OTWAY WATER BOOK 52

"Up to 50% of Geelong's Drinking Water Came from Groundwater Extraction During the 1982-83 Drought and 70% During the Millennium Drought – *Urban Myth*."

<u>Cambridge Dictionary.</u>
***urban myth* – a story or statement that is not true but is often repeated, and believed by many to be true.**

Disclaimer

This book may be of assistance to you, but there is no guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaim all liability from error, loss or other consequence that may arise from relying on any information in this book.

This book has been prepared, and supporting documents used, with diligence. Statements within this publication that originate from groups or individuals have not been evidentially tested. No liability is accepted from any action resulting from an interpretation of this book or any part of it. The data in this book is arrived at from information sourced and available in the public domain at the time. The passage of time, manifestation of latent conditions or impacts of future events may necessitate further examination and subsequent data analysis , and re-evaluation of the data, findings, observations and conclusions expressed in this book. This book has been prepared in accordance with care and thoroughness. No warranty or guarantee, whether expressed or implied, is made of the data, observations and findings expressed in this book. This book should be read in full. I accept no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this book by any third party. However, I do sincerely hope this book encourages you to enquire about and or further evaluate the material presented and diligently follow up on any aspect of Otway Ranges water resource management that may have been aroused in your mind but not answered.

August 2020.

Malcolm Gardiner

Email: otwaywater@yahoo.com.au
www.otwaywater.com.au

CONTENT'S PAGE. OTWAY WATER BOOK 52.

INTRODUCTION.

On public occasions and in Barwon Water & Jacobs documents, statements have been made claiming that during the 1982-83 drought 50% of Geelong's water came from groundwater extraction at the Baron Downs Borefield, and, during the Millennium Drought 70% of Geelong City's drinking water came from this borefield. These statements have been repeated so often as very definitive claims, that one could reasonably assume were based on readily available and verifiable data. However, efforts to gain this confirmation have not been easy and it would appear that such claims are a classic example of the creation of an Urban Myth.

PART A. Geelong's Water Consumption & Extractions from the Barwon Downs Borefield During the 1982-1983 Drought.

During the 1982-1983 drought the Barwon Downs Borefield was reported as being critical to Geelong, replenishing its diminishing water requirements. As a result, Barwon Water was extremely keen to extend its utilisation of this Borefield as an asset. The 1987 to 1990 test pump conducted at the Barwon Downs Borefield was designed to put the borefield aquifers under stress in an effort to determine their sustainability with regard to Barwon Water's continued utilisation of the groundwater.

It took five years to analyse the test results and compile a 315 page report. In 1995 Witebsky et al.[1] completed the report and included this statement…
"***This borefield provided a significant contribution to Geelong's water supply during the 82-83 drought***."

50% Reliance.
The Victorian 1988 "State of the Environment Report,"[3] qualified Witebsky's report by stating Geelong derived approximately 50% of its domestic water requirements from the Barwon Downs Borefield during this drought.

Extraction Data Cannot Be Found.
In 2006 when attempting to learn more about these groundwater extractions, Barwon Water was asked to provide the yearly groundwater extraction volumes from 1980 to 2005.

With regard to this Freedom of Information Request(FOI) in November 2006[2], Barwon Water replied… ***"Please note there are no records prior to 1988"*** for groundwater extraction volumes. This seemed incredible as the determining of the second stage granting of a groundwater extraction licence for Barwon Water was to be based on the results of the stress test pump. Yet Barwon Water could find no record of any groundwater extraction figures pre 1988.

What About Stress Test Pump Reports Around this Time?
Another reason for the Freedom Of Information request was to gain the figures for any stress test pump reports past Report Number 8.[6] I had copies of Report 7 and 8 regarding the test pump but had none past August '89. Report Number 8, dated August 1989, indicated there would be additional extractions.
"***7. Forward Program.***
The stressing of the aquifer is now approaching the production which was originally targeted. It is expected that around 18,000 ML will have been drawn from the aquifer by the end of November 1989, and three winter

***recharge periods will have occurred. Further, an amount of 12,600 ML is expected to be extracted in the 15 month period between September 1988 and November 1989, and that the amount is equal to the present annual licence.*"**[6] Actually the extraction went way over the 12,600 ML mark.

(The above quote is found on page 5 of the Geelong and District Water Board report, "*Barwon Downs Groundwater Test Pumping Program-Progress report No. 8. August 1989.*")

Surprise, Surprise.

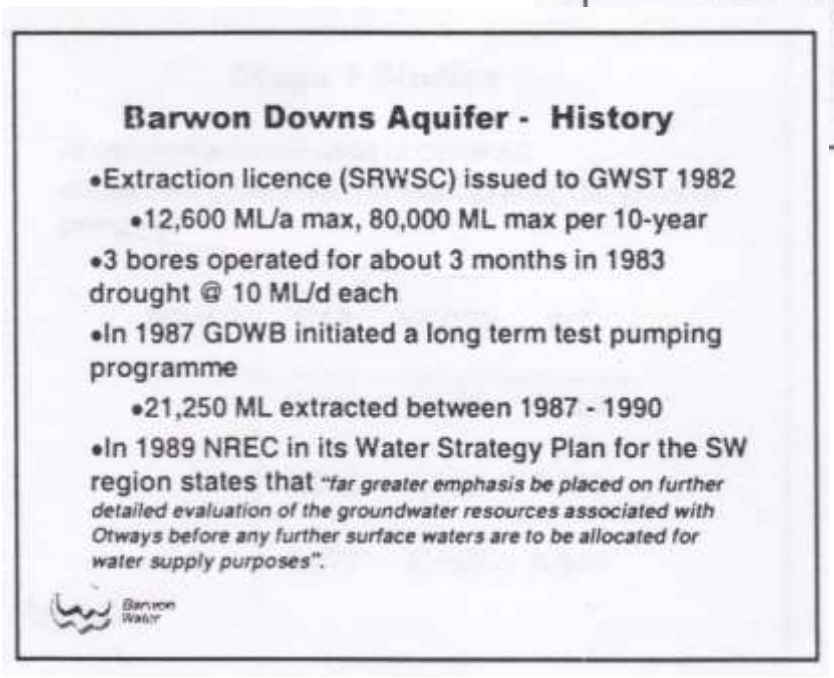
Surprisingly, Barwon Water replied in the FOI that there were no more Progress Report for the stress test pump past report Number 8. This added to the mystery why no records of extractions from the Barwon Downs Borefield could be found pre 1988.

Stress Test Pumping After August 1989.

After Report No. 8 another 17 months of pumping took place at the Barwon Downs Borefield with "… ***about15,480 ML*** …" extracted.[1, page 61]

But, Paul Northey of Barwon Water Could Find Figures Pre 1988.

In 2006-2007 during the process of researching and applying for a renewal of the 2004 extraction licence, the following two slides were presented as part of a presentation given to a community meeting in 2002.



This slide indicates that Barwon Water (then GDWST) extracted around 2,700 ML of water during the 1982-1983 drought.

Then Barwon Water initiated a test pump starting in 1987.

Barwon Water was not a passive bystander in the scenarios that were taking place at the Barwon Downs Borefield and should have kept comprehensive records of events that took place. Why then, couldn't these extraction figures pre 1988 be found and made available? Where did the final stress test pump reports disappear to?

In 2016 Where Did Jacobs Gain Its Figures?

To add insult to injury not being given access to early extraction figures, in 2016 Barwon Water's long term consultants on these matters, reported that there were 3,652 ML extracted during the 1982-1983 drought (see Appendix Three, page 23). Where did these figures "spring" from? Amazingly, the Northey and Jacobs figures differ by 952 million litres, and…

A Highway of Water.

952 ML of water is equivalent to a highway of water 3 metres wide and 1 metre deep between Canberra and Sydney. With a few kilometres of water left over.

Consumption Figures.

50% of Geelong's water consumption would equate to something like 14,190.5 ML (see Figure One) during the 1982-1983 period.

Financial Year	Geelong's Total Consumption In ML	50% of this total consumption		Groundwater Extracted during 82-83 Drought	Groundwater Extraction Data Source
1982-83	28,381 ML	14,190.5		2,700 3,652 8,100	Northey 17 June 2002 Jacobs 2016 Witebsky et al. 1995

Figure One.

More Confusion.

- **Significant contribution?** Witebsky et al. said the groundwater extraction was significant. Northey's calculation of 2,700 ML out of 28,381 ML does not appear to be a significant amount. This is around 9.5%. Even Jacobs figure of 3,652 ML (see Appendix Three, page 23) is around 13% but is still well short of being a "significant" amount when compared against 28,381 ML.
  Even Witebsky et al. figures of 8100 ML[1, page 33] still fall short of 50%.
- **50% State of the Environment Report?** As for a 50% amount of groundwater servicing Geelong's needs during the 1982-1983 drought, these "given" extraction amounts fall way short of 50%, or 14,190.5 ML.
- Looking at Figure Two below, the yearly consumptions either side of the 1982-1983 figures are interesting.

Geelong Region (Total Metered) Consumption - 1980/81 to 2015/16

Year	ML
1980-81	37,154
1981-82	40,262
1982-83	28,381
1983-84	33,627
1984-85	36,535
1985-86	34,521

See page 12 for the full set of data.

Figure Two: Data provided via FOI (see Appendix One, pages 17-21).

Movement of Water and Possible Losses.

Movement of water from the Borefield along a 46 km leaking and mostly open earthen channel during summer/drought would incur a considerable loss of water, not to mention the loss when being held in a very shallow lake at Wurdee Boluc (see Appendix Seven, page 28).

Fully Piped 8%-13% Losses.
The Otway to Warrnambool **fully piped** system in 1989 was reported as having water losses of between 8 and 13% (see Appendix Five, page 25).

A concreted Section of the Barwon Water Inlet Channel in Poor Order.

Appendix Seven, page 28 includes comment on irrigation channels during the Millennium Drought and the losses these open earthen channels have.

Even sections of the Wurdee Boluc Inlet Channel that were concreted were more often than not in very poor order.

Appendix Six, page 27, discusses the estimated loss during the 1982 drought at 1,860 ML. If Paul Northey's figure of 2,700 ML is accepted as the extraction amount, then losses of 1,860 ML or part thereof does not allow much water to reach the end user. Has this water loss been taken into consideration when calculation was made regarding the "significance" of the Barwon Downs Borefield?

Seepage looking down from the channel wall.

This open earthen Wurdee Boluc Inlet Channel was notoriously known as of very poor design in regard to the amount of water losses through evaporation and or seepage. There has been no public disclosure of the amount of groundwater extracted from the Barwon Downs Borefield that has been lost from the system.

PART B. Geelong's Water Consumption & Extractions from the Barwon Downs Borefield During the Millennium Drought.

A 2008 ABC Stateline television program is the first reference I can find that refers to the Barwon Downs Borefield providing 70% of Geelong's water supply during the Millennium Drought. Michael Malouf, Managing Director of Barwon Water at the time, stated that the Barwon Downs Borefield was "*...crucial to Geelong's water supply in a diversified sense. For example in the major drought period of 2006, the Barwon Downs aquifer provided over 70% of Geelong's water.*"
This statement prompted attempts to determine exactly what this meant.

On page 15 of the 2016 Jacobs Integration Report[5] this statement can be found "***At the height of the Millennium drought, Geelong's water storages dropped to 14 per cent when catchment inflows were severely reduced. To meet demand during this time 52,684 ML was extracted from the borefield providing up to 70 per cent of Geelong's drinking water.***" This is quite different to what Mr. Malouf was saying. There could be quite a difference between *"total water consumption" and "drinking water consumption."* Drinking water use would logically be much lower than total use as seen in this pie chart from a Barwon Water report.

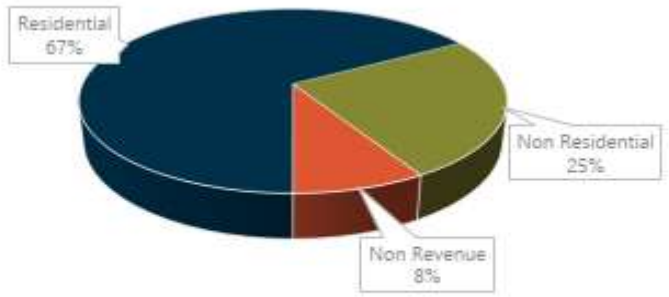


Figure 6 – Geelong Region water use in 2017/18

Every effort was made throughout an exchange of emails in an attempt to determine the various meaning to figures and any distinctions that could be made between the references to "***70% of Geelong' drinking water***," "***the 70% of the region's needs***," "***the 70% of Geelong's water needs***," "***the 70% of the Geelong water supply***," "***the city's drinking water***," "***the region's drinking water***," "***the city's daily use***," and "***Geelong's total water consumption***." (see Appendixes 4, page 24 & Appendix 8, pages 29-40)

The final words taken to be the interpretation of all these differing 70% references can be found in these two quotes made by email in 2017 (see page 22).

"***…the Borefield contributed up to 70% of bulk consumption on a daily basis***."

"***In any event, the 70% figure used to describe borefield's contribution is based on regional daily consumption and is inclusive of "city" use.***"

From this statement it would appear that the 70% is in fact referring to total consumption rather than just drinking water use, city's needs etc.

Figure One: Geelong Region Yearly Water Consumption Figures.

Geelong Region (Total Metered) Consumption - 1980/81 to 2015/16

Year	ML
1980-81	37,154
1981-82	40,262
1982-83	28,381
1983-84	33,627
1984-85	36,535
1985-86	34,521
1986-87	32,874
1987-88	35,702
1988-89	32,366
1989-90	35,607
1990-91	35,137
1991-92	32,403
1992-93	28,978
1993-94	29,476
1994-95	32,611
1995-96	29,770
1996-97	34,474
1997-98	32,722
1998-99	30,155
1999-00	28,240
2000-01	31,548
2001-02	31,137
2002-03	33,038
2003-04	32,443
2004-05	30,087.9
2005-06	33,669.922
2006-07	26,672.828
2007-08	24,933.182
2008-09	25,298.118
2009-10	23,907.412
2010-11	23,902.161
2011-12	25,522.763
2012-13	26,756.755
2013-14	25,709.2
2014-15	26,760.288
2015-16	29,600.296

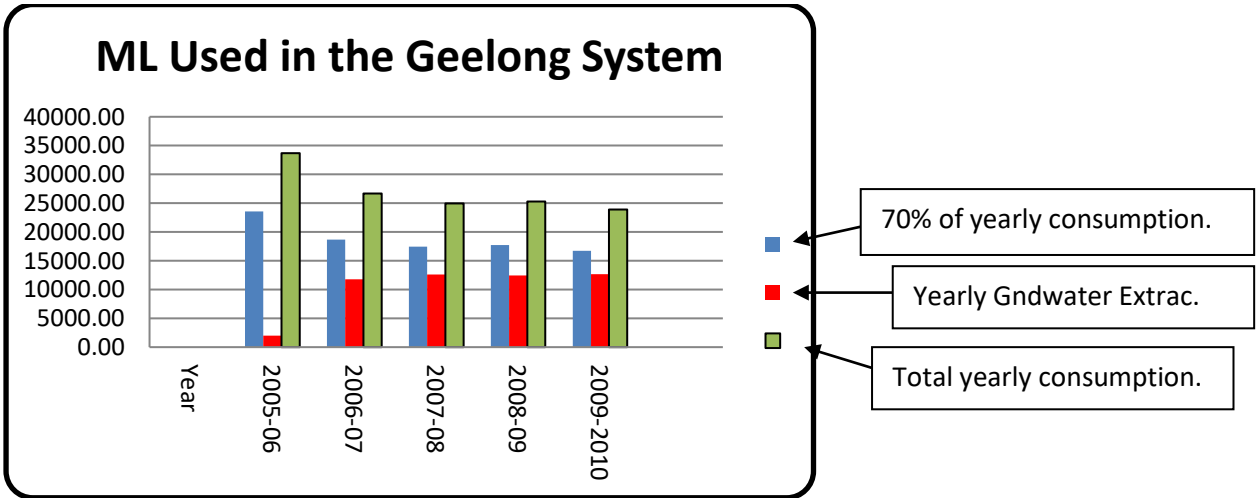
Year	Total Annual	Progressive Total
2001/02	229	228.50
2002/03	0	228.50
2003/04	271	499.30
2004/05	0	499.30
2005/06	1,998	2,497.03
2006/07	11,807	14,304.32
2007/08	12,604	26,908.77
2008/09	12,438	39,346.51
2009/10	12,692	52,038.98
2010/11	1,144	53,183.24
Ten Year Total		53,183
Licence cap total		80,000

Figure Two: Extractions figures Taken from Barwon Water's 2010-2011 Borefield Report.

Financial Year	Total Consumption In ML	70% of total consumption	Groundwater Extracted	Groundwater Extraction Data Source
2005-06	33,670	23569	1998	Barwon Downs 2005-06 Groundwater Report
2006-07	26,672.828	18,670.9	11,807	Barwon Downs 2006-07 Groundwater Report
2007-08	24,933.182	17,453.2274	12,604	Barwon Downs 2007-08 Groundwater Report
2008-09	25,298.118	17,708.6826	12,438	Barwon Downs 2008-09 Groundwater Report
2009-10	23,907.412	16,735.1884	12,692	Barwon Downs 2009-10 Groundwater Report
	134,481.154	**94,136.998**	**51,539**	Millennium drought

Figure Three.

Using data from Figures One to Three the following graph was drawn up. This graph shows that the yearly extractions have never come close to 70% of the yearly consumption.



Graph One.

How Rubbery Are the Figures & Statements that have been made?

Whichever way one considers it, the figures and conclusions drawn from these figures have to be regarded as "rubbery."

If the following figures taken from page 18 of the 2006-07 Barwon Water Annual Report are used as a data source then the following calculations show just how "rubbery" and manipulative the data is.

P18 BW Annual Report 2006-07

Residential and non-residential metered consumption

Area	Residential customers		Non-residential customers	
	Numbers (1)	Metered consumption (5) megalitres	Numbers (1)	Metered consumption (5) megalitres
Geelong (2)	66,564	10,954	6,610	8,162
Townships				
Leopold/Drysdale/Clifton Springs	7,913	1,406	329	135
Portarlington/ Indented Head/St Leonards	5,426	528	187	101
Queenscliff/Pt Lonsdale	3,295	348	210	110
Ocean Grove/Barwon Heads	7,947	1,123	420	200
Torquay/Jan Juc	6,136	906	319	267
Anglesea	2,848	245	123	74
Winchelsea	738	157	97	87
Birregurra	271	50	38	13
Otway region (3)	11,437	2,468	1,331	1,798
Other areas (4)	4,457	1,601	472	520
TOTAL	**117,032**	**19,787**	**10,136**	**11,466**

(1) Excludes holiday residents and visitors.
(2) Includes Geelong urban area, Lara, Batesford, Waurn Ponds, Fyansford and adjoining semi-rural development.
(3) Otway region includes Colac, Lorne, Aireys Inlet, Apollo Bay, and surrounding regions.
(4) Includes all other townships and rural areas within Barwon Water's district.
(5) Metered consumption excludes non-revenue water.

Figure Four.

Regarding the figures Presented for the year 2006-2007 (Figure Four)**.**

1. The Geelong regional total consumption for the 2006-07 year was given as 26,672.828 ML. Page 18 above taken from the 2006-07 Barwon Water Annual Report gives the yearly consumption, above the blue line for residential and non-residential, as 24,559 ML. Rubbery?
2. Residential consumption (red box above) works out to be 15,510 ML for the year. 70% of this is 10,857 ML – close to the 11,807 ML of groundwater extracted that year. In this case it could be argued that 100% of drinking water came from groundwater extraction. Rubbery?
3. Birregurra and Winchelsea consumption of 207 ML cannot be regarded as Geelong drinking or consumption water. But, perhaps it has.
4. 70% of 10,954 M (blue box above) for Geelong residential consumption, would work out to be 7,599.9 ML. Don't think this was how the 70% was

calculated especially considering this 10,954 ML consumption not only includes the Geelong City but also Lara, Batesford, Waurn Ponds, Fyansford and adjoining semi-rural development. Far too rubbery.

5. If the figure in the blue box was regarded as Geelong City's drinking water consumption then the groundwater extracted from the borefield would account for 100% of Geelong City's drinking water, with some left over. Perhaps, but why wasn't this stated?
6. Combine Geelong residential and non-residential with "Other areas" and the total is 26,680 ML. This is close to the Figure One total of 26,672.828 ML. 70% of this total is 18,670.9936 ML. Way above groundwater extraction rates for the year. This does not match with the statements.

Similar results are gained if the data from other years of the Millennium drought are analysed in a similar way.

2018 Licence Renewal Application.

As part of its licence renewal process Barwon Water included this quote in documentation supporting its licence renewal application in 2018.[8]

"***2006-2010 – Millennium Drought.***

During this period, the Barwon Downs Borefield was the only standby source available to supplement the Geelong region water supply and with no other alternatives sources to bring online the borefield was heavily relied upon to maintain supply of water and at times it supplied above 70% of Geelong's daily water requirements. Without the use of the borefield Geelong would have almost certainly run out of drinking water."

70% Reliance on Groundwater for Geelong's Needs, Sends a Strong Message.

Being able to state that Geelong relies on groundwater for 70% of its water "needs" in the past, painted a very convincing case supporting the continuation of groundwater extraction into the future. The inference presented being without this water back up source, Geelong and the neighbouring region would suffer dire consequences in times of severe drought.

An Urban Myth.

Given that Barwon Water cannot "define" and provide data supporting statements, then the notion of a 70% contribution of groundwater to Geelong's water requirements is nothing more than an urban myth.

Floods.

Thankfully the drought broke with the floods of August 2010 (see Appendix Nine, pages 41-43).

Groundwater Extraction from the Barwon Downs Borefield Ceased.
In April 2019 Barwon Water withdraw its renewal application. Geelong will not be extracting groundwater from the Barwon Downs Borefield in the foreseeable future.

The Minister for Water Makes a Dramatic Call.
Minister for Water, Lisa Neville, under advisement reduced the yearly Permissible Consumptive Volume (PCV) from 20,000 ML/year by 99%, down to 239 ML/year allowing three farmers to exercise their extraction licences.[7]

CONCLUSION.

What appeared to be the driving force behind the urban myth that Geelong relied on the Barwon Downs Borefield for 50% of its water supply during the 1982-1983 drought, and, 70% during the Millennium Drought, was to justify and preserve the right to utilise this cheap source of water.
"***The Barwon Downs borefield provides a crucial and cost effective water source when surface water storages run low.***"
(Source: Barwon Water website, 10/9/2016, "Q&A Barwon Downs Borefield.")

Not only do the facts and figures show the 50% and 70% announcements to be an urban myth, the reliance on groundwater extraction at Barwon Downs for Geelong is not as crucial as reported, as Barwon Water withdrew its groundwater extraction licence renewal application in 2019.

APPENDIX ONE.

It took over 50 days to obtain the yearly consumption of Geelong's drinking water between 1981 & 2015. This Freedom Of Information was sent 13 December 2016.

from date sent 49 days
gives us 31/01/2017

Barwon Water

Freedom of Information

BARWON REGION WATER CORPORATION
61-67 Ryrie Street
PO Box 659
GEELONG VIC 3220
www.barwonwater.vic.gov.au
ABN 86 348 316 514

Telephone Local (03)5226 2543
Telephone Overseas +61 3 5226-2543
Fax No. Local (03) 5222 6983

Freedom of Information Act 1982

Access request form

NAME: MALCOLM GARDINER

POSTAL ADDRESS: 1805 Colac Lavers Hill Road
KAWARREN VIC 3249

TELEPHONE CONTACT: BH 03 52 358 325 AH

DETAILS OF DOCUMENTS REQUESTED:

(1) The daily water volumes released from the West Barwon Reservoir between 01/01/2016 to 01/10/2016
(2) The number, location & depth of the Clifton Formation observation bores that Barwon Water monitors.
(3) The yearly consumption of Geelong City's drinking water between 1981 and 2015.

FORM OF ACCESS REQUIRED: (Tick one)

(i) A copy of the document(s) ☑

(ii) Inspection of the document(s) ☐

(iii) Access in another form (specify) ☐

I understand that an application fee of $27.70 must accompany this request and that further reasonable charges for photocopying and other processing costs may be applicable. FOI fees and charges are not subject to GST.

Signature [signature] Date 13/12/2016

Send request and cheque/money order (payable to Barwon Water) for $22.70 to:
FREEDOM OF INFORMATION MANAGER
BARWON WATER
PO BOX 659
GEELONG VIC 3220

Barwon Water

Our Ref: F087261
Enquiries To: **Paul Rawson**

19/12/2016 + 45 days
days
12 left in Dec 2016
31 January 2017
43
2 in Feb. 2017

3 January 2017

Reply due 2/2/2017.
Reply arrived 9/2/2017

Mr Malcolm Gardiner
1805 Colac Lavers Hill Road
KAWARREN VIC 3249

Dear Mr Gardiner

Re: Freedom of Information request

I refer to your request dated 13 December 2016 received by Barwon Region Water Corporation on 19 December 2016 in which you sought access to various documents under the *Freedom of Information Act 1982* ("**Act**").

Barwon Water will respond to your Freedom of Information request as soon as practicable and in any event within 45 days of the date your request was received.

If you have any queries, please contact me on 1300 656 007.

Yours sincerely

Paul Rawson
FOI Officer
Manager Corporate Support Services

As per the practice of the period, every 45 days allowed before the FOI had to be replied, was taken.

Barwon Region Water Corporation
ABN 86 348 316 514

P.O. Box 659, Geelong, Victoria, 3220 TEL: 1300 656 007 FAX: +61 3 5221 8236

www.barwonwater.vic.gov.au

Our Ref: F087261 - A11473210
Your Ref:
Enquiries To: Paul Rawson

6th February 2017

Mr Malcolm Gardiner
1805 Colac Lavers Hill Road
KAWARREN VIC 3249

Rang Paul re: this omission. He thought it was included. Sendg it via email. 9/2/17 (11:40 a.m) phone.

2016?

Dear Malcolm

Freedom of information request

I refer to your letter dated 13/12/2106 received by Barwon Region Water Corporation on 19/12/2016 in which you sought access to various documents under the *Freedom of Information Act 1982* ("**Act**").

In your request you asked for:

Recieved ✓ • *The daily water volumes released from the West Barwon Reservoir between 01/01/2016 to 01/10/2016*

" ✓ • *The number, location & depth of the Clifton Formation observation bores that Barwon Water monitors.*

Not included → • *The Yearly consumption of Geelong City's drinking water between 1981 and 2015*

No explanation given

One document has been produced in accordance with section 19 of the FOI Act. I have determined to grant full access to the document.

Barwon Water may seek charges prior to providing access to documents under FOI in certain circumstances. On this particular occasion, Barwon Water has decided to waive all access charges otherwise payable by you in relation to this request. Please note that future FOI requests to Barwon Water may attract access charges payable under the Act and the *Freedom of Information (Access Charges) Regulations 2014*.

If you are not satisfied with my decision, you may complain to the FOI Commissioner by writing to PO Box 24274, Melbourne, Victoria, 3001. Telephone: 1300 842 364. Email: enquiries@foicommissioner.vic.gov.au, Web: www.foicommissioner.vic.gov.au

You have 60 days from the date you receive this letter to submit your complaint.

If you have any further queries, please contact me at Barwon Region Water Corporation on Ph: 1300 656 007 or email info@barwonwater.vic.gov.au

Yours faithfully

Paul Rawson
FOI Officer
Manager Corporate Support Services
Barwon Region Water Corporation
ABN 86 348 316 514

61 – 67 Ryrie Street, Geelong, Victoria, 3220
P.O. Box 659, Geelong, Victoria, 3220 TEL: 1300 656 007 FAX: +61 3 5221 8236
DX22061

www.barwonwater.vic.gov.au

Unfortunately, the data asked for under point 3 of the FOI was not included.

Hi Malcolm,

Please find attached the Geelong Water Consumption data as requested.

Many thanks for your understanding in this matter.

Kind Regards

Paul Rawson
Manager Corporate Support Services | Barwon Water
61-67 Ryrie Street (P.O. Box 659) Geelong Victoria 3220
T (03) 5226 2547 | M 0414 461 112 | F (03) 5221 8326

Geelong Water Consumption

Email received 9/2/2017 as follow up to the missing section of FOI answers.
(Barwon Water Ref: F087261 – A11473210)
Phoned Paul today & he sent this email through to complete the 3RD request of the FOI sent 13/12/2016.

After a quick phone call the data asked for was emailed through.

Geelong Region (Total Metered) Consumption - 1980/81 to 2015/16

Year	ML
1980-81	37,154
1981-82	40,262
1982-83	28,381
1983-84	33,627
1984-85	36,535
1985-86	34,521
1986-87	32,874
1987-88	35,702
1988-89	32,366
1989-90	35,607
1990-91	35,137
1991-92	32,403
1992-93	28,978
1993-94	29,476
1994-95	32,611
1995-96	29,770
1996-97	34,474
1997-98	32,722
1998-99	30,155
1999-00	28,240
2000-01	31,548
2001-02	31,137
2002-03	33,038
2003-04	32,443
2004-05	30,087.9
2005-06	33,669.922
2006-07	26,672.828
2007-08	24,933.182
2008-09	25,298.118
2009-10	23,907.412
2010-11	23,902.161
2011-12	25,522.763
2012-13	26,756.755
2013-14	25,709.2
2014-15	26,760.288
2015-16	29,600.296

On Thursday, March 2, 2017, 13:40, [redacted]@barwonwater.vic.gov.au> wrote:

Hi Malcolm,

Thanks for your patience and understanding in waiting for us to clarify your FOI request.

In response to your request (Barwon Water Ref: FO87261-A11473210) which asked for the yearly consumption of Geelong's drinking water between 1981 and 2015, please refer to the attached spreadsheet, under the tab Geelong Water Consumption (it's the same spreadsheet that was sent through Paul Rawson). Bulk consumption is calculated by summing together water leaving the Wurdee Boluc and Moorabool water treatment plants. This water is provided to customers in Geelong and surrounds (i.e. not just Geelong city).

Barwon Water and Jacobs documents have, at times, referred to the use of the Barwon Downs borefield as "contributing up to 70% of Geelong's drinking water during the Millennium drought". This is based on the above mentioned data for the whole Geelong region, not just 'Geelong city'. This statistic is based on periods during the Millennium drought in the years 2006-07 and 2007-08, where the borefield contributed up to 70% of bulk consumption on a daily basis. For example, this occurred between July 13-31 in 2007 and again throughout the month of September 2007. The percentage the borefield contributed fluctuated on a daily basis depending on the time of year, weather and subsequently customer demand.

Whilst the attached metered data measures the region's overall water use, Barwon Water does meter assets more locally, which could be aggregated to more closely resemble 'Geelong city'. You have mentioned 'Geelong City' in your emails as being separate to the Geelong region. It would be really helpful for me to understand what you define as city. Does this include towns such as Lara, Leopold, Clifton Springs and Portarlington? These are within Barwon Water's service region, and are therefore, currently included in the bulk water consumption data provided. If you are happy to provide more clarity on this definition, that will assist us in providing more detailed data back to you.

In any event, the 70% figure used to describe borefield's contribution is based on regional daily consumption and is inclusive of 'city' use.

APPENDIX TWO.

This pie chart is for the total consumption period for the 2017-2018 year.

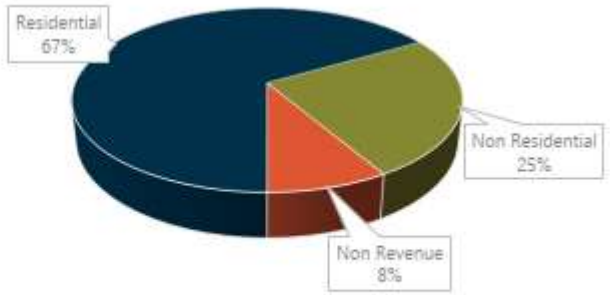


Figure 6 – Geelong Region water use in 2017/18

APPENDIX THREE.

"Barwon Downs Technical Works Program – Barwon Water – Integration Report." FINAL DRAFT 1 Dec 2016

1.2.2 Groundwater extraction

Barwon Water operates the borefield in times of extended dry periods. This has occurred only five times in the last 30 years. The borefield is a critical back up source for Barwon Water because it is buffered from climate variability due to the depth and large storage capacity of the aquifer, whereas surface water catchments are susceptible to seasonal fill patterns mostly driven by rainfall.

Although extraction occurs infrequently, large amounts of groundwater are drawn when needed to supplement surface water storages during drought. This is completed in compliance with the groundwater licence (refer to Section 1.3). This operational philosophy of intermittent pumping has been an effective way to provide customers with security of supply, especially in times of prolonged dry conditions.

To date, Barwon Water has extracted the following volumes from the aquifer:

- 3,652 ML from February to April in 1983 due to drought,
- 19,074 ML during a long term pump test in the late 1980s,
- 36,817 ML during the 1997 - 2001 drought,
- 52,684 ML during the 2006 – 2010 millennium drought, and
- 2,383 ML in 2016 to boost storages after a very dry summer.

Groundwater extraction has supplemented surface water supply by a total of 114,610 ML, equating to approximately 10 per cent of total water consumed over a 30 year period.

1.2.3 Licence history

The first licence was issued in 1975 but did not come into effect until 1982, as the bores were not brought into operation until the 1982-83 drought. This was the first time the borefield was used to supply water to Geelong. The licence issued by the State Rivers and Water Supply Commission (now Southern Rural Water) was to allow Barwon Water to operate four production bores based on the following conditions:

- Extraction for the purpose of urban water supply;
- Maximum daily extraction rate of 42.5 ML;
- Maximum annual extraction rate of 12,600 ML;
- Maximum ten-year extraction rate of 80,000 ML; and
- Periods of licence renewal of 15 years (1975 – 1990).

The licence was subsequently renewed for two periods of five years up to 2000. From 2000, the licence was temporarily extended three times for a total of four years to allow the licence renewal to take place through to 31 August 2004.

APPENDIX FOUR.

"Barwon Downs Technical Works Program - Barwon Water - Integration Report." FINAL DRAFT 1 Dec 2016.

JACOBS

1.3 Current groundwater licence

The Barwon Downs borefield is operated under licence from Southern Rural Water. This licence was granted in 2004 and is due for renewal by June, 2019.

This licence makes provision for extraction limits on a volumetric basis over a range of time scales. As part of the licence conditions, Barwon Water monitor groundwater levels and quality, subsidence, flow in Boundary Creek and Barwon River, as well as the protection of riparian vegetation, protection of stock and domestic use and the protection of flows in the Barwon River tributaries.

Reporting against these licence conditions is provided in an annual report to Southern Rural Water who administers and regulates groundwater licences on behalf of the Water Minister.

1.4 Strategic drivers for the Barwon Downs technical works monitoring program

Ahead of the upcoming 2019 licence renewal process, Barwon Water instigated a technical works monitoring program to improve the comprehensiveness of the current monitoring program to ensure the submission of a technically sound licence application.

Driving the need for this monitoring program is the reliance on the borefield to provide water security for Barwon Water customers, to address outstanding community issues particularly where the relationship between cause and effect is not yet fully understood, and to close out any known technical knowledge gaps.

1.4.1 Water security

The Barwon Downs borefield provides water for the regional communities of Geelong, the Surf Coast, the Bellarine Peninsula and part of the Golden Plains Shire.

A prolonged period of unprecedented drought (known as the Millennium drought) saw a sustained dry climate average from 1997 to 2011. In 1997, many of the region's water storages were close to capacity, however by January 1998, after high consumption and low catchment inflows, water restrictions were necessary to balance supply and demand in the Geelong area. This clearly highlighted that even by having large storages the region was susceptible to rapid changes.

In 2001, strong catchment inflows from healthy rainfall refilled storages, ending water restrictions in Geelong. Five years later, after a very dry year, strict water restrictions were again required with climate extremes exceeding the historical record. At the height of the Millennium drought, Geelong's water storages dropped to 14 per cent when catchment inflows were severely reduced. To meet demand during this time 52,684 ML was extracted from the borefield providing up to 70 per cent of Geelong's drinking water.

In 2010, improved rainfall restored storages and restrictions were again slowly lifted in the Geelong area. This allowed the Barwon Downs borefield to be switched off and to begin recharging. Without the use of the borefield during this time, residents and industry in Geelong, Bellarine Peninsula, Surf Coast and southern parts of the Golden Plains Shire would have run out of water.

The township of Colac will soon be connected to the Geelong system through construction of a pipeline between Colac and Geelong. This interconnection will also allow the borefield to supply Colac residents and will provide additional water security for the water supply system which is currently susceptible to seasonal fill patterns.

1.4.2 Community issues

Although Barwon Water is compliant with the monitoring program associated with the 2004 licence, it is accepted that this program is not comprehensive enough to address community interest about specific issues centered on potential environmental impacts in the local catchment.

APPENDIX FIVE.

90

Rural Water Commission of Victoria

District Office: P.O. BOX 63, CAMPERDOWN 3250
Telephone: 931577

16TH MAY, 1989.

Malcolm Gardner
R.M.B. 5180
KAWARREN
Vic. 3249

Dear Mr. Gardner

RE: SYSTEM LOSS IN THE OTWAY WATER SUPPLY DISTRICT

In replying to your request for information on system loss in the Otway District, I would first like to make some important points.

Our loss rates are based on bulk meter readings of all water in to the system compared with meter readings at the point of end use - e.g. consumers individual meters and bulk meters where water is sold in bulk to another authority.

The difference includes all water used in flushing at Allansford, Terang and Cobden and other small retics such as Carlisle River, Carpendeit, Cudgee, Garvoc etc. It also includes all water discharged to waste during main pipeline swabbing operations, and evaporation in storages. As well, it includes bulk meter discrepancy. In discussing meter discrepancy, it should be noted that bulk meter technology has made enormous progress during the last 10 years or so. Some of our bulk meter technology is as old as 1975, some as new as 1988, therefore discrepancies are to be expected between say, a 1975 propellor meter driving a four pole magneto type totalisator, and a 1988 "State of the Art" ultrasonic type bulk meter.

It should also be noted that as a main pipeline/urban supply district our water is almost totally confined inside pipes from headworks to end user, it only "sees the light of day" during the time it spends in our major storage basins along the pipeline. These basins are designed to hold a maximum amount of water for minimum loss by evaporation.

Any losses to ground are mainly caused by pipeline bursts in the reticulation areas. Other losses could be attributed to small leaks which do not become evident at the surface. Therefore our percentage losses would obviously be much less than an authority who supply by open channel, flume or aqueduct.

Having said all this, our water loss calculations are based on a running yearly average of the following formula:

$$A - B = \frac{C}{A} \times \frac{100}{1} = D\ \%\ \text{LOSS}$$

Where :
- A = water metered in to the scheme
- B = water metered out of the scheme
- C = difference between A & B
- D = loss as a % of A

This average consistantly lands between 8 & 13 %.

Yours faithfully,

KEITH MAXWELL
District Manager

APPENDIX SIX.

Department of Water
Resources Victoria

2nd Floor
35 Spring Street
Melbourne, 3000
Telephone: (03) 651 3977
Facsimile: (03) 651 3989

Your ref:
Our ref: RMB898297.ltr 004417
Ext. no:
Contact:

19 OCT 1989

Mr G Bellamy
Director of Research
Natural Resources and Environment Committee
19th Level, Nauru House
80 Collins Street
MELBOURNE 3000

Water Victoria

Dear Mr Bellamy

SOUTH-WESTERN REGION WATER MANAGEMENT STRATEGY

In your letter of 29 August 1989, you asked for an objective opinion on two matters of concern to members of the Natural Resources and Environment Committee in relation to this Inquiry. The matters of concern are:

1. Water losses from the Geelong and District Water Board's Wurdee Boluc channel and possible means of reducing those losses.

2. Doubts cast by the Gellibrand River System Committee (GRSC) in relation to Geelong's forecast water demands, and the effects on the possible use of Gellibrand River water.

1. Water losses - Wurdee Boluc Channel

To answer your questions about losses from the Geelong and District Water Board's Wurdee Boluc Inlet Channel, it is necessary to examine whether estimates of the losses are reasonable and whether the losses themselves are reasonable. It is also necessary to examine the economics of reducing those losses as part of the strategy for water resource management.

This Department recently asked the Rural Water Commission's Senior Works Inspector from its Werribee District to help in providing an objective opinion on the losses from the Channel. I have enclosed his brief written comments on the Channel which indicated that the Channel is remarkably well maintained, shows no obvious signs of leakage and for a channel system of its size and complexity, has an appropriate standard of flow measurement and recording. He also observes that the often quoted figure of a 10% loss of total flow from the channel could well be higher than actual losses.

The observation is confirmed by a summary of inflows and outflows prepared by the Geelong and District Water Board which shows losses over the 1980 to 1987 period averaging 2.8% of inflows or an average annual loss of 780 ML. The loss in 1982 under drought conditions was estimated by the Board to be 9.7% of inflow which represents an actual loss of 1860 ML.

APPENDIX SEVEN.

The Warrnambool Standard 25-04-2008

V/Line Passenger Pty Ltd (Subject to Deed of Company Arrangement) ABN 29 087 425 269 Ref: 22382VLN

Water Myth #2

Myth: "Irrigators are the ones wasting our water."

Fact: Victoria's farmers are among the most water-efficient irrigators in the world. Though they use 76% of our water, the real problem lies with our leaky old irrigation system – it loses hundreds of billions of litres of water every year through things like seepage and evaporation. Modernising the system will save as much water every year as all Victorian households use.

For your free Water Saving Kit, SMS '**save**' to 13 21 20, call 13 61 86 or visit **www.ourwater.vic.gov.au**

Our Water Our Future

A Victorian Government initiative

Victoria The Place To Be

WS567431-MV-16/4

FNS 010

APPENDIX EIGHT.

The following 12 pages include documents referring to the 70% reliance on the groundwater extractions from the Barwon Downs Borefield during the Millennium Drought.

2008

Media release

100 YEARS SERVING OUR COMMUNITY

Barwo Water

1908 - 2008

December 05, 2008
REF: 226/08

Soil claims 'premature'

Barwon Water today described as "premature and speculative" claims that groundwater pumping at Barwon Downs is responsible for acid sulphate soil in the area.

Acting Managing Director Joe Adamski said a flora investigation currently underway would determine if there was any relationship between the two.

"The study is being undertaken as part of ongoing environmental modelling and a sustainable management program. It will look at the impact or otherwise of groundwater operations on the local flora.

"It would be injudicious to comment until that information is available," Mr Adamski said.

Mr Adamski was referring to a newspaper report in which Barwon Water was accused of creating conditions for the formation of acid sulphate near a local waterway, Boundary Creek.

He said a robust monitoring program had been in place since the borefield began operating in the 1980s. "We currently have more than 60 observation bores monitoring water levels and salinity and there have been a number of significant related investigations. The flora study is another element on that continuous process," Mr Adamski said.

The Barwon Downs borefield is a crucial supply source for Geelong during dry conditions.

Located south of Colac, it has met up to 70 per cent of the region's needs since being brought on line in 2006 when the full impact of the drought hit regional reservoirs.

It is currently meeting around 30 per cent of demand.

The groundwater reserve holds more than more than 500,000 megalitres (million litres). By comparison, Geelong's largest storage at Wurdee Boluc has a capacity of 40,000 megalitres while West Barwon Reservoir can hold 20,000 megalitres.

Mr Adamski said Geelong was in the enviable position of having a major groundwater resource at Barwon Downs. "Indeed, we are one of the few urban areas in Victoria with significant groundwater supplies.

"Barwon Downs has thrown Geelong a lifeline several times over the past 30 years; without it, we would have been in dire straits.

"Because of its importance to our diversified supply network, we are ensuring the resource is respected, protected and sustainable. To do otherwise would be irresponsible."

Mr Adamski said data gathered over three decades dictated the parameters for operating the borefield. These parameters were included in strict licensing conditions set down by Southern Rural Water.

He said Barwon Water had readily acknowledged Boundary Creek was affected by operations at Barwon Downs. But monitoring also indicated Boundary Creek had run dry when the borefield had not been operating.

"We should be mindful of the fact the region is still gripped by drought - and, based on Bureau of Meteorology forecasts, there appears little likelihood of any relief over summer," he said.

Further information: Cassie Miner, Media Liaison Officer,
Telephone: Work (03) 5226 2352 Mobile 0401 857 580

TONY PRYTZ

BARWON Water was monitoring the potential impact of its Barwon Downs groundwater operation on local vegetation, a senior manager said yesterday.

General manager of strategy and technology Joe Adamski said flora specialists were looking at the condition of native vegetation at a number of sites in the aquifer recharge area.

Mr Adamski was responding to claims made last week by activist Malcolm Gardiner that groundwater pumping was creating acid sulphate soils in the Otways.

Mr Gardiner released pictures showing degraded soil and dead trees and plants in Big Swamp, at Yeodene, and claimed the devastation was due to Barwon Water's pumping at Barwon Downs.

Mr Gardiner yesterday was critical of the authority's response.

"Acid levels in Boundary Creek have been increasing progressively and have been at toxic levels since the early 1990s," he said.

The Big Swamp area, along Boundary Creek at Yeodene, was dying and the influence of the acid and heavy metals had been spreading for more than a decade.

"I am astounded that Barwon Water is not concerned about this toxic mix leaching into

Joe Adamski

their groundwater reserves," Mr Gardiner said.

"Barwon Water's flora and fauna investigations in the early 2000s were a farce and there is no confidence that the proposed 2009 flora ones will be any better."

Mr Adamski said the study would also examine a range of other impact factors, such as drought, weed infestation, fire and other causes of disturbance.

"If soil health is found to be an issue, we will investigate further," he said.

The borefield had "thrown Geelong a lifeline several times".

"Without it we would have been in dire straits."

On some occasions the bore met as much as 70 per cent of Geelong's water needs; it is currently meeting about 30 per cent of demand.

Barwon Downs borefield is estimated to hold 500,000 megalitres (million litres). Wurdee Boluc storage basin holds 40,000 megalitres and West Barwon Reservoir just 20,000.

11 December 2008. A Geelong Advertiser article by Tony Pryzt,

2008.

Media release

100 YEARS SERVING OUR COMMUNITY

Barwon Water

1908 - 2008

December 16, 2008
REF: 233/08

Groundwater use

Barwon Water Managing Director Michael Malouf said while he respected Malcolm Gardiner's right to raise concerns about the possible effects of groundwater use, Barwon Water had no evidence that its borefield at Barwon Downs was responsible for the reported appearance of acid sulphate soils.

"Throughout his campaign against Barwon Water's use of groundwater Mr Gardiner has failed to acknowledge and address one very important aspect; without Barwon Downs borefield, 250,000 Geelong residents would be running very short of water due to the drought," Mr Malouf said.

"Barwon Downs has thrown Geelong a lifeline several times over the past 30 years; without it, we would have been in dire straits."

The borefield is currently meeting around 30 per cent of demand.

"Because of its importance to our supply network, we are ensuring the resource is respected, protected and sustainable. To do otherwise would be irresponsible," Mr Malouf added.

"Barwon Water is developing a diversified supply system that will allow us to scale back our use of Barwon Downs borefield in the coming years. We have the Anglesea borefield coming online next year, followed by the Melbourne-Geelong interconnection, Northern Water Plant and Black Rock recycled water plant over the next five years.

"At the moment the borefield remains a crucial supply source and has, at times, met up to 70 per cent of the region's needs since being brought on line in 2006 when the full impact of the drought hit regional reservoirs."

Mr Malouf said the latest vegetation studies were part of a robust long-term monitoring program.

The program has been in place since the borefield began operating in the 1980s. Currently there are more than 60 observation bores monitoring water levels and salinity and there had been a significant number of related investigations.

"The vegetation monitoring component is an element of that continuous process. It was established in 1994 to improve our understanding of the interaction between groundwater, surface water and the health of native vegetation in recharge areas," Mr Malouf said.

"If soil health is found to be an issue, Barwon Water will investigate. Such an investigation would cover other potential impacts, including drought, weed infestation, fire and other causes of disturbance."

Ends

Plan to study water

A water authority will initiate new studies into the environment impact of groundwater pumping in the Colac district after a previous study had inconclusive results.

Barwon Water is investigating the effects of pumping at Barwon Downs, south-east of Colac.

The volume of water the authority extracts from the borefield varies but it is currently pumping 40 million litres from it a day to provide about 50 per cent of Geelong's water supply.

Barwon Water says independent experts had a two-month research project at eight separate sites to determine if the borefield pumping was affecting vegetation in the area.

But the study's results were inconclusive.

The research team identified changes to the landscape but reported there was not a single contributing factor.

Barwon Water says potential causes for the changes include prolonged drought, increased temperatures, agricultural activity, stock grazing and groundwater extraction.

Barwon Water capital projects and greenhouse general manager Paul Northey said the study included field surveys, groundwater levels and an assessment of new and previous data by ecological and hydrogeological specialists.

"They reported that given the complex interaction of many factors with vegetation, it was extremely difficult to pinpoint a single cause or activity," Mr Northey said.

Paul Northey

"Considered in its entirety, the study was inconclusive," he said.

"Accordingly, Barwon Water will initiate further investigations to see if a clearer picture can be drawn on the relative impact of the various factors."

Flora studies are an operating licence requirement for groundwater extraction and Barwon Water has supplied a report of the latest study's findings to Southern Rural Water.

Mr Northey said vegetation monitoring was an important part of Barwon Water's work at Barwon Downs.

"Such studies were introduced to improve our understanding of the interaction between groundwater, surface water and the health of native vegetation in recharge areas," he said.

"Further investigations will help determine the full extent of the drought on local flora in comparison to other possible causes."

Colac Herald 27 April 2009

2009

Media release

Barwon Water

April 23, 2009
REF: 063/09

Flora study inconclusive

Barwon Water will undertake further investigations after an inconclusive study into the effects of groundwater pumping at the Barwon Downs borefield.

Independent experts conducted a two-month research project at eight separate sites to determine if the borefield operation was impacting on local vegetation.

The research team identified changes to the landscape, but reported there was no single contributing factor. Rather, there were a number of potential causes, including the prolonged drought, increased temperatures, agricultural activity, stock grazing and groundwater extraction.

Barwon Water's General Manager Capital Projects and Greenhouse Paul Northey said the study was undertaken by ecological and hydrogeological specialists, who conducted field surveys, reviewed groundwater levels and assessed new and previous data.

"They reported that given the complex interaction of many factors on vegetation, it was extremely difficult to pinpoint a single cause or activity.

"Considered in its entirety, the study was inconclusive. Accordingly, Barwon Water will initiate further investigations to see if a clearer picture can be drawn on the relative impact of the various factors," Mr Northey said.

Barwon Downs is a critical water source for greater Geelong during drought. It is currently meeting about 50 per cent of demand.

Flora studies are a requirement under the operating licence issued by Southern Rural Water. The first was conducted in 1994, with the second in 2001.

In addition, there are more than 60 observation bores monitoring water levels and salinity and there have been a significant number of related investigations.

Mr Northey said vegetation monitoring was an important element in operating Barwon Downs.

"Such studies were introduced to improve our understanding of the interaction between groundwater, surface water and the health of native vegetation in recharge areas," Mr Northey said.

"There is no question that in more recent years drought has had a significant impact, not only on vegetation but on stream flows, habitat, agriculture and so on right across the region.

"Further investigations will help determine the full extent of the drought on local flora in comparison to other possible causes," he said.

A report on the findings has been provided to Southern Rural Water.

Ends

Further information: Cassie Milner, Media Liaison Officer
Telephone: Work (03) 5226 2352, Mobile 0401 857 580

2010

Barwon Water

About us » Corporate information » Media releases » Media releases 2010 » Barwon Downs rested

Barwon Downs rested

Media release issued Tuesday 7 December 2010

Above average rain and healthy storages have allowed the crucial Barwon Downs borefield, south of Colac, to be rested.

The borefield was brought back into operation in 2006 when Geelong was in the midst of one of the worst droughts on record.

At peak production, it provided up to 70 per cent of the city's drinking water as supplies dwindled and Barwon Water was forced to introduce harsh restrictions.

But consistent rain during winter and spring has boosted storages from 32 per cent at the start of 2010 to today's 73.7 per cent, the highest since 2002.

Barwon Water's General Manager Water Systems Carl Bicknell said the soaking rain, combined with new water projects, had enabled the borefield to be taken off line.

"The borefield was Geelong's savior during the drought. In fact, it has come to the city's rescue several times since it was established more than 30 years ago.

"It is — and will remain — a back-up supply in extremely dry conditions. But the recent rain across our catchments has meant we can now rest the resource, particularly with projects such as the new Anglesea borefield and the Melbourne to Geelong pipeline extending our diverse supply network," Mr Bicknell said.

The Barwon Downs aquifer is estimated to hold more than 500,000 million litres. By comparison, Geelong's main storage at Wurdee Boluc has a capacity of 40,000 million litres.

The borefield is operated under licence from Southern Rural Water, with Barwon Water allowed to take 20,000 million litres in any one year, or 80,000 million litres over 10 years.

Between April, 2006, and when pumping ceased this year, the borefield supplied 52,439 million litres to Geelong and surrounding towns. This is 43 per cent of all water used over this period.

Unlike stock and domestic bores, which target shallow aquifers, the six production bores at Barwon Downs draw supplies from depths up to 630 metres.

Mr Bicknell said Barwon Water had compiled extensive data and knowledge on the aquifer over more than three decades.

"This information has been crucial is determining the borefield's operation under licence.

"Research and continuous monitoring at more than 50 sites indicates the current yield is sustainable. It is imperative we protect the aquifer because of its importance as a unique water source to the people of Geelong," Mr Bicknell added.

2012.

Barwon Water

About us » Corporate information » Media releases » Media releases 2012 » Barwon Downs review

Barwon Downs review

Media release issued Thursday 21 June 2012

Barwon Water will undertake a comprehensive review of its Barwon Downs borefield monitoring program.

The corporation said today the review would look at potential improvements in monitoring as well as provide vital data for future operations.

The borefield is a critical water source during prolonged dry spells.

At the height of the recent drought, the worst on record, it provided up to 70 per cent of the city's drinking water when storages plummeted to 14 per cent.

The borefield was taken off-line in 2010 and has shown significant signs of recovery.

Barwon Water is currently scoping the review, including whether investigations into more advanced monitoring is required.

The review is expected to consider recent acid sulphate soil and peat fire investigations, fish and macro invertebrate surveys and stream flow and water quality research.

Barwon Water Interim Managing Director Joe Adamski said while the current program was best practice at the time of the initial licence application, new monitoring methods would be considered.

"The review will focus on the ecological and hydrogeological aspects of the borefield operations and look at expanding the current monitoring program," Mr Adamski said.

This information would be considered leading up to an application to renew the operating licence in 2019. Community engagement also would be a critical element in this process, he said.

"The borefield is part of Geelong's diverse supply system and has proven its worth time and again. Indeed, it was the city's savior during the drought. Without the resource, Geelong faced the very real risk of running out of water in 2007."

The aquifer from which the water is drawn is estimated to hold more than 500,000 million litres. By comparison, Geelong's main storage at Wurdee Boluc has a capacity of 40,000 million litres.

The borefield is operated under licence from Southern Rural Water, with Barwon Water allowed to take 20,000 million litres in any one year, or 80,000 million litres over 10 years.

Between April, 2006, and when pumping ceased in 2010, the borefield supplied 52,439 million litres to Geelong and surrounding towns. This was 43 per cent of all water used over this period.

2016.

BarwonWater

Downloaded from Bw website 10/9/2016

Q&A. Barwon Downs borefield

Q. What is the Barwon Downs borefield?

Barwon Water operates a groundwater borefield at Barwon Downs, near Colac. The borefield is a crucial supply source for Geelong, the Surf Coast, Bellarine Peninsula and parts of Golden Plains Shire during drought or prolonged dry periods.

It comprises six production bores that extract groundwater from an aquifer between 300 to 630 metres below the surface. The estimated total volume of water in the Barwon Downs aquifer at any time is around 500,000 million litres (equivalent to the amount of water held in Sydney Harbour).

The borefield was established in the 1980s and has been brought online four times since then. At the height of the worst drought on record (2006 to 2010), Geelong's water storages dropped to 14 per cent. The borefield provided up to 70 per cent of the region's drinking water during this time. It was last used in 2010 after good rain boosted surface water storages.

Q. Do conditions apply in operating the groundwater?

The borefield is operated under a licence issued by Southern Rural Water, which is responsible for licensing and monitoring groundwater extraction in southern Victoria on behalf of the Water Minister. The licence sets out conditions so that groundwater use is carefully monitored and managed.

The licence covers extraction volumes and monitoring requirements. The maximum extractable volume in any one year is 20,000 million litres. The maximum extractable volume over any 10-year period is 80,000 million litres and 400,000 million litres over a 100-year period.

As part of the Barwon Downs licence, Barwon Water monitors:

- groundwater levels and pressures
- groundwater quality (including salinity)
- groundwater pumping rates
- subsidence
- flows in Boundary Creek and the Barwon River
- vegetation health.

Barwon Water conducts ongoing monitoring in accordance with the licence. This includes regular groundwater level monitoring, flora studies every five years and measuring volumes of water pumped from the Barwon Downs aquifer. Barwon Water's current licence to operate the Barwon Downs borefield was issued in 2004 and is due for renewal in June, 2019.

Q. What is Barwon Water doing to prepare for its new licence?

Barwon Water reviewed the existing monitoring program in 2012 and decided to expand it to improve the quality and quantity of data collected. The data will be used in an application to renew the licence.

The Barwon Downs monitoring program aims to:

Barwon Water

Groundwater facts

Groundwater is one of the most important, abundant, yet sometimes misunderstood resources on earth.

Billions of people worldwide depend on groundwater for survival.

Local groundwater reserves have saved Geelong from crisis during prolonged dry spells.

What is groundwater?

Groundwater is water found below the surface. It is typically contained in aquifers, which are porous materials such as gravel, sand and fractured rock that hold water in the gaps, like a sponge.

Rainfall and run-off enters aquifers at recharge areas, flows underground, and eventually discharges to creeks, rivers, lakes or the ocean. Some aquifers discharge as natural springs.

Groundwater can be harvested via bores, i.e. pipes drilled into the ground to tap into the aquifers.

The quality of groundwater sources varies widely. Some supplies are so pure they are bottled at the source and sold as spring water or mineral water. Others are so high in dissolved salts they are unsuitable for drinking.

Groundwater may be tens, hundreds or even thousands of years old.

Many cities and countries around the world depend on groundwater. Waterways and ecosystems also rely on it.

Groundwater around the world

Groundwater is by far the world's largest source of fresh water.

Parts of Asia and the Middle East, such as Iran and northern China, are more reliant on groundwater than surface water.

Up to 80 per cent of drinking water across Europe and Russia comes from underground.

Around 46 per cent of US residents rely on groundwater as their primary source of fresh water.

Fast facts

Groundwater is part of the water cycle. It is recharged by rainfall, linked to surface water and ecosystems, and eventually discharges to lakes, rivers or the ocean.

Groundwater is abundant. It is the world's largest source of fresh water, more than lakes, reservoirs and rivers combined.

Groundwater is crucial to Geelong. In 2007, at the height of the worst drought on record, Geelong's water supplies plummeted to 14 per cent and groundwater provided up to 70 per cent of the city's drinking water.

Groundwater is varied. No two groundwater sources are the same. The depth, capacity, quality and usability of groundwater sources can vary considerably.

Groundwater must be managed. Like all natural resources, groundwater must be carefully monitored and managed to ensure it is used sustainably.

Downloaded from BWW website 10/9/16

BarwonWater

Our projects » Barwon Downs borefield monitoring program

Barwon Downs borefield monitoring program

We have expanded our ongoing monitoring of the Barwon Downs borefield ahead of an application to renew our groundwater licence.

Background

The Barwon Downs borefield is a crucial emergency water source for greater Geelong when surface storages are low.

In 2007, at the height of the worst drought on record, Geelong's water storages dropped to just 14% and the borefield provided up to 70% of the city's drinking water. *

Barwon Water operates the Barwon Downs borefield under licence from Southern Rural Water, due for renewal in June 2019.

We reviewed the existing monitoring program and decided to expand it to improve the quality and quantity of data collected. The data will be used in an application to renew the licence.

About the borefield

The Barwon Downs borefield consists of six bores that pump groundwater from an aquifer 300 to 630 metres below ground.

For the purposes of managing and licensing groundwater use, the borefield is contained within a defined boundary known as the Gerangamete groundwater management unit (GMU), one of 34 defined GMUs in Victoria. The Gerangamete GMU is estimated to contain approximately 14,000 gigalitres of groundwater – approximately half the capacity of Port Phillip Bay!

www.barwonwater.vic.gov.au/projects/barwon-downs-borefield-monitoring-program 10/08/2016

2016. See Appendix Four for another example.

2017.

Home » Barwon Downs borefield licence renewal » Barwon Downs borefield study released

Barwon Downs borefield study released

6/09/2017. 17:03

2 months ago

A new study confirming the impacts of groundwater pumping on Boundary Creek will allow Barwon Water to develop an improved flow restoration plan based on solid scientific data.

The study is part of a comprehensive groundwater monitoring program launched in 2013 to help inform the corporation's Barwon Downs borefield licence renewal application, which is due to be submitted to Southern Rural Water in late 2017.

Barwon Water General Manager Strategy and Partnerships Carl Bicknell said while it has been known for some time that borefield pumping was connected to flows in Boundary Creek, the level of interaction had not been fully understood.

"As a condition of our current groundwater licence we have released supplementary flows into Boundary Creek. However, we know these flows have not always made their way to the lower reaches of the waterway," Mr Bicknell said.

"We now have results of a thorough scientific study that provides answers we can be confident in, allowing us to examine ways to restore flows that will compensate for the operation of the borefield," he said.

The borefield is a crucial supplementary water source for the region when surface storages are low. It consists of six bores that pump groundwater from an aquifer 300 to 630 metres below ground.

In 2007, at the height of the worst drought on record, Geelong's water storages dropped to just 14 per cent and the borefield provided up to 70 per cent of the city's daily usage.

Mr Bicknell said the new data was a result of a major update to the groundwater model for the Barwon Downs area.

The model meets the highest ranking under Australian guidelines and is sophisticated enough to separate natural climate-related impacts from past groundwater pumping.

It found operation of the borefield over the past 30 years was responsible for two thirds of the reduction in base flow from the aquifer into Boundary Creek. The dry climate experienced over the same period accounted for the remaining third.

The model also shows the lower sections of Boundary Creek would likely have no flow periods during summer regardless of groundwater pumping. However, pumping has increased the frequency and duration of no-flow periods in lower reaches of Boundary Creek.

The data confirmed there was no predicted impact to vegetation outside the Boundary Creek catchment as a result of groundwater pumping.

Mr Bicknell said further technical studies were underway to assess the effect of a range of alternative borefield operating regimes on flows in Boundary Creek and measures to address the issue of acid water release from Big Swamp into Boundary Creek.

To find out more about the licence renewal project and access technical reports please visit our document library.

Like Sign Up to see what your friends like.

Terms and Conditions Privacy Policy Moderation Policy Accessibility Technical Support Site Map

engagement hub

http://www.yoursay.barwonwater.vic.gov.au/barwon-downs-bo...e-renewal/news_feed/barwon-downs-borefield-study-released 6/09/2017, 17:03 Page 1 of 1

2019.

Colac Herald Monday 9th Sept. 2019.

Water shortages loom for region

Colac and district water whizzes can don their thinking caps to help Barwon Water face its looming water supply challenge.

The water corporation said it wanted to team up with local councils and communities to develop a water strategy for the next decade, with worst-case scenario projections showing growing consumption will meet dwindling supply in 2029.

Water demand could begin to outdrink supply in that year, potentially creating a shortfall which would only likely increase as urban boundaries expand.

Barwon Water says climate change and more customers are part of the problem, with the average yearly rainfall collected at Forrest's West Barwon Reservoir dropping 32 per cent since 1997 and the Geelong region's population doubling since the 1980s.

Barwon Water general manager of strategy, systems and environment Seamus Butcher said that although water consumption had actually dropped since 1983 despite the population boom – thanks to customer water saving and new technologies – the region still felt the pressure in dry times.

He said losing groundwater access at a Barwon Downs borefield had pulled the supply-consumption D-Day forward from 2043 to just 10 years away, and the *Colac Herald* understands the borefield supplied about 70 per cent of Geelong's drinking water in 2007.

Barwon Water stopped pumping groundwater at the site in 2016 after admitting the pumping had impacted local waterways, and Water Minister Lisa Neville has ordered the corporation to remediate Boundary Creek and Yeodene's Big Swamp.

"We're planning for life without Barwon Downs, but we're mindful of never saying never," Mr Butcher said.

"Right now we're 100 per cent committed to remediation, no matter how long that takes, whether it be five years, 10 years," Barwon Water's Jo Murdoch said.

Mr Butcher said the water corporation was keen to face its future water challenge and was looking for innovative ways to increase water supply while keeping water bills down, and it would also focus on improving "regional prosperity" by branching out with a range of new programs.

He said Barwon Water was looking at options to deal with Apollo Bay's burgeoning summer population, which could inflate up to 15,000 people or more in the peak period.

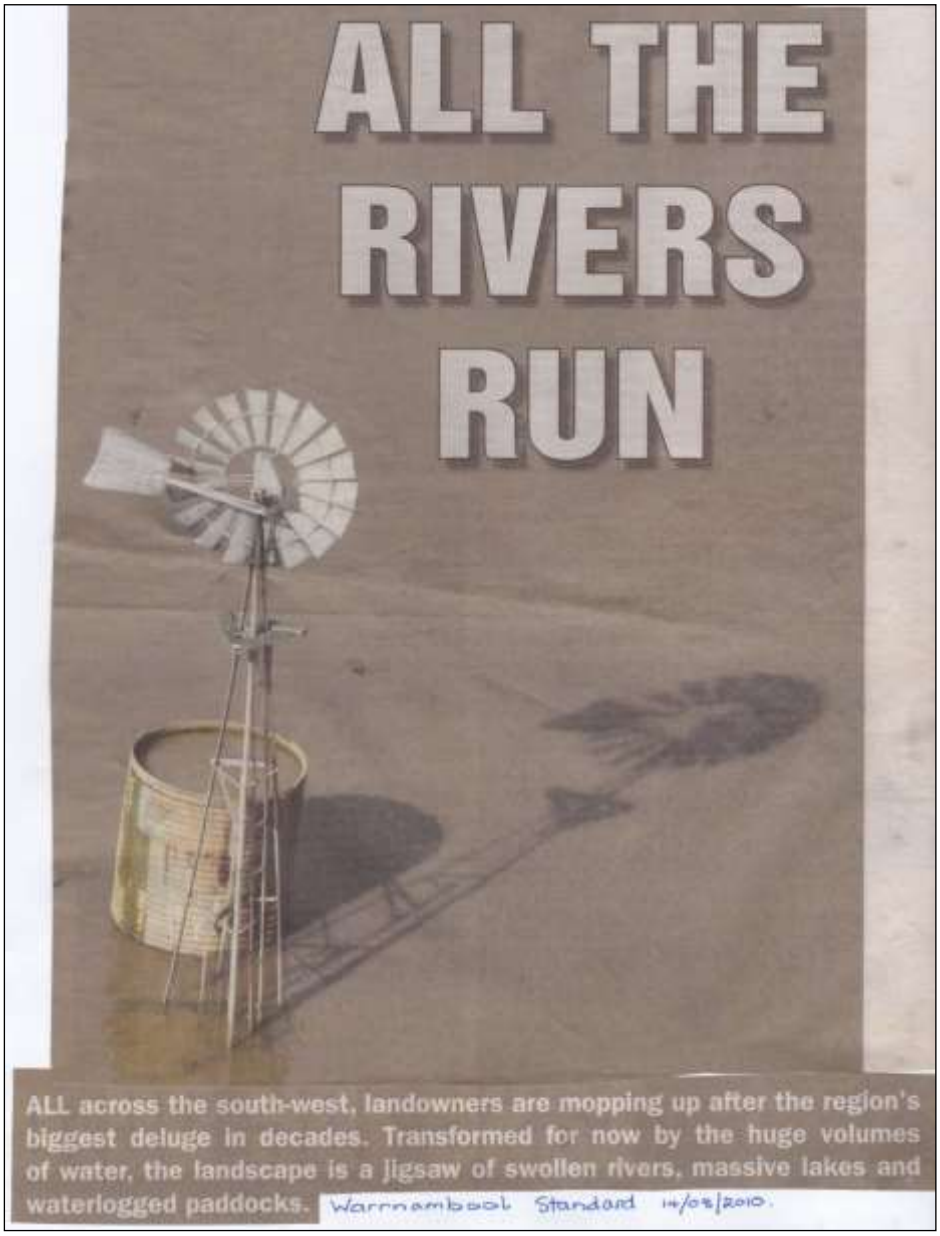
Meanwhile, the Colac water system uses about 3000 million litres of water a year, less than one tenth of what the Geelong region uses.

Colac's system is separate from Geelong's, but it can receive a boost from the bigger system via the new Wurdee Boluc Channel.

"We feel pretty good about Colac," Mr Butcher said.

APPENDIX NINE.

The drought broke with the floods of August 2010.



Rainfall over the next several years continued.

Warrnambool Standard 26 -02-2011.


6 - SATURDAY, August 14, 2010 The Standard

CORANGAMITE

1

1. Roads and paddocks are inundated by the flooded Gellibrand River

"Wettest Ever." "Rainfall records have been smashed with the south-west experiencing its wettest summer ever."

Geelong Advertiser 26-02-2011.

"Geelong, like much of Victoria, has received rain, wind and clouds almost all season."

By 2012 reserviors were overflowing.

Reservoir overflowing after rain

by Jennifer Chiu

A Colac district reservoir overflowed in November for the first time in more than a decade.

The West Barwon Reservoir, Barwon Water's water storage at Forrest, has been spilling for about a week after three months of above-average rain.

Water started flowing over the reservoir spillway at a rate of 450 million litres a day from November 24, after the reservoir received more than 22 millimetres of rain in the previous four days.

Mount Sabine, near Lorne, received 88 millimetres in the same period, adding to the water storage and sparking the spill.

Barwon Water infrastructure systems general manager Paul Northey said it was unusual for the reservoir to spill in late spring.

"The last time West Barwon spilled in November was 2001," Mr Northey said.

"Good, consistent rainfall since August has seen West Barwon remain at a high level, even with a large volume of water sent to Wurdee Boluc Reservoir, which is also currently at capacity," he said.

Mr Northey said the West Barwon Reservoir overflowed "several times" between July and October 2012, and in July 2002.

WET: The West Barwon Reservoir is overflowing afterthree months of above-average rain

References.

1. Witebsky S., Jayatilaka C. and Shugg A. J., November 1995: Groundwater Development Options and Environmental Impacts. Barwon Downs Graben, South-Western Victoria. Department of Natural Resources and Environment.
2. Freedom of Information Request Reply, 9 November 2006, Barwon Water Ref. 15/260/0003X(3).
3. Government. 1988: State of the Environment Report. Victoria's Inland Waters. Office of the Commissioner for the Environment, Government of Victoria, Melbourne, Victoria Australia
4. Jacobs, 21 February 2017: Barwon Downs Hydrologeological Study 2015-2016 PASS Baseline Assessment. Final. Barwon Water.
5. Jacobs, 1 December 2016: Barwon Downs Technical Works Program-Barwon Water – Integration Report. Final Draft.
6. Geelong and District Water Board report, August 1989: Barwon Downs Groundwater Test Pumping Program - Progress report No. 8. August 1989.
7. Gardiner. M., September 2019: Otway Ranges Subterranean National Park. Otway Water Book 55 & Appendixes.
8. Barwon Water, 2018: Barwon Downs Borefield – Requirements for reports as outlined in the existing licence (BE032496).