35	-18.67	0.406	-78.25	-71.19	-25.69		-2.06		-31.8
20-Nov-2002	-43.39	-45.42		-23.37		5.763	-0.84	19.482	7.5582	7.2114	6.2932		-26.25	2.4686	-27.43	-17.91	0.4284	-78.43	-71.28	-25.49	-30.73	-1.79		-31.93
23-Dec-02	-43.42	-45.46		-23.4		6.015	-0.4	19.788	7.854	7.548	5.814		-26.11	2.346	-27.44	-17.51	0.816	-78.4	-71.23	-25.29	-30.73	-1.82		-31.94
24012003	-43.46	-45.51		-23.34		8.12	-0.32	20.196	7.854	7.548	6.12		-25.99	2.346	-27.48	-17.33	1.02	-78.38	-71.21	-25.16	-30.87	-1.42		-31.98
17-Feb-03	-43.42	-45.45		-23.44		6.324	ZERO	20.196	8.16	7.896	6.426		-25.78	2.244	-27.52	-17.18	1.224	-78.44	-71.23	-25.05	-30.71	-1.27	6.732	
20-Mar-03	-43.37	-45.41		-23.36		6.528		20.502	8.364	8.058	6.66		-25.65	2.244	-27.49	-16.99	1.122	-78.35	-71.15	-24.57	-30.63	-1.1		-31.99
23-Apr-03	-43.54	-45.51		-23.42		6.63	0.408	20.604	8.466	8.058	6.69		-25.4	2.244	-27.63	-16.88	1.326	-78.54	-71.28	-24.84	-30.69	-1.13		-32.11
28-May-03	-43.43	-45.45		-23.47		6.936	0.8282	20.604	8.6028	8.7108	7.0176		-25.35	2.2746	-27.57	-16.69	1.6728	-78.44	-71.19	-24.69	-30.69	-1.24		-32.02
26-Jun-03	-43.5	-45.5		-23.46		6.8442	0.8834	20.4	8.4864	8.3046	7.0278		-24.58	2.295	-27.59	-16.8	1.6216	-78.52	-71.28	-25.09	-30.69	-1.86		-32.11
24-Jul-03	-43.5	-45.5		-23.3		1.071	-7.86	14.7084	0.1122	8.8356	1.5196		-25.84	2.3907	-27.45	-17.76	4.794		-71.04	-25.57	-30.58	-1.74		-32.08
21-Aug-03	-43.53	-45.49		-23.41		5.9772	-0.78	19.788	7.7112	7.4868	6.1404		-25.39	2.4276	-27.53	-17.09	0.255		-71.2	-24.68	-30.69	-2		-32.17
18-Sep-03	-43.41	-45.48		-23.54		6.783		20.4	8.5608	7.9668	6.534		-25.11	2.4786	-27.41	-16.98	1.1832		-71.15	-24.51	-30.7	-1.42	6.987	-32.1
27-Oct-03	-43.53	-45.52		-23.55		7.242	0.3774	20.91	8.976	8.4456	7.1196		-24.87	2.5704	-27.4	-16.5	1.8492		-71.21	-24.34	-30.7	-0.86	7.4154	-32.22
02-Dec-03	-43.63	-45.58		-23.52		7.4868	1.1016	21.114	9.2616	8.8032	7.1808		-24.77	2.6418	-27.42	-16.28	2.1012		-71.21	-24.2	-30.67	-0.81		-32.29
22-Dec-03	-43.52	-45.58		-23.45		7.5606	1.02	21.114	9.3642	8.925	7.242		-24.7	2.5806	-27.32	-16.17	2.142		-71.07	-24.04	-30.52	-0.6		-32.23
20-Jan-04	-43.66	-45.6		-23.47		7.7622	1.1526	21.216	9.4758	9.2322	7.2318		-24.48	2.5806	-27.4	-16.03	2.2238		-71.2	-24.03	-30.63	-0.6		-32.34
23-Feb-04	-43.58	-45.65		-23.87		7.752	1.122	21.42	9.486	8.874	7.446		-24.36	2.346	-27.5	-15.65	2.448		-71.22	-23.84	-30.68	-0.025		-32.38
25-Mar-04	-43.61	-45.67		-23.51		8.007	1.1424	21.42	9.7002	9.659	7.242		-24.31	2.4786	-27.56	-15.62	2.346		-71.21	-23.82	-30.6	-0.015		-32.41
27-Apr-04	-43.55	-45.62		-23.73		8.07	1.43	21.73	9.88	9.54	7.86		-24.24	2.42	-27.52	-15.73	2.55		-71.05	-23.78	-30.7	-0.07		-32.38
26-May-04	-43.68	-45.58		-23.83		8.24	1.54	21.93	10.01	9.66	8.17		-23.97	2.43	-27.55	-15.56	2.86		-71.08	-23.83	-30.82	-0.42		-32.44
22-Jun-04	-43.85	-45.63		-23.56		8.32	1.61		10.07	9.92	8.35		-23.86	2.34	-27.57	-15.49	2.92		-71.08	-23.81	-30.78	-0.91		-33.41
21/07/2004*	-43.7	-45.7		-23.71		8.12		21.83	10.07	9.98	8.31		-23.89	2.42	-27.55	-15.77	2.87	-78.8	-71.27	-23.58	-30.68	-1.13		-32.55
27-Aug-04	-43.66	-45.64		-23.87		8.58	1.92	22.13	11.2	10.27	8.36		-23.85	2.57	-27.52	-15.33	3.06	-78.76	-71.1	-23.8	-30.64	-0.3		-32.46
23-Dec-04	-43.58	-45.54		-23.64		8.89	2.07	22.24	10.5	10.45	9.05		-23.31	2.69	-27.33	-15.11	3.42	-78.57	-71.15	-23.1	-30.62	-0.01		-32.47
30-Mar-05	-43.83	-45.8		-23.76		8.97	2.39	22.44	10.61	10.51	9.25		-22.78	2.53	-27.47	-14.86	3.56	-78.74	-71.22	-22.92	-30.61	-0.02		-32.78
28-Jun-05	-43.87	-45.84		-23.8		8.92	2.06	22.54	10.91	11.02	9.32		-22.7	2.26	-27.58	-14.96	3.5	-78.9	-71.3	-22.85	-30.67	-0.06		-32.86
27-Sep-05	-43.85	-45.84		-23.81		9.64	2.72	15.3	11.53	12.44	9.44		-22.62	2.34	-27.49	-14.39	3.87	-78.92	-71.25	-22.49	-30.6	-0.87		-32.91

Extracts of Salinity documentation from the 2004/05 Report (page 35)

4. GROUNDWATER SALINITY (Clause 2)

Groundwater samples this year were collected for analysis on the 22nd of December 2005. Samples were collected using a bailer, and analysed by Water ECOscience in Geelong. These results were recorded in a database from which the following graphs are taken:

CK13

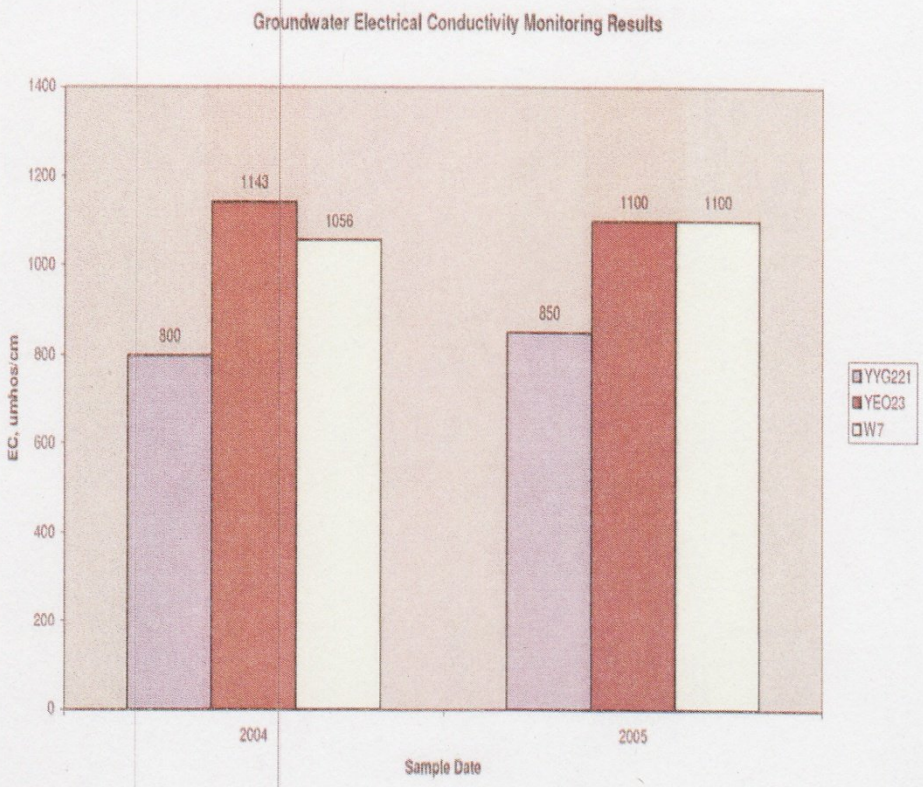
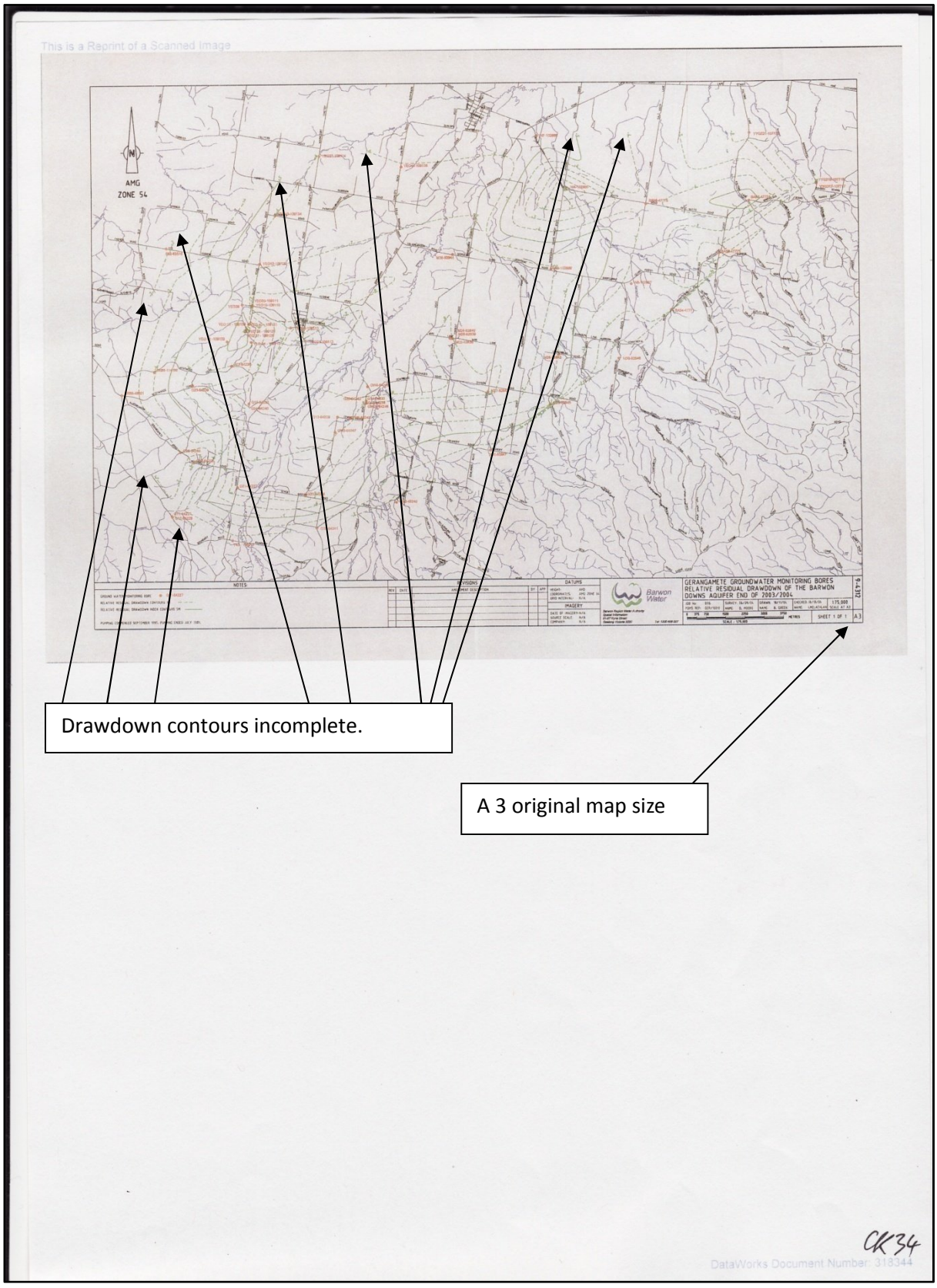


Figure 5: Electrical Conductivity (µmho/cm) Monitoring Results.

The latest results are simular to those recorded last year with no trend discernable at this stage.

(page 36)

Difficult to read and incomplete drawdown maps (2008 version)(page 37)



This is the end of the 23 October 2008 formal complaint to Southern Rural Water.

In the meantime Councillor Peter Mercer had queried Barwon Water regarding the non compliance. The next two pages are the reply from Michael Malouf, Managing Director.

25/9/07 17

100 YEARS SERVING OUR COMMUNITY

Barwon Water

1908 - 2008

Our Ref: 15/090/0011A
Your Ref:
Enquiries To: Ian Davis

435

October 6, 2008

COLAC OTWAY SHIRE
16 OCT 2008
RECEIVED

SCANNED

Received 23/10/2008 by Mal Gardiner
Include the Report Noted as MG1 - MG4

Cr Peter Mercer
Colac Otway Shire
PO Box 21
COLAC VIC 3250

Dear Peter,

Re: Barwon Downs Groundwater Licence No. 893889

Thank you for the opportunity to provide a response to your concerns about the operation of the above licence and in particular issues raised in Chapter 25 of "Otway Water Who Gives A Damn"

The intent of the abovementioned licence in the Gerangamete Groundwater area is to allow the sustainable extraction of water for urban supply. The licence was developed in 2003/4 with input from technical experts, community representatives and government departments. This group identified the following key areas that would assist in the evaluation of the sustainability of the borefield:

- Production limits for daily volumes, maximum annual volumes and maximum 10 year volumes,
- Regional groundwater levels,
- Groundwater salinity,
- Subsidence,
- Flow in Boundary Creek,
- Protection of riparian vegetation,
- Protection of stock and domestic use, and
- Protection of Flow in Barwon River and tributaries.

Barwon Water endeavours to ensure all the requirements of the licence are met and that sufficient data is collected to demonstrate the sustainability of the borefield. For the vast majority of time compliance with the licence is achieved however some minor non-compliances do occur from time to time but these are not critical to the overall assessment of the borefield and any impacts its operation has on the nearby area.

I have had a review undertaken of the issues contained in Chapter 25 and I advise as follows:

YEO 40

In previous Annual Reports there has been some confusion regarding the location and timing of the YEO 40 replacement. This bore is one of four critical monitoring bores that has been assigned a trigger level used to protect groundwater levels in the groundwater area.

To clarify this issue, YEO 40 was replaced in May 2005 as required under the licence. The bore is located adjacent to the old YEO 40 on McCalls Road near Boundary Creek.

Barwon Region Water Corporation
ABN 86 348 316 514

61-67 Ryrie Street, Geelong, Victoria
P.O. Box 659, Geelong, Victoria, 3220
DX 22061 (Geelong)
www.barwonwater.vic.gov.au

Telephone: 1300 656 007
Facsimile: (03) 5221 8236

Discharges to Boundary Creek

The licence requires Barwon Water to discharge water to Boundary Creek under certain conditions. The Corporation complies with this licence condition on the vast majority of occasions, though occasional difficulties are experienced in maintaining flow provisions due to variations in the natural stream flow in Boundary Creek after rain events, the operation of a private on-stream irrigation dam and maintenance and operation of the Colac water supply pipeline.

It is important to note that the Boundary Creek data provided by Barwon Water to Southern Rural Water is the only data used for compliance reporting.

Administrative Errors

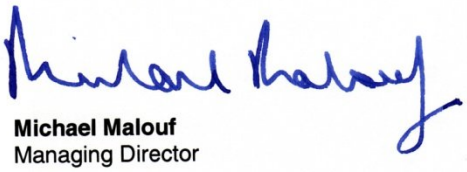
Previous Annual Reports have included a number of reporting errors. These are essentially administrative issues and have not impacted on the appropriate extraction of groundwater under the licence. Barwon Water are continually working with Southern Rural Water to improve reporting under the licence.

Conclusion

Overall, Barwon Water complies with the intent and key aspects of the licence. In conjunction with Southern Rural Water we are continually improving the operation and reporting for the borefield. For your information I attach a copy of the 2007/08 report as provided to Southern Rural Water.

If you have any further queries please call Ian Davis, Manager Water Supply on 5226 9230.

Yours sincerely,



Michael Malouf
Managing Director

Encl: Groundwater Licence No 893889 - 2007/08 Report

cc: Tracey Slatter, CEO Colac Otway Shire
Chris Smith, Mayor Colac Otway Shire

It will be extremely interesting to read and compare this letter with Southern Rural Water's reply when it arrives.

The 2007/08 report attached to the Peter Mercer letter is the very same report requested under Freedom Of Information back in September and still has not arrived.

CONCLUSION

Given a casual glance at the latest formal complaint sent off to Southern Rural Water it would be most apparent that there are extremely strong grounds for the complaint.

Considering it took Southern Rural Water over 4 months to deal with the last formal complaint on this issue, it was felt that the publication of this book could not wait an indefinite period for the reply. However, it is worth stating the obvious. Don't expect to gain gratification easily when challenging the "establishment."

The licence review facet of the Barwon Downs groundwater extraction in the Otways, has yet to conclude and will no doubt be written about at a later stage.

CHAPTER 8

Efforts to Gain a Daily Environmental Flow Allocation for Streams in the Loves Creek Catchment

The protection of the ecosystems in the Gellibrand River catchment and particularly the Loves Creek catchment has been given a great deal of attention in the last 30 years. Loves Creek is a tributary of the Gellibrand River. After speaking with officers of the Corangamite Catchment Management Authority (CCMA) it would appear that these ecosystems are protected from additional human demands. Climate change and groundwater extraction is another story.

RMCG in its 2008 Regional Water Audit[30] states that the Gellibrand Groundwater Management Area was set at zero to protect surface water flows in the Gellibrand River.

The argument that has been waged since 1989 is that the surface waters of the Gellibrand River and Loves Creek are fully allocated during the summer and autumn periods. If the truth be known and the human component of allocated water is accurately determined, in all probability the allocations made far exceed the amount of water available. A study of the Loves Creek catchment is presently being conducted and early indications suggest that this is the case. The surface waters are already over allocated.

The streams in the Loves Creek catchment have continued to flow throughout this worst drought on record and highlight the interconnectedness between groundwater and surface water flows. Using the experiences from the neighbouring Barwon Downs borefield, extracting groundwater, dries streams up. If groundwater is extracted from the Kawarren borefield the impact on stream flow will in effect be double dipping, allocating the water resource twice. Pump from the aquifer and the overflow from this aquifer into the streams, will be reduced accordingly. The amount of surface water available will be significantly reduced.

It would appear that the Government of the day and the water authority involved in the Kawarren groundwater investigations have not done the desk top studies of earlier research, failed to consult with the local experts and plan to blindly persist with groundwater extraction.

If the extraction of groundwater from Kawarren could be put aside for a moment, the discussions with CCMA officers Simone Wilkie and Greg Williams is most encouraging. The maintenance and security of the ecosystems in the Loves Creek catchment would seem assured. Much of the discussion was centred around the Water Act 1989 and the Government document "Securing Our Water Future Together.[31]"

Securing Our Water Future Together covers such things as:

- Long term planning
- Water resource allocation
- Restoring our rivers and aquifers for future generations

- Regional differences
- Maintaining healthy streams
- Sustainability
- Accountability
- Improved capability and effectiveness
- Clarity of roles and responsibilities

... and are relevant to the following discussion.

Williams[33] states that the Victorian Government has declared the Gellibrand River catchment to be one of 21 priority unregulated rivers in Victoria. Being unregulated means that there can be no new allocation of surface water outside the July to October period. Even then it must be clearly demonstrated that there is sufficient winter flush and environmental water. The extracted surface water must also be stored off stream.[34]

Williams[33] makes the point that the surface waters of the Gellibrand River are already fully allocated during the stress periods of summer and autumn. But more importantly he states that no longer can consumers expect to automatically increase their allocations without paying due regard to the environment. From past experience this will be difficult. This present government appears to be placing urban water demands before all other considerations. As urban water demands increase so will the demand to "chip" into the environmental share, what ever that may be.

Returning to the argument of extracting groundwater it is blatantly clear that any drawdown from the aquifer under the Kawarren valley will impact on the surface water flows in the Gellibrand River. Due to this connectedness the document Securing Our water Future Together[34] clearly states that an Environmental Water Reserve will be set at a level which protects the integrity of the aquifer. It should also minimises the risk of too much groundwater extraction affecting rivers, wetlands and other dependent plant and animal communities. This document goes on to state that it will be important to ensure that both surface and groundwaters are managed together.

With all this said can one be confident that the stream and river systems of the Gellibrand River catchment will be managed accordingly, where surface water and groundwater are managed together? Unfortunately, the answer is "NO." This process of protecting the Gellibrand River has raged for decades and no effective environmental flow has resulted. It was recommended in 1999 that groundwater from the Gellibrand Groundwater Management Area be set at zero. The setting of zero groundwater extraction from the Kawarren/Gellibrand area has been reiterated on numerous occasions as the appropriate level. Seven years after this recommendation the Victorian Government finally Gazetted zero groundwater extraction for ALL aquifers in the Gellibrand Groundwater Management Area. However, to facilitate Barwon Water doing a stress pump at Kawarren the Minister Tim Holding has re-gazetted[35] the zero extraction to allow 650 ML to be pumped over a thirteen month period. Under what advice did Minister Holding make this decision?
The signs that the Gellibrand River will be protected from groundwater extraction remain extremely doubtful.

Officers of the Corangamite Catchment Authority can only work within the constraints put on them by the Victorian Government. Personnel working at the “coal face” are more than capable of defining the actions required to implement the appropriate management of a river system. However, the same cannot be said of the politician who makes the final decision. Too often these decisions are politically motivated and the appropriate action is lost. If past record is taken into account the Gellibrand River may have another 20 years to wait.

Michael Malouf (Managing Director, Barwon Water) stated on Victorian ABC television STATELINE on 10 October 2008, that the Corangamite Catchment Management Authority has given Barwon Water a very good bill of health environmentally in regard to Boundary Creek. Is this a political comment or fact?

Boundary Creek wetlands 2008.

Ten Mile Creek wetlands 2008

In the initial stages of the Kawarren groundwater investigations, until pointed out by local residents, Barwon Water was not aware of the Ten Mile Creek wetlands. During summer the Ten Mile Creek wetlands supply 1.2 ML/day into the Gellibrand River system. Pre pumping Boundary Creek used to supply 3.2 ML/day into the Barwon River. Boundary Creek now runs dry over summer. Will the Gellibrand River have the same fate as Boundary Creek? Most likely, if left to politicians. Can the Gellibrand River wait another 20 years? It is doubtful.

CONCLUSION

The officers of the CCMA should be given the authority to do their job of catchment management and protection. The battle to protect environmental flows in the Gellibrand River and its tributaries is still to be won. Given political involvement there is every indication that the rhetoric, high ideals and policy in regard to Environmental Water Reserves mean nothing for the summer and autumn flows required to maintain the integrity of the Gellibrand River and its catchments.

CHAPTER 9

Colac Otway Shire Involvement in the Kawarren Borefield Development

The Colac Otway Shire strongly maintains the stance that even though it recognises and understands the Kawarren and Gellibrand residents concerns regarding the groundwater extractions issues at Kawarren, it has very limited responsibility in any investigation.

These quotes highlight the Colac Otway Shire commitment...

- Jack Green, General Manager Sustainable Planning and Development, Colac Otway Shire. (24 January 2008)
  "As we have explained to you in previous correspondence sent dated 4 December 2007, Colac Otway Shire's involvement in this process is restricted to assessing an "application for consent" to undertake works within the road reserve."
- Councillor Chris Smith, Mayor, Colac Otway Shire. (28 April 2008)
  "At the Ordinary Meeting of April 22, 2008, Council unanimously adopted the following resolution."**That Council, although it is outside our area of responsibility, recognises the community's concern regarding the potential impacts of groundwater extraction from the Gellibrand Valley Aquifer.**""
- Motion carried at the 26 August Council Meeting.
  "That Council advocates strongly to ensure farmers, residents, business and environmental flows are not put at risk by water harvesting schemes, particularly in the Kawarren/Gellibrand area.
  That the Chief Executive Officer seek to arrange for Councillors to meet with Barwon Water board members to discuss areas of mutual concern such as, but not limited to:
  Kawarren Underground Water
  Apollo Bay Water
  Water for Intensive Agriculture
  Colac Water
  Recycled Water."

The following extracts are taken from the Colac Otway Shire web site, 3 October 2008.

- **Planning Scheme Overlays**
  ...To protect areas of significant vegetation,
  ...To maintain and enhance habitat and habitat corridors,
  ...To ensure that development is compatible with identified environmental values,
  ...To protect areas prone to ...land degradation processes, by land disturbance and inappropriate development,
  ...To protect water quality.
  ...Does not significantly increase the threat of life and surrounding property from wild fire.
  ...Protection and enhancement of the bio-diversity of the area.
- **Environment**

...Colac Otway Shire is widely regarded as one of the most picturesque municipalities in Victoria,
...The Shire hosts some of Australia's greatest National and State Parks including...Kawarren Regional Park,
...The Colac Otway Shire's commitment and consideration to the environment is reflected in the Planning Scheme Overlays.

Colac Otway Planning Schemes-Environmental Significant Overlays...

Schedule 1 includes...

- Barongarook High & Other Groundwater Areas – the protection and retention of groundwater quality is of major importance...
- To protect and maintain quality and quantity of groundwater recharge in the Barwon Downs Wellfield Intake Area (Geelong) Water Supply Catchment...

Schedule 2 includes...

- Lakes, wetlands and streams.
- To protect and enhance lakes and wetlands with significant flora, fauna and fisheries habitat.
- The Gellibrand River, Loves Creek and Porcupine Creek are noted as having rare or threatened species present and or high biodiversity values or links.

Schedule 3 includes...

- To protect and maintain water quality and water quantity in the Gellibrand River...

Schedule 4 includes...

- Porcupine and Boundary Creeks are named as areas of rare, threatened or remnant species present or high biodiversity values/links.
- To assist the protection and, where possible, restoration of catchments, waterways, water bodies, groundwater, and the marine environment.
- ...to identify the beneficial uses of groundwater resources and have regard to potential impacts on these resources of proposed land use or development.
- Fire hazards must be considered in planning decisions affecting wildfire risk environments to avoid intensifying the risk through inappropriate located or designed uses or development.

These written items taken from the Overlay documents present some insight into a significantly different degree of responsibility to the ones of action that the Colac Otway Shire appears to be taking.

The Draft Corangamite Fishery Management Plan No. 50 Feb. 2008, pages 16 & 18 makes reference to local government responsibilities.
In regard to this Plan the following items are listed as the Shire's responsibilities.

- That the Colac Otway Shire works in partnership with the CCMA.
- That the Shire has roles and responsibilities that are set out in this document that clearly indicate the Shire should be actively involved in water issues directly affecting rate payers under its care.
- That the last two responsibilities mentioned on these pages are local government responsibilities:
    - *Facilitate local industries involvement in river restoration and catchment management,* AND
    - *Provide local support for local action groups.*

Under this Plan surely Barwon Water has to be regarded as a local industry. Further to this the Kawarren/Gellibrand community must be regarded as a local action group. And the Land And Water Resource Otway Catchment (LAWROC) landcare group most definitely fits under the category of a local action group.
This Plan also discusses the fact that the Shire should be involved in the maintaining of environmental flows.

Further, the "Land and biodiversity at the time of climate change" – Green Paper on page 76, point 9.3 Local Government, states that ***"Local governments are the primary advocates for, and coordinators of, local community groups and interests."***
This Paper also has this to say, ***"Local government has an important role in natural resource management on both public and private land, through statutory responsibilities and non statutory activities. Local government is responsible for developing policies and implementing land use planning as well as regulating a wide range of activities that may affect natural resources***."

The Colac Otway Shire has well defined responsibilities and roles in the extraction of groundwater that is taking place at Barwon Downs, and planned to take place at Kawarren. The Shire should be exercising its responsibilities without fear nor favour and doing much more than simply "advocating" as noted in the 26 August motion passed by Council. The Shire should be setting the agenda in its areas of responsibility, not being subservient to an "outside" authority. The Shire's role in this issue is clearly and specifically defined.

Barwon Water should be seeking Colac Otway Shire clarification on what it can and cannot do in the Shire, not the other way around.

CONCLUSION

Water is a crucial resource influencing the development of the Colac Otway Shire and it would appear to be quite clear that the Shire has a direct and significant role to play in the management and development of groundwater extraction. This is especially so when inappropriate management practices have resulted in economic, social and environmental disastrous impacts in the Barwon Downs area. There is every indication that a similar impact will be felt throughout the Gellibrand River catchment.

The Colac Otway Shire's present commitment and involvement would appear to be falling well short of its civic, statutory and non statutory responsibilities.

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INDEX

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