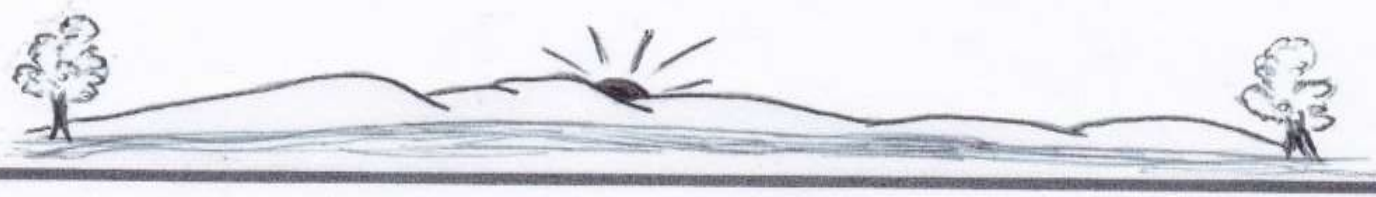
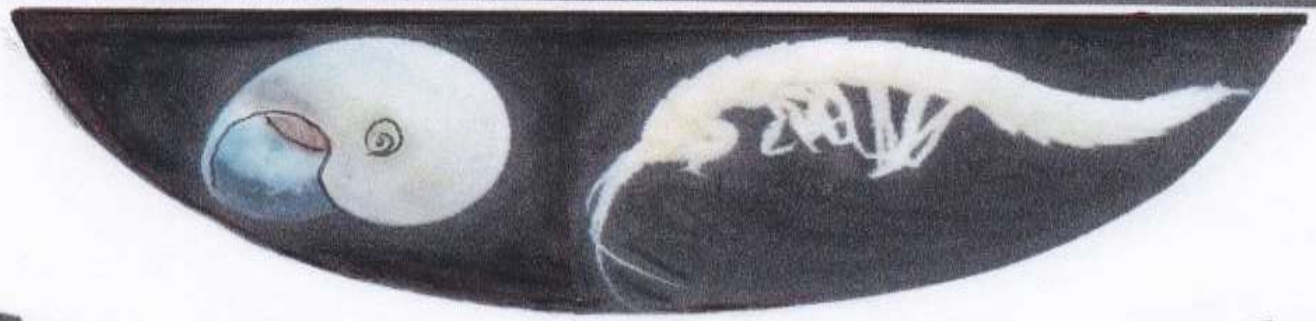
OTWAY RANGES



SUBTERRANEAN



National Park

This…

Or…

this…

Many wetlands in Victoria have been lost as a result of surface water drainage. Despite man's efforts, many of the wetlands in the Gerangamete Groundwater Management Area could not be drained because of the overflow into springs, soaks and creeks from a naturally full aquifer system. However, the extracting of groundwater at the Barwon Downs Borefield caused many of these groundwater dependent ecosystems to dry out. Given the chance these ecosystems will eventually recover.

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.

September 2019.

Malcolm Gardiner

www.otwaywater.com.au

www.stopgroundwatermining.com.au

Preface:

All our natural supplies of underground water are vital for our nation and should be protected at all costs on behalf of our Commonwealth. While it is practical to use some of the water it must be done in a sustainable way and every effort must be made to prevent pollution of the supply. I support the care of these resources in the Otways.

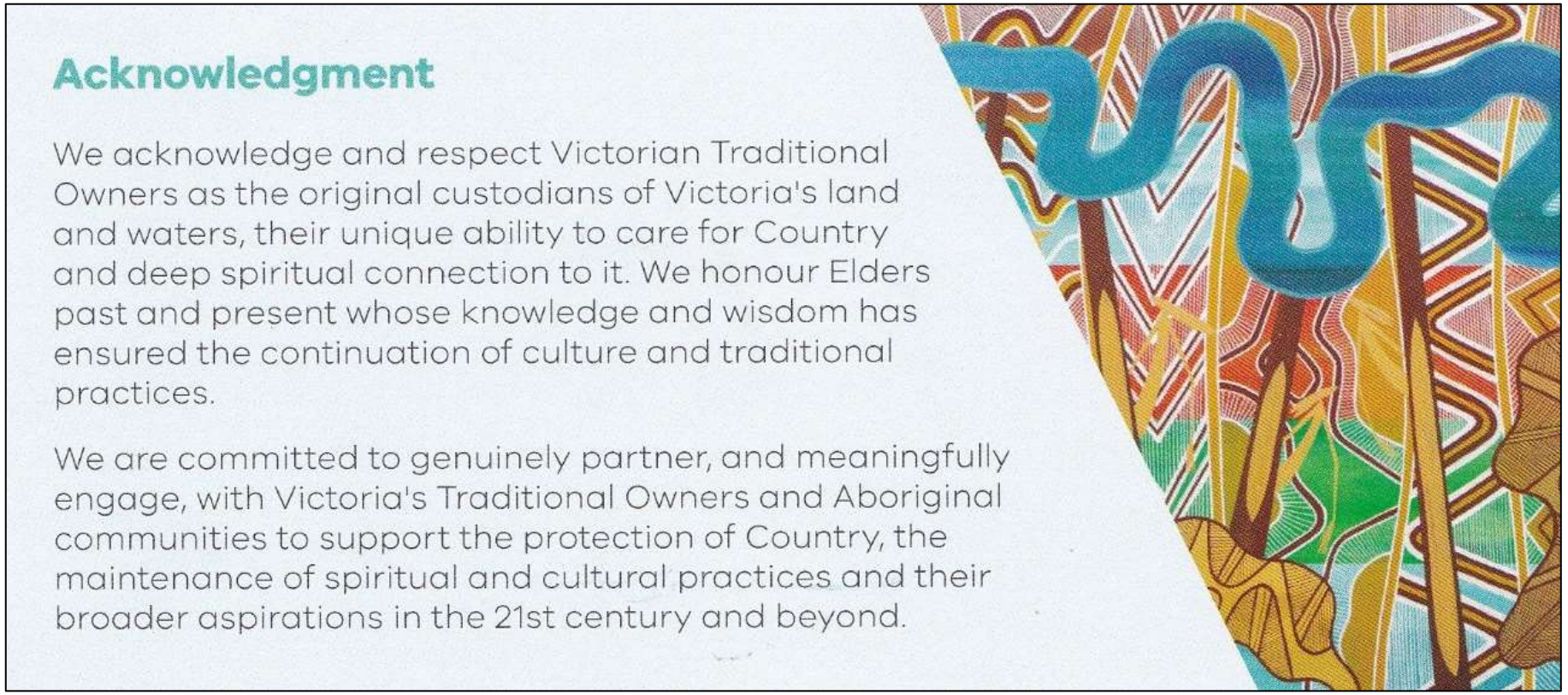
Bruce Pascoe.

Bruce Pascoe is the author of many books including…

"Dark Emu" (Magabala Books) and

"Convincing Ground – *Learning to fall in love with your country*." (Aboriginal Studies Press)

A Victorian State Government Acknowledgement and Commitment.



(Taken from "***Long Term Water Resource Assessment for Southern Victoria – Basin-by-Basin Results, DRAFT 2019***")

CONTENTS Book 55 Subterranean National Park

VISit **http://otwayrangessubterraneannationalpark.org.au**

INTRODUCTION.

Since European settlement in Australia the management of freshwater resources has been abysmal. Within years of European settlement an 80,000 year old civilised and environmentally sustainable Aboriginal culture was destroyed with years of water management practices lost. From this time forward, water resource managers have blundered along ignoring past and present experiences and seem incapable of protecting key water resources on one of the driest and unique continents in the world.

There may be some justification to support a case that the first European settlers knew no better when they systematically destroyed Aboriginal housing; decimated successful agricultural practices and ruined viable aquiculture enterprises. And, Bruce Pascoe in his book “Dark Emu” presents a confronting, convincing case that the systematic obliteration of the Aboriginal way was a conscious, calculated and deliberate series of actions.

The question is, have we learnt anything in 200 years of European type, freshwater management? Sadly the answer seems to be no. The very same ideologies that drove the values used to manipulate and justify the actions and deeds of the early European settlers, persist today. As I read “Dark Emu” I could not help but come to this conclusion. The imposing of northern hemisphere western practices and ideologies based on the assumption that European ways of managing water is somehow superior to the “primitive” way of the Aboriginals, has been disastrous.

How many examples need to be presented to illustrate the truth of this mismanagement.

- The Murray Darling fiasco impacting across four Australian states.
- The Perth urban water supply demands impacting on environmental values throughout the city’s boundaries.
- The Great Artesian Basin mis-management and depletion of the resource.
- Agricultural and freshwater groundwater depletion in Gippsland resulting from on-shore and off-shore gas extraction.

- Aquifer depletion and contamination impacting as a result of on-shore gas extraction across state boundaries to the north of Australia.
- Sea water (salt water) intrusion to the Werribee aquifers and who knows where else,
- Anglesea River, Victoria, fish kills associated with groundwater extraction,
- Unsustainable Otway Ranges surface and groundwater extraction for the Geelong reticulated system,
- Lack of toxic waste ash barriers from coal fired electric generating plants, and
- This list is far from complete.

Each of these examples has a dramatic and sad story of mismanagement to tell. The example concentrated upon in this book is the unsustainable mis-management of the Gerangamete and Gellibrand Groundwater Management Area aquifers and the need to preserve and return these systems as close as is possible to their former functionality.

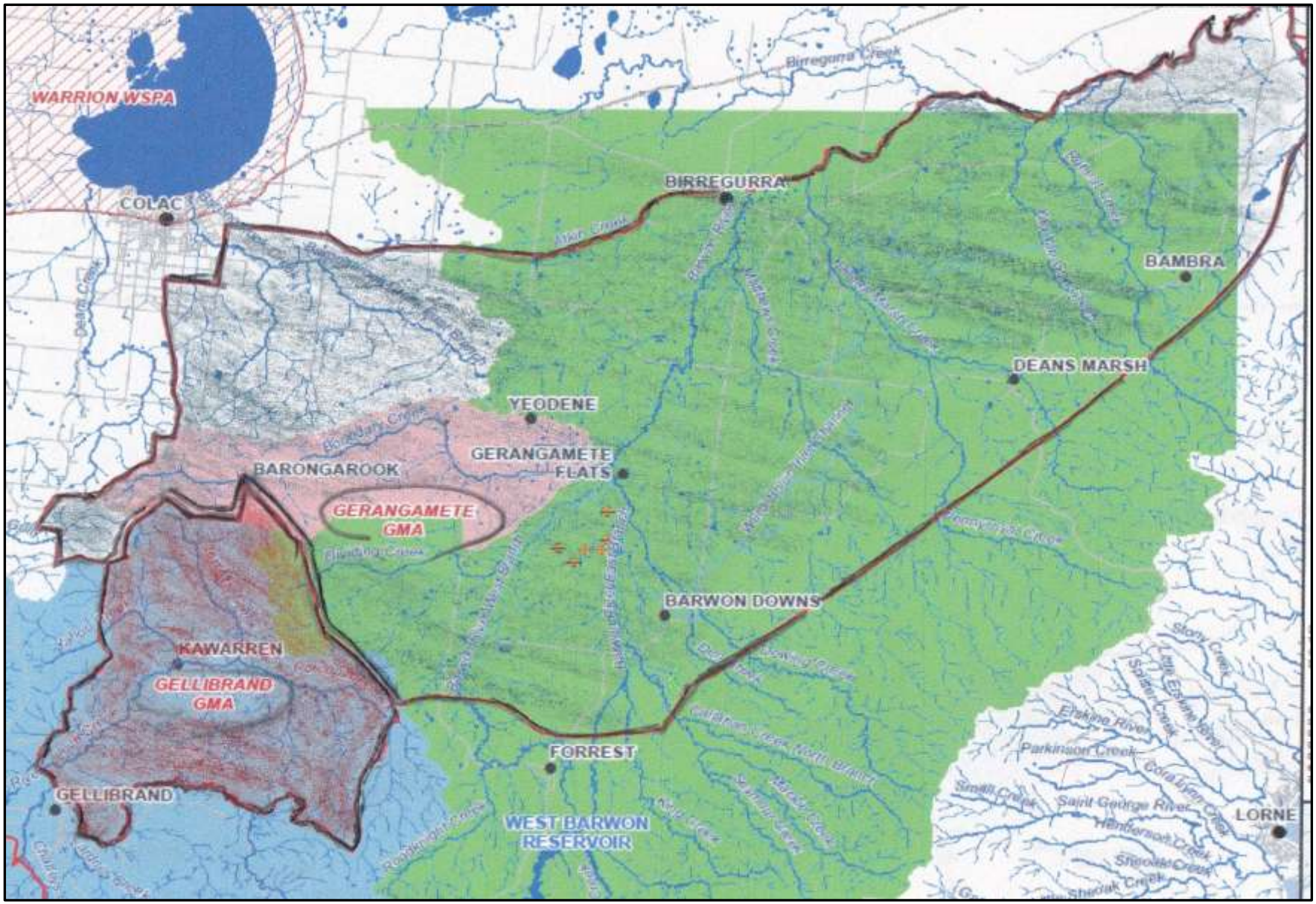
Is this possible? Yes. Things can change. This book presents a compelling case that the creation of an Otway Ranges Subterranean National Park would be one step in this direction, and a reasonable place to start. All that is needed is…

A vision to see,
A faith to believe, and
The courage to do. (Michael Connelly)

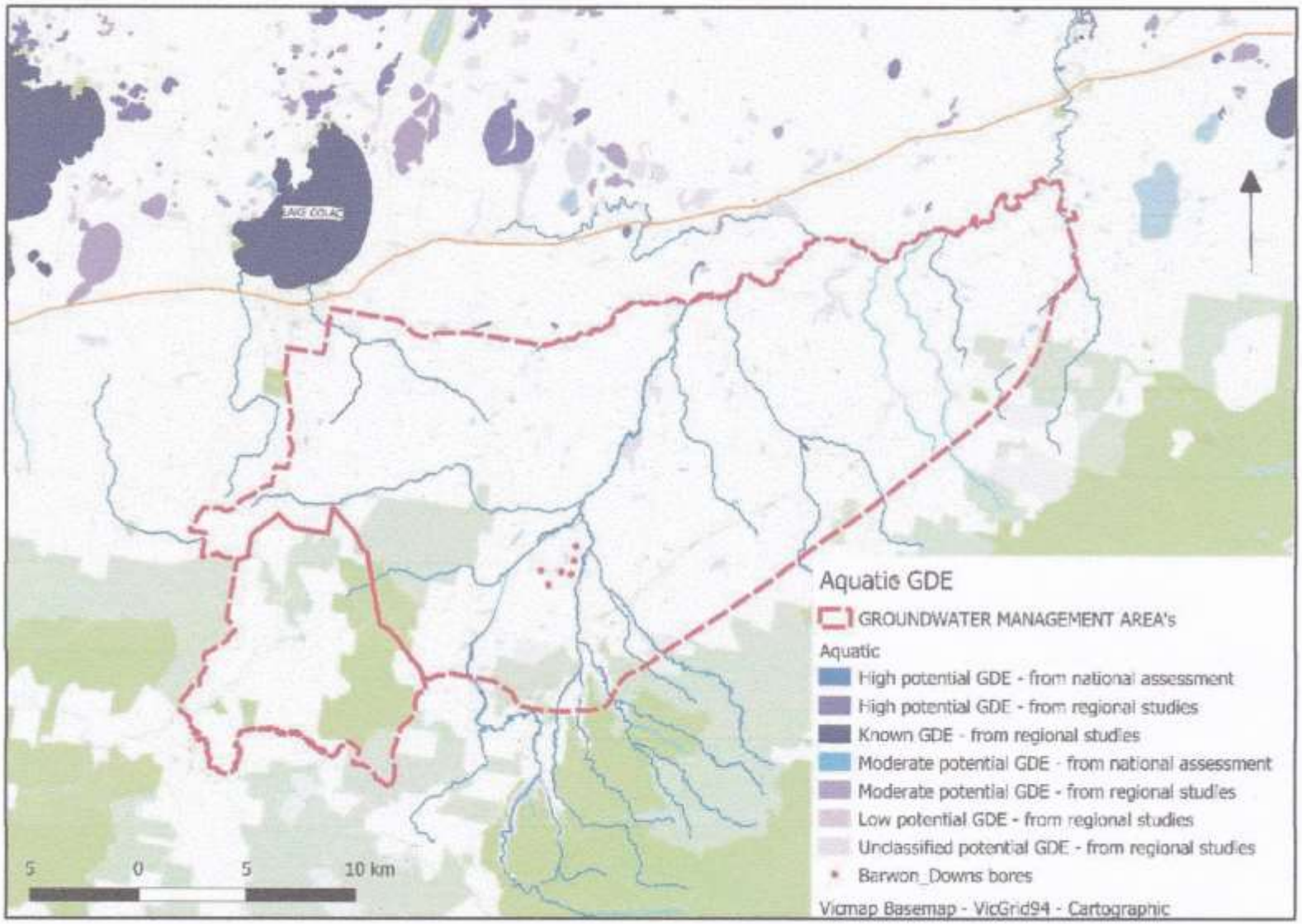
Look after the aquifers and the surface waters will look after themselves.

The Proposal

Declare the aquifer formations in the Gerangamete and Gellibrand Groundwater Management Areas as a Subterranean National Park, allowing no groundwater extraction other than as designated under Stock and Domestic rights.


WARRION WSPA
COLAC
BIRREGURRA
BAMBRA
DEANS MARSH
YEODENE
GERANGAMETE FLATS
BARONGAROOK
GERANGAMETE GMA
BARWON DOWNS
KAWARREN
GELLIBRAND GMA
FORREST
GELLIBRAND
WEST BARWON RESERVOIR
LORNE
Birregurra Creek
Parkinson Creek
Saint George River
Henderson Creek

(source BoM 2018, http://www.bom.gov.au/water/groundwater/gde/)



Managing the Subterranean Park.

The cost to Federal and or State Governments would be negligible.

Southern Rural Water as the authority enforcing government water law and order in the area would have the minimal task of ensuring that only the appropriate amounts of groundwater would be extracted as per the rights of Stock and Domestic landholders (see Appendix One re: domestic rights, pages 41).

Benefits of a Sub-terranean National Park.

- Stygofauna (Subterranean lifeforms) would be protected.
- Surface water Beneficial Uses would once again benefit from a natural discharge of water from the aquifers…
    - Preventing streams, creeks and rivers from drying up,
    - Supporting Groundwater Dependent Ecosystems,
    - Supplying and maintaining ample farmer Stock and Domestic water,
    - Providing a natural buffer against Climate Change, and
    - Reduce the likelihood of fires.
- Costs to the administrators of the Park would be negligible. Basically, there would be nothing new to administer.
- The attractiveness and integrity of the area would be maintained continuing to draw tourists and income into the area.
- The three farmers with current groundwater extraction licences for the Gerangamete Groundwater Management Area will be able to revert back to surface water extraction when the aquifers return to full and overflowing discharge into streams. This would mean a return to pre Barwon Water's groundwater extraction. (see page 46 re: these three licences).
- There would no longer be the need to base groundwater resource management decisions on flawed data, modelling, assumptions and guesswork.

- Any observable surface resource water impact will be directly related to surface water management practices eliminating any guesswork as to the cause of the impact.
- The damaging practice of allocating the same water resource twice, once as groundwater and then as surface water, will no longer take place. One of the major factors creating an unsustainable over allocation of resource will be prevented.

Justification.

Over the last 30 years of water resource management by successive State Governments, it has been shown that under the present system there has been a failure to manage and protect the Otway Ranges aquifers in the Gerangamete and Gellibrand Groundwater Management Areas.

Past Governments have allowed groundwater extraction in the Gerangamete Groundwater Management Area resulting in:

- the decimation of significant ecosystems;
- the drying up of a perennial tributary of the Barwon River and,
- as a consequence the cessation of flows in the Barwon River over several summers;
- impacts affecting an adjoining Groundwater Management Area and,
- the creation of impacts that will take decades to return the size of the impacts area back to *something* like a natural pre European state.

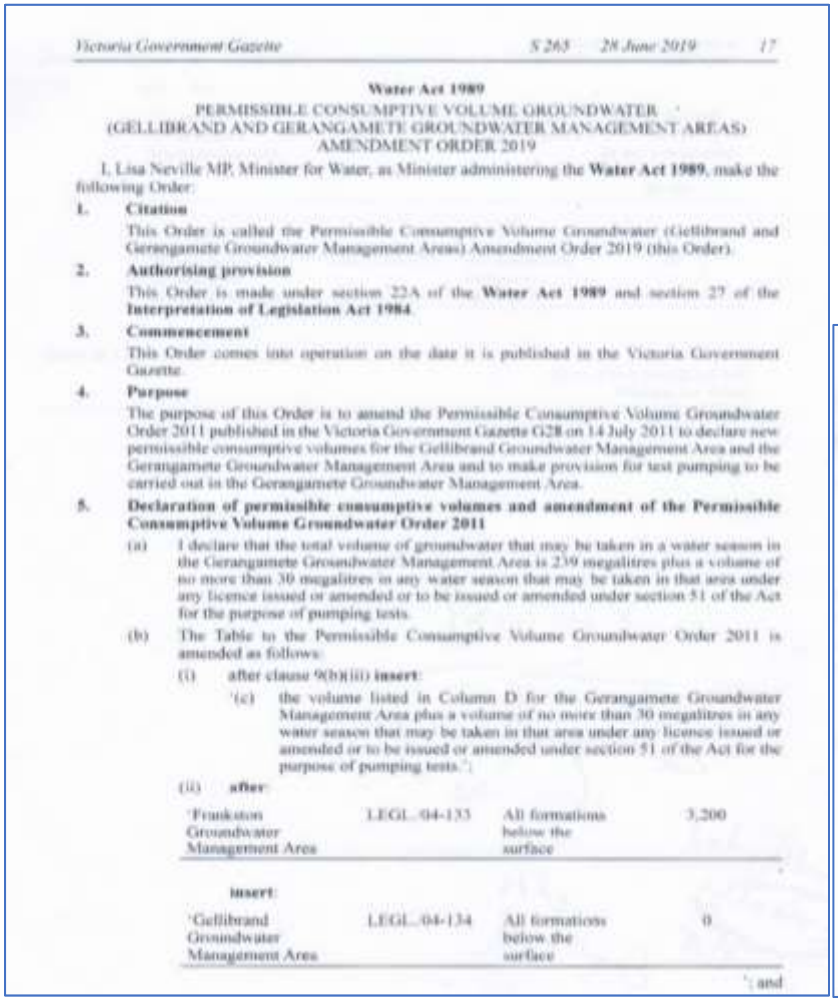
The water resources within the Gellibrand Groundwater Management Area have been shown to be managed in a similar fashion with the resources being grossly over allocated.

The predicament of these two areas has been acknowledged by the present Labour State Government leading to the following legislation passed in June 2019.

- Gellibrand Groundwater Management Area Permissible Consumptive Volume to be set at ZERO megalitres a year (ML/year), and

- The Gerangamete Groundwater Management Area Permissible Consumptive Volume to be set at 239ML/year. This 239 ML/year covers three farmers with current licences (see Appendix Three, page 46).

The Permissible Consumptive Volume Legislation.



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Water Act 1989

PERMISSIBLE CONSUMPTIVE VOLUME GROUNDWATER (GELLIBRAND AND GERANGAMETE GROUNDWATER MANAGEMENT AREAS) AMENDMENT ORDER 2019

I, Lisa Neville MP, Minister for Water, as Minister administering the **Water Act 1989**, make the following Order:

1. **Citation**

This Order is called the Permissible Consumptive Volume Groundwater (Gellibrand and Gerangamete Groundwater Management Areas) Amendment Order 2019 (this Order).

2. **Authorising provision**

This Order is made under section 22A of the **Water Act 1989** and section 27 of the **Interpretation of Legislation Act 1984**.

3. **Commencement**

This Order comes into operation on the date it is published in the Victoria Government Gazette.

4. **Purpose**

The purpose of this Order is to amend the Permissible Consumptive Volume Groundwater Order 2011 published in the Victoria Government Gazette G28 on 14 July 2011 to declare new permissible consumptive volumes for the Gellibrand Groundwater Management Area and the Gerangamete Groundwater Management Area and to make provision for test pumping to be carried out in the Gerangamete Groundwater Management Area.

5. **Declaration of permissible consumptive volumes and amendment of the Permissible Consumptive Volume Groundwater Order 2011**

(a) I declare that the total volume of groundwater that may be taken in a water season in the Gerangamete Groundwater Management Area is 239 megalitres plus a volume of no more than 30 megalitres in any water season that may be taken in that area under any licence issued or amended or to be issued or amended under section 51 of the Act for the purpose of pumping tests.

(b) The Table to the Permissible Consumptive Volume Groundwater Order 2011 is amended as follows:

(i) after clause 9(b)(iii) **insert**:

'(c) the volume listed in Column D for the Gerangamete Groundwater Management Area plus a volume of no more than 30 megalitres in any water season that may be taken in that area under any licence issued or amended or to be issued or amended under section 51 of the Act for the purpose of pumping tests.';

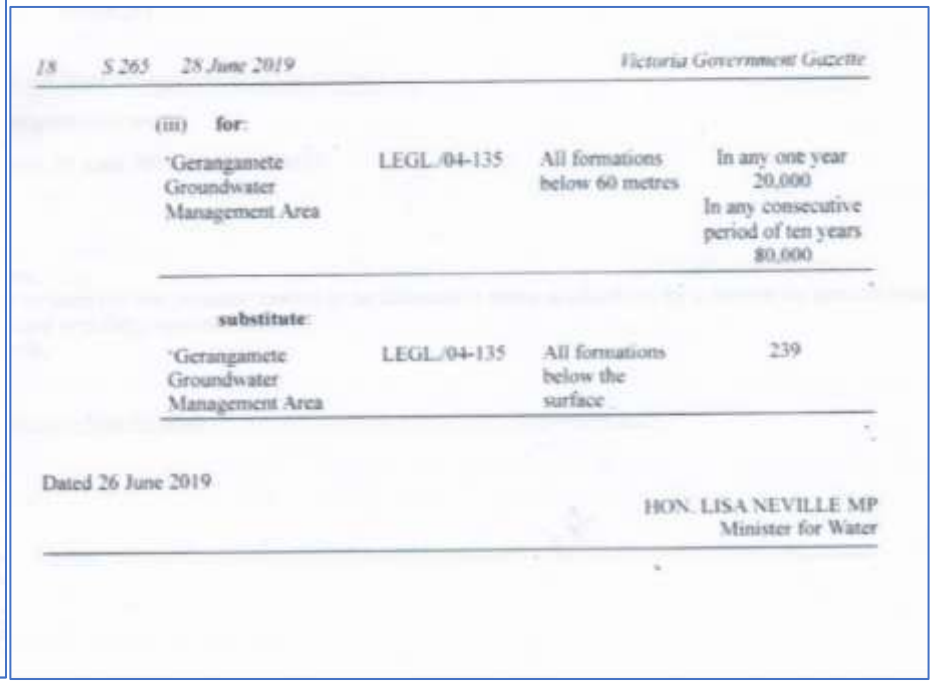
(ii) **after**:

'Frankston Groundwater Management Area	LEGL./04-133	All formations below the surface	3,200

insert:

'Gellibrand Groundwater Management Area	LEGL./04-134	All formations below the surface	0

'; and



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(iii) **for**:

'Gerangamete Groundwater Management Area	LEGL./04-135	All formations below 60 metres	In any one year 20,000 In any consecutive period of ten years 80,000

substitute:

'Gerangamete Groundwater Management Area	LEGL./04-135	All formations below the surface	239

Dated 26 June 2019

HON. LISA NEVILLE MP
Minister for Water

Advice & Recommendations Given to the Minister for Water leading up to the 26th June 2019 Permissible Consumptive Volume Allocation Legislation.

When preparing its recommendations for the Minister of Water's consideration, the Department of Environment, Land, Water and Planning (DELWP) spent some considerable time reviewing the two Permissible Consumptive Volumes for the Gerangamete and Gellibrand Groundwater Management Areas. This process involved comprehensive gathering and analysis of historical and present day data, site visitation and extensive local community consultation.

A request was made for a copy of the advice given to the Minister and as this was denied (see page 48) a Freedom of Information request was made (see Appendix Six pages 49-51). The FOI request arrived with omissions of irrelevant material, personal detail, opinions and any material contrary to the public interest (see Appendix Eight, pages 55- **).

The FOI reply contains 47 pages of detail and ***presents a very convincing and strong set of data and comment that supports the notion that the two groundwater management areas under discussion should be zero groundwater extraction areas in the short and long term.***

In the Short Term.

1. If extractions were to continue at levels over 1,200 ML/year mining of the Lower Tertiary Aquifers' storages would continue.
2. Extractions below 1,200 ML/year would most possibly have the aquifer levels equalise but be at levels way below pre groundwater extractions.
3. The Permissible Consumptive Volumes legislated in June 2019 supports efforts being made to remediate historic damage.
4. The three existing farmers' licences will be allowed to continue (238 ML/year).
5. The 59 metre cone of depression and 480 km^2 area of drawdown influence will take between 50-100 years to recover. This calculation has been made assuming there are no further extractions.

6. The farmers can and most likely will exercise their rights to extract. Past extractions have been approximately 130 ML/year. Any extractions will increase the recovery period.
7. Recovery in the Big Swamp area could take between 30-50 years.
8. Waterways connected to the Lower Tertiary Aquifers will continue to be impacted to varying degrees during the 50 to 100 years recovery period.
9. Groundwater extractions in the Gerangamete Groundwater Management Area will impact on the neighbouring Gellibrand Groundwater Management Area.
10. Impacts caused by the extractions at the Barwon Downs Borefield will be remediated.
11. This remediation is legally enforceable under a government s78 Notice directive.
12. Actual Acid Sulfate Soil impacts are most likely to continue through this recovery period.
13. The results and recommendations from recent studies put forward by Barwon Water need to be evidentially verified.

In the Long Term.

1. Some parts of the aquifer could take up to 309 years to recover (see Appendix Nine page 97).
2. Once groundwater levels recover to elevations prior to groundwater extraction, DELWP estimates that between 200 and 400 ML/year extraction from the Gerangamete Groundwater Management Area could be taken without adverse impacts on the waterways.
3. Extraction of groundwater should not equate to the same amount as the recharge amount (1,000 to 1,200 ML/y).
4. After full recovery extractions over 1,200 ML/year would be regarded as a mining operation.

At the 15th August 2019 Southern Rural Water's Community Leaders Group meeting, a meeting dealing with the remediation of impacts from groundwater extraction in the Gerangamete and Gellibrand Groundwater Management Areas, a presentation was made by DELWP explaining the processes involved in determining the "*Gerangamete GMA – Review of Permissible Consumptive Volume"* (see Appendix Nine, pages 90-120).

Community Supports Preservation of the Aquifers.

When Barwon Water applied for a Licence renewal in late 2018 for a 15 year licence to extract 12,000 ML/year from the Barwon Downs Borefield, 1042 objections were sent to Southern Rural Water (see Appendix Seven, pages 52-54). A three page summary of these objections prepared by Southern Rural Water, highlights the deep community concern at such levels of extraction.

Pages 27 and 28 discuss the 12,000 ML/year licence application. This figure of 12,000 was based on reports conducted and presented to Barwon Water by Jacobs. Many of these very same reports were referred to by DELWP and informed the recommendations arrived at regarding the Permissible Consumptive Volume levels that were sent to the Minister for Water's consideration. However, community scrutiny of the Jacobs' reports discerned that a 12,000 ML/year extraction was a gross over calculation of the ability of the Lower Tertiary Aquifers to sustain these levels without further devastating impacts. DELWP also questioned some of the Jacobs' work and dismissed the 12,000 ML/year extractions making recommendations much more in line with a multitude of other research and the community's findings.

Brief Summaries of the Mis-management of the Two GMAs.

The Gerangamete Groundwater Management Area Story.

1912.

Anecdotal history tells us that Boundary Creek a tributary of the Barwon River, had continually flowed from at least 1912 until 1984.

1970s.

Early in the 1970s it become apparent that there needed to be a comprehensive rethink of water resource management in the South-Western district of Victoria. And so began years of time consuming investigation, consultation and drawing up of a far reaching and progressive water plan resulted. (See 1989 NREC, bottom of page 19).

1982-1983 Drought.

During this drought Barwon Water extracted 50% of Geelong's water requirements from the Barwon Downs Borefield.

1984 extraction impacts.

Soon after this major 1982-1983 extraction, surface water depletion impacts began to appear. Most apparent being Boundary Creek stopping to flow for short summer periods and Groundwater Dependent Ecosystems in this catchment started to show signs of stress.

1986 Quentin Farmar-Bowers's Research.

Before any further groundwater extraction was to take place, the Rural Water Commission had Farmar-Bowers carry out research to determine what studies were needed to be conducted. This proposed data collection was designed to build a data bank that would be used to inform one aspect of what was taking place during and after the stress test pump. None of the agricultural or environment studies were conducted but Barwon Water insisted at the NREC hearing that the environmental studies had been done. Farmar-Bowers, based his work on the data at hand at the time and determined that groundwater levels were, and had been for some considerable time, stable in the Boundary Creek district. He also wrote that 1600 ML extraction a year would be a sustainable level. He also found the potential impact area was of considerable agricultural and environmental value.

1986-1990 Stress Test Pump at the Barwon Downs Borefield.

Up to the mid 1990s many predictions and much conjecture was written about the sustainability and potential impacts that could result from various groundwater extraction scenarios. It is worth adding at this point (2019) that these predictions and conjecture have been shown to be extremely accurate. However, in 1987 a groundwater extraction lasting several years was commenced with the aim of placing the Lower Tertiary Aquifers under a stressful regime to enable data collection aimed at determining sustainable and unsustainable levels of extraction.

Late in 1989 Natural Resources and Environment Committee (NREC) Strategy.

A water management strategy for the South-Western District of Victoria commenced in the 1970s and the Natural Resources and Environment Committee (NREC) tabled its final strategy in 1989. This Strategy was comprehensive,

visionary and was heralded as providing solutions to a multitude of water resource management problems. During the following 30 years the NREC Strategy recommendations were not implemented and, poor management decisions continued to be made.

1990-1997 Extremely Wet Period.

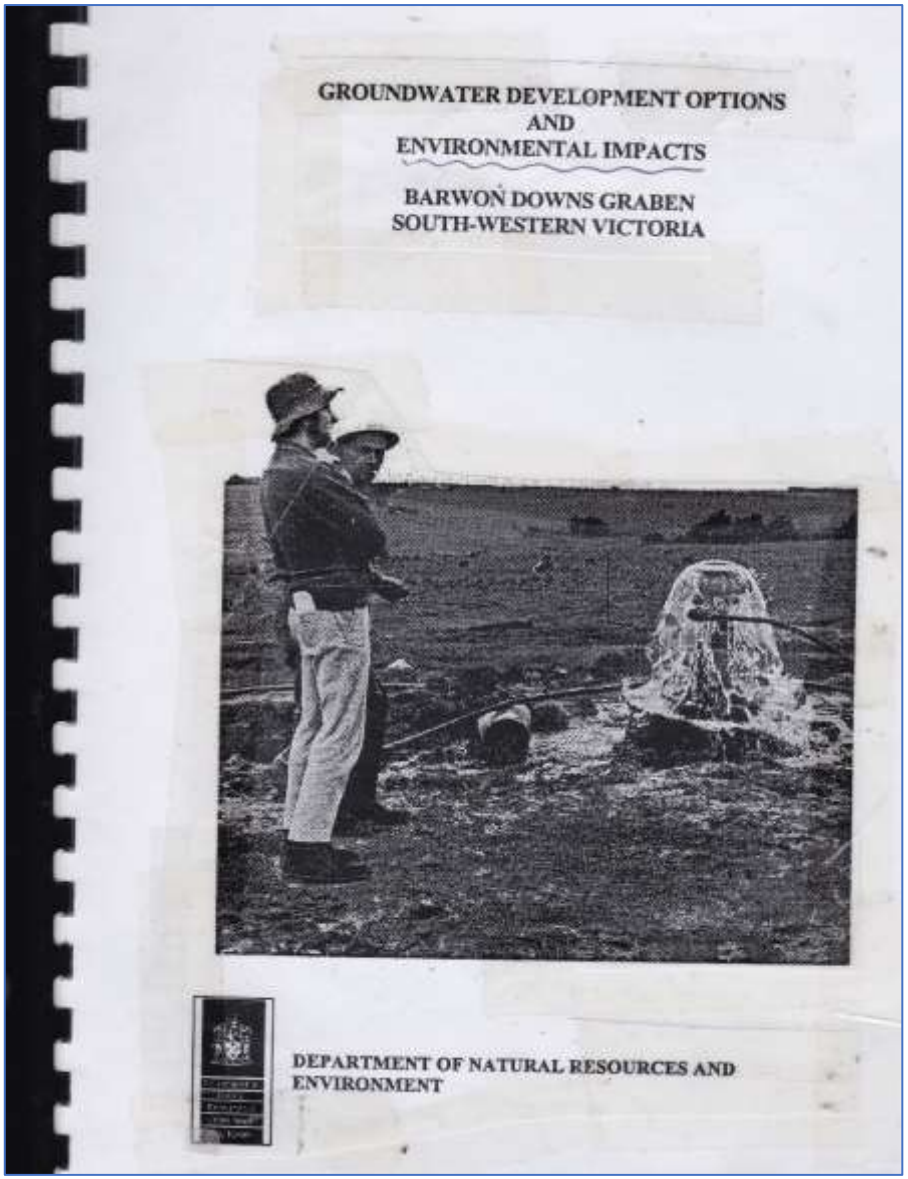
This 1990-97 period experienced one of the wettest times since European settlement. When Barwon Water was attempting to carry out Artificial Recharge & Storage experiments in the late 1980s and early 1990s, it was found that the Lower Tertiary Aquifer was as close to full as it could be and it was not feasible or possible at the time to induce additional recharge. Recharge trials were abandoned and the Lower Tertiary Aquifers continued to overflow to the surface with minimum impact on Ground Water Dependent Ecosystems, springs, perennial streams, creeks and rivers in the area.

Early 1990s Comprehensive Studies Completed.

In preparation and as a lead up to Barwon Water applying for a groundwater extraction licence, extensive and comprehensive flora and fauna studies were conducted.

1995 results of the 1986-90 stress test pump.

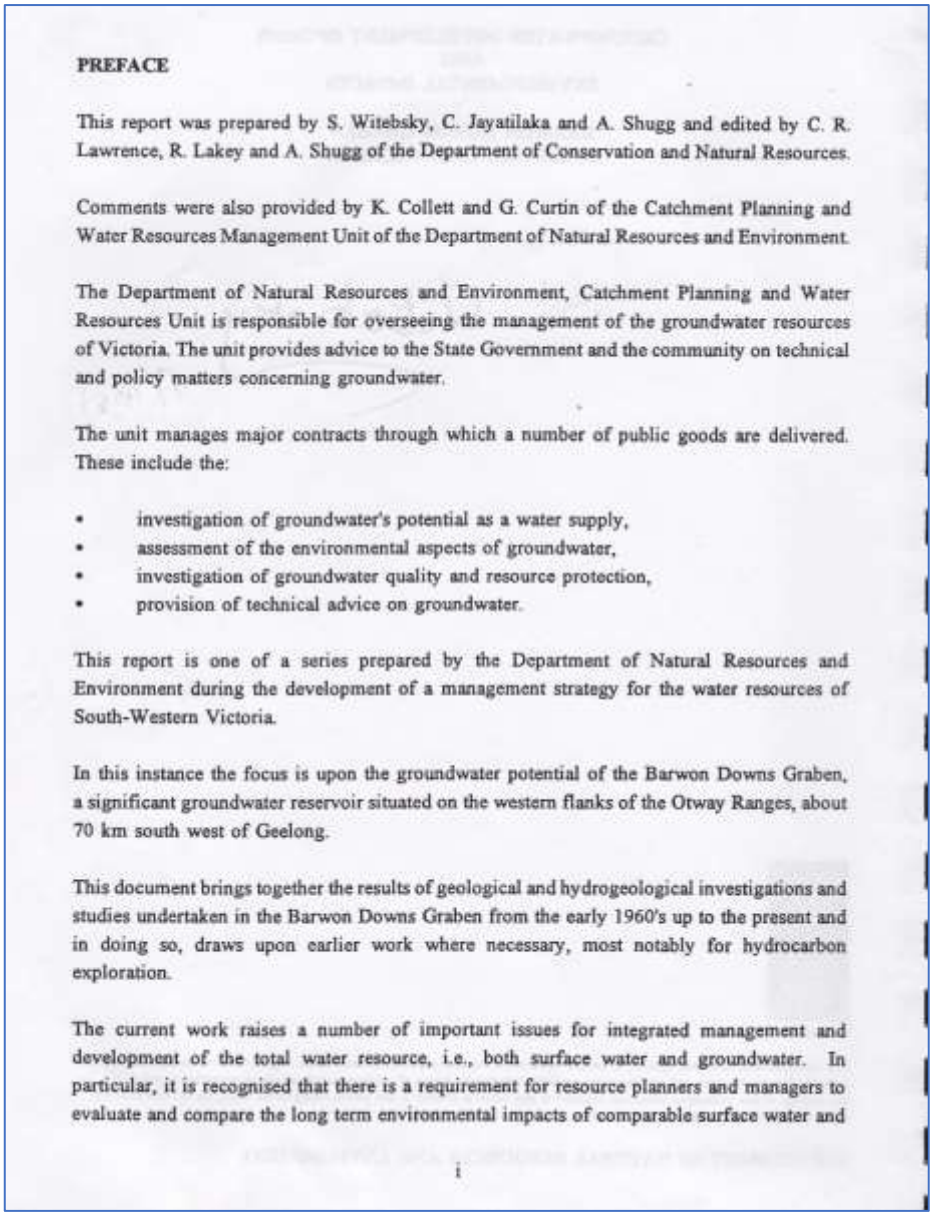
It took several years to analyse and report on the data collected during the Barwon Downs Borefield stress test pump. This report is often referred to as the Witebsky report and volumed out at ***317 pages***. A large number of very competent experts were involved and consulted during the preparation of this comprehensive report (see extracts on pages 21-24).



1500 ML/year extraction was determined to be the sustainable level with no resulting drawdown impact.

4,000 ML/year would result in impacts becoming apparent. As impacts at this level were regarded as manageable the 1990s Permissible Annual Volume recommendation was set at 4,000ML/year (see Appendix Eleven, page 116).

Extractions over 4,000 ML/year during drought should be off set with Artificial Storage and Recovery in wet years.



PREFACE

This report was prepared by S. Witebsky, C. Jayatilaka and A. Shugg and edited by C. R. Lawrence, R. Lakey and A. Shugg of the Department of Conservation and Natural Resources.

Comments were also provided by K. Collett and G. Curtin of the Catchment Planning and Water Resources Management Unit of the Department of Natural Resources and Environment.

The Department of Natural Resources and Environment, Catchment Planning and Water Resources Unit is responsible for overseeing the management of the groundwater resources of Victoria. The unit provides advice to the State Government and the community on technical and policy matters concerning groundwater.

The unit manages major contracts through which a number of public goods are delivered. These include the:

- investigation of groundwater's potential as a water supply,
- assessment of the environmental aspects of groundwater,
- investigation of groundwater quality and resource protection,
- provision of technical advice on groundwater.

This report is one of a series prepared by the Department of Natural Resources and Environment during the development of a management strategy for the water resources of South-Western Victoria.

In this instance the focus is upon the groundwater potential of the Barwon Downs Graben, a significant groundwater reservoir situated on the western flanks of the Otway Ranges, about 70 km south west of Geelong.

This document brings together the results of geological and hydrogeological investigations and studies undertaken in the Barwon Downs Graben from the early 1960's up to the present and in doing so, draws upon earlier work where necessary, most notably for hydrocarbon exploration.

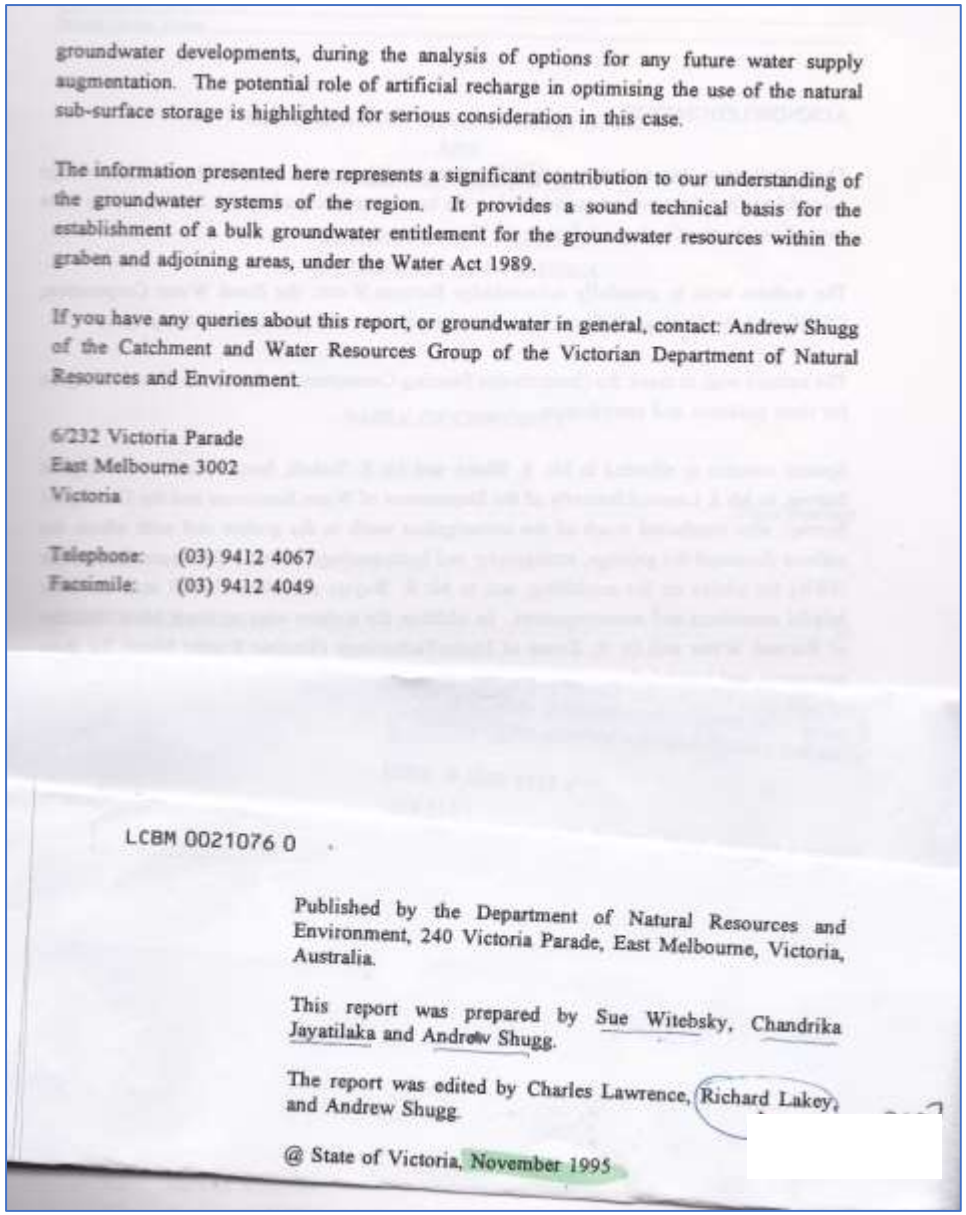
The current work raises a number of important issues for integrated management and development of the total water resource, i.e., both surface water and groundwater. In particular, it is recognised that there is a requirement for resource planners and managers to evaluate and compare the long term environmental impacts of comparable surface water and

i

The compilation of the Witebsky et al. document involved some of the most experienced and definitely the elite of the water industry of the time.

The stress test pump was a direct result of NREC water resource management activities conducted during the water management resources investigations for South-Western Victoria.

This document was one of many on the subject.



groundwater developments, during the analysis of options for any future water supply augmentation. The potential role of artificial recharge in optimising the use of the natural sub-surface storage is highlighted for serious consideration in this case.

The information presented here represents a significant contribution to our understanding of the groundwater systems of the region. It provides a sound technical basis for the establishment of a bulk groundwater entitlement for the groundwater resources within the graben and adjoining areas, under the Water Act 1989.

If you have any queries about this report, or groundwater in general, contact: Andrew Shugg of the Catchment and Water Resources Group of the Victorian Department of Natural Resources and Environment.

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East Melbourne 3002
Victoria

Telephone: (03) 9412 4067
Facsimile: (03) 9412 4049

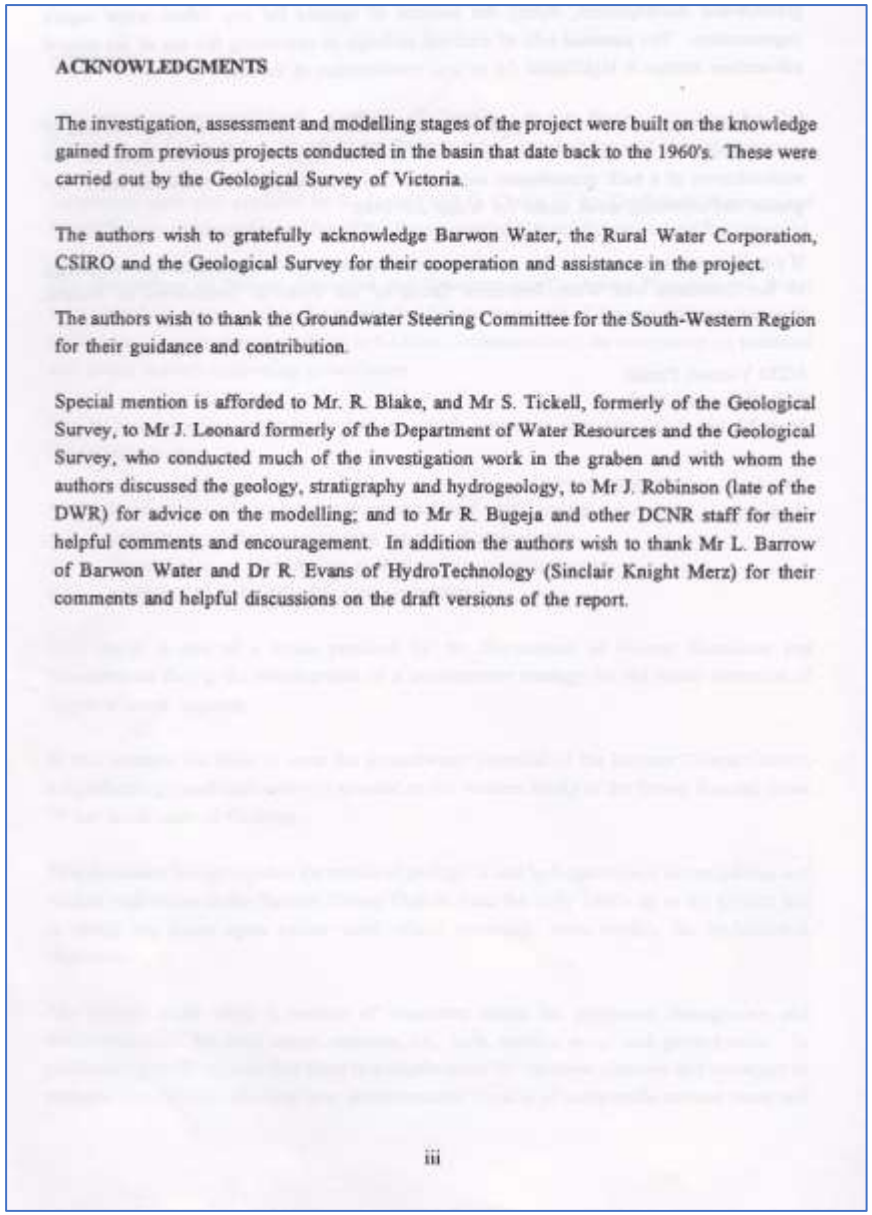
Published by the Department of Natural Resources and Environment, 240 Victoria Parade, East Melbourne, Victoria, Australia.

This report was prepared by Sue Witebsky, Chandrika Jayatilaka and Andrew Shugg.

The report was edited by Charles Lawrence, Richard Lakey, and Andrew Shugg.

As stated this report was a significant contribution to the understanding of the groundwater mechanisms of the area. So much so that all follow up investigations have relied on this work as a base reference.

OTWAY WATER BOOK 55



ACKNOWLEDGMENTS

The investigation, assessment and modelling stages of the project were built on the knowledge gained from previous projects conducted in the basin that date back to the 1960's. These were carried out by the Geological Survey of Victoria.

The authors wish to gratefully acknowledge Barwon Water, the Rural Water Corporation, CSIRO and the Geological Survey for their cooperation and assistance in the project.

The authors wish to thank the Groundwater Steering Committee for the South-Western Region for their guidance and contribution.

Special mention is afforded to Mr. R. Blake, and Mr S. Tickell, formerly of the Geological Survey, to Mr J. Leonard formerly of the Department of Water Resources and the Geological Survey, who conducted much of the investigation work in the graben and with whom the authors discussed the geology, stratigraphy and hydrogeology, to Mr J. Robinson (late of the DWR) for advice on the modelling; and to Mr R. Bugeja and other DCNR staff for their helpful comments and encouragement. In addition the authors wish to thank Mr L. Barrow of Barwon Water and Dr R. Evans of HydroTechnology (Sinclair Knight Merz) for their comments and helpful discussions on the draft versions of the report.

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This page shows an extensive use of who's who in the water industry of the time. This was a thorough report and was heralded as a most comprehensive document.

In 2019 the Department of Environment, Land, Water and Planning (DELWP), determined very similar findings to the findings of this 1995 Witebsky report (see Appendix Nine, pages 60 to 106).

1995. A 12,600 ML/year Extraction Licence Granted to Barwon Water.

With complete disregard to the work being compiled in the Witebsky report, Southern Rural Water granted Barwon Water an extraction licence for 12,600 ML/year.

September 1997 Barwon Water starts to pump.

Nearly two years later and one month before the Permissible Annual Volume (PAV) was announced Barwon Water commenced groundwater extraction at the Barwon Downs Borefield.

October 1997 recommendations Set the Permissible Annual Volume (PAV) at 4,000ML/year.

Because Barwon Water had an extraction licence for 12,600 ML/year Southern Rural Water stated that the PAV would not be put into force or be given any further consideration until Barwon Water's licence was up for renewal in 2002 (see Appendix eleven, page 116).

Summer of 1997-1998. Top End of the Big Swamp Caught Fire.

After such a prolonged period of very wet winters (1990-1997) the Big Swamp should have been well and truly saturated as it had been for decades. However, for the first time in recorded history a nearby wildfire in the summer of 1997-98 ignited the peat in the top end of the swamp. This area of the swamp is still struggling to recover 22 years later. At the time the lower end of the peat swamp was far too wet to burn.

This area turned from a benign Potential Acid Sulfate Soil site into a toxic mix of acid and liberated heavy metals. As the groundwater extraction progressed lowering the water table further and further, the swamp slowly dried out and the Actual Acid Sulfate Soil problem magnified, spreading toxins down through the swamp.

Acid creep down through the swamp with pH levels down to 2.

2002 Licence due for renewal.

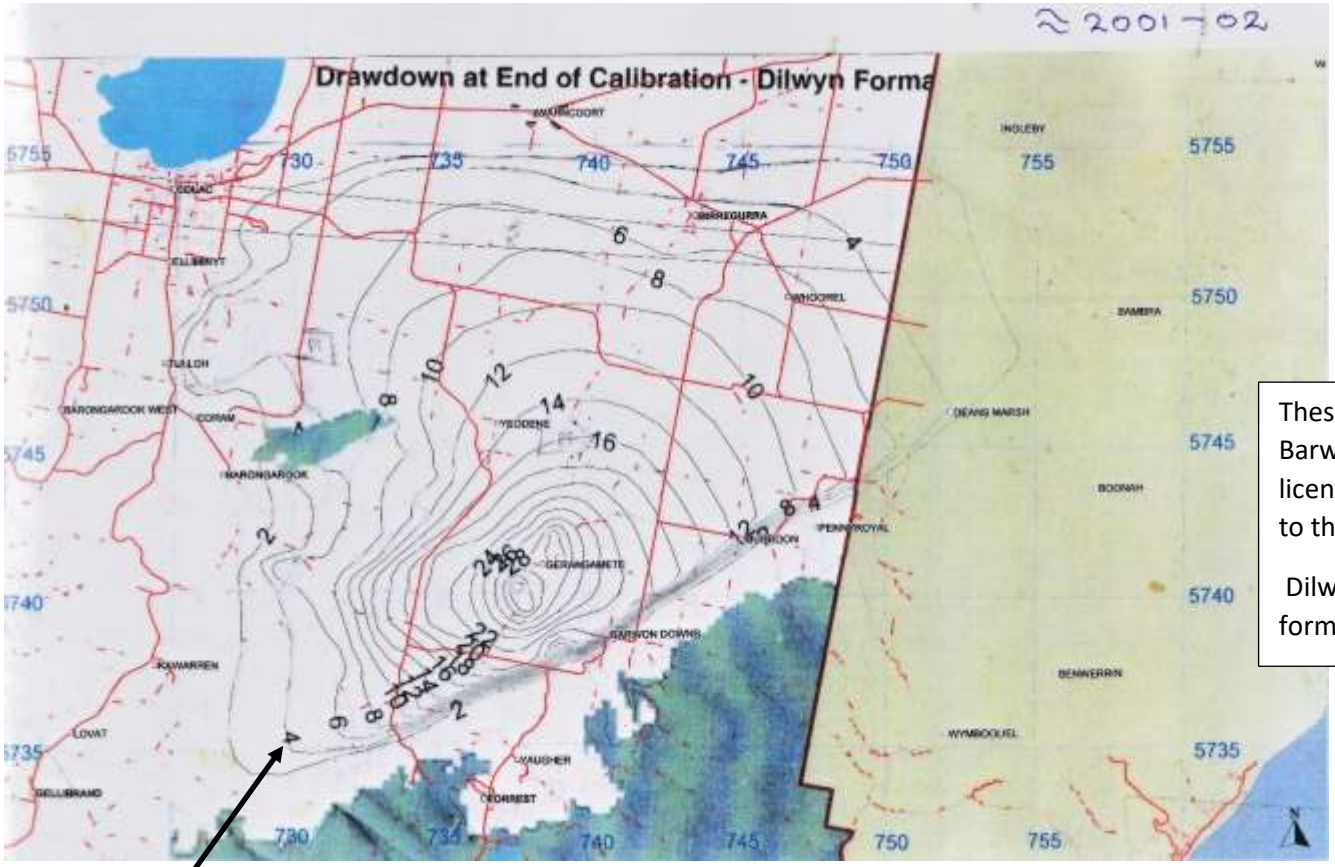
Unfortunately, Barwon Water had not prepared its application for licence renewal and the process dragged on over two years.

2002 Flora and Fish Studies.

As part of the preparation process Barwon Water commissioned follow up vegetation and fish surveys. The results were not encouraging and "warning bells" were ignored.

Even by 2002 the Cone of Depression was Extensive. (see drawdown maps pages 27-28)

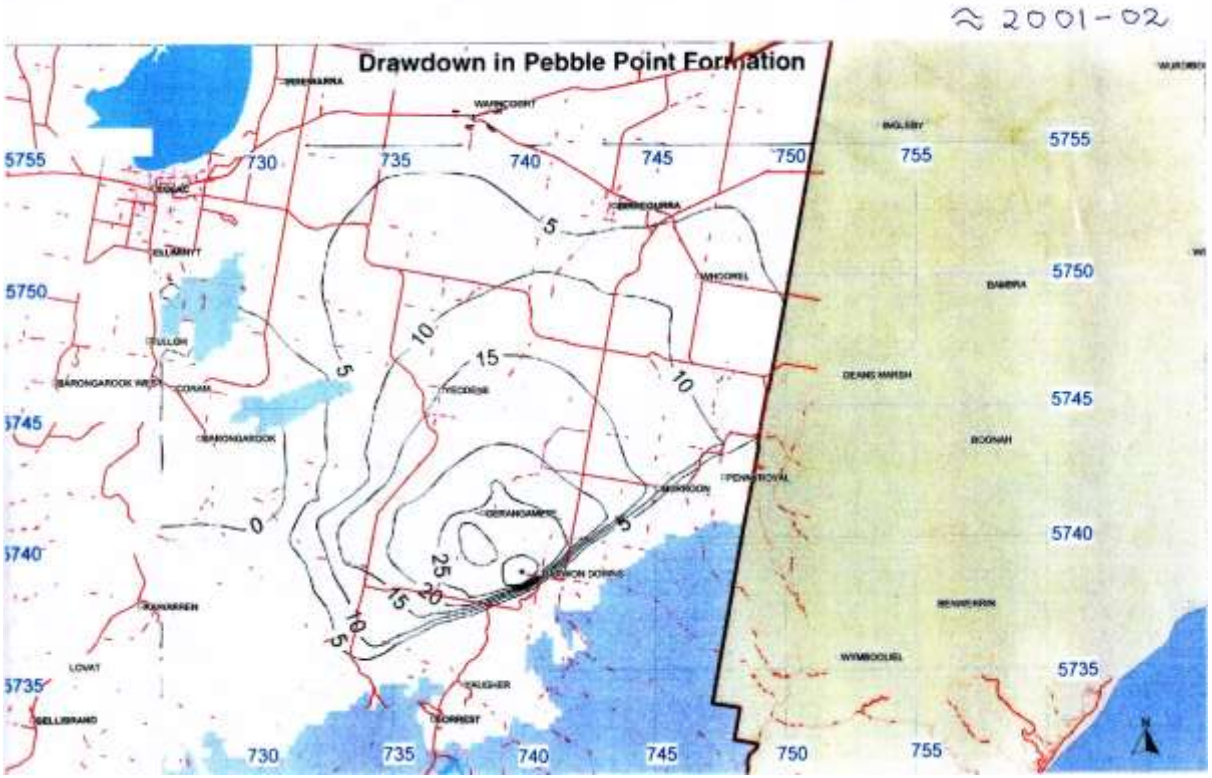
By this stage the cone of depression created from groundwater extraction at the Barwon Downs Borefield covered a significant area and Boundary Creek days of no flow progressively escalated since the 1982-83 drought. Extractions continued. There is every indication that the impacting influence from this 1982-83 extraction has not abated over the 37 years since and the area of impact has spread to an estimated 480 square kilometres.



Contour lines showing drawdown in the Lower Tertiary Dilwyn Aquifer.

These two maps were provided by Barwon Water as part of the licence renewal process leading up to the 2004 licence.

Dilwyn and Pebble Point aquifer formation drawdowns.



2004. Licence Renewed.

Despite 1980 predictions manifesting themselves and despite all of the warning signs appearing from a multitude of observations, Southern Rural Water granted Barwon Water a 15 year extraction licence for 20,000 ML/year.

2006-2010 Millennium Drought.

During this period Barwon Water relied on groundwater extraction from the Barwon Downs Borefield for 70% of Geelong's water requirements.

2012-2014. Vegetation Monitoring Sites Changed and Fish Studies Dropped.

By 2014 Barwon Water was determined to make a fresh start and basically set the reference point for this new start at 2014. Much of the pre 2014 data was ignored or ruled out as unimportant. Modelling was based on post 2014 data, assumptions, guesswork and poor scientific and technical processes.

December 2018 Barwon Water Applies for a Licence Renewal.

This application was based on the results of 2018 modelling by Jacobs. The model determined that 12,000 ML/year was sustainable. The 12,000 ML/year application was submitted by Barwon Water despite recommendations made back in 1986 that 1,600 ML/year was a level that could be sustained. And, this was also despite the 1995 follow up

determination that found the sustainable level to be around 1,500 ML/year. The 1995 recommendation resulted from data collected during the 1987-90 stress test extraction and has never been disproved. But, the most worrying aspect of applying for 12,000 ML/year extraction in 2019 was that the devastation caused by earlier extractions happened as a result of levels under 12,000 ML/year. The average extraction during the Millennium Drought was 11,000 ML/year. If the licence was renewed at 12,000 ML/year very little would have changed other than it would have appeared that a reduction from a licence of 20,000 ML/year down to 12,000ML/year was a huge concession. No concession at all.

2019. Unsustainable Practices Recognised.

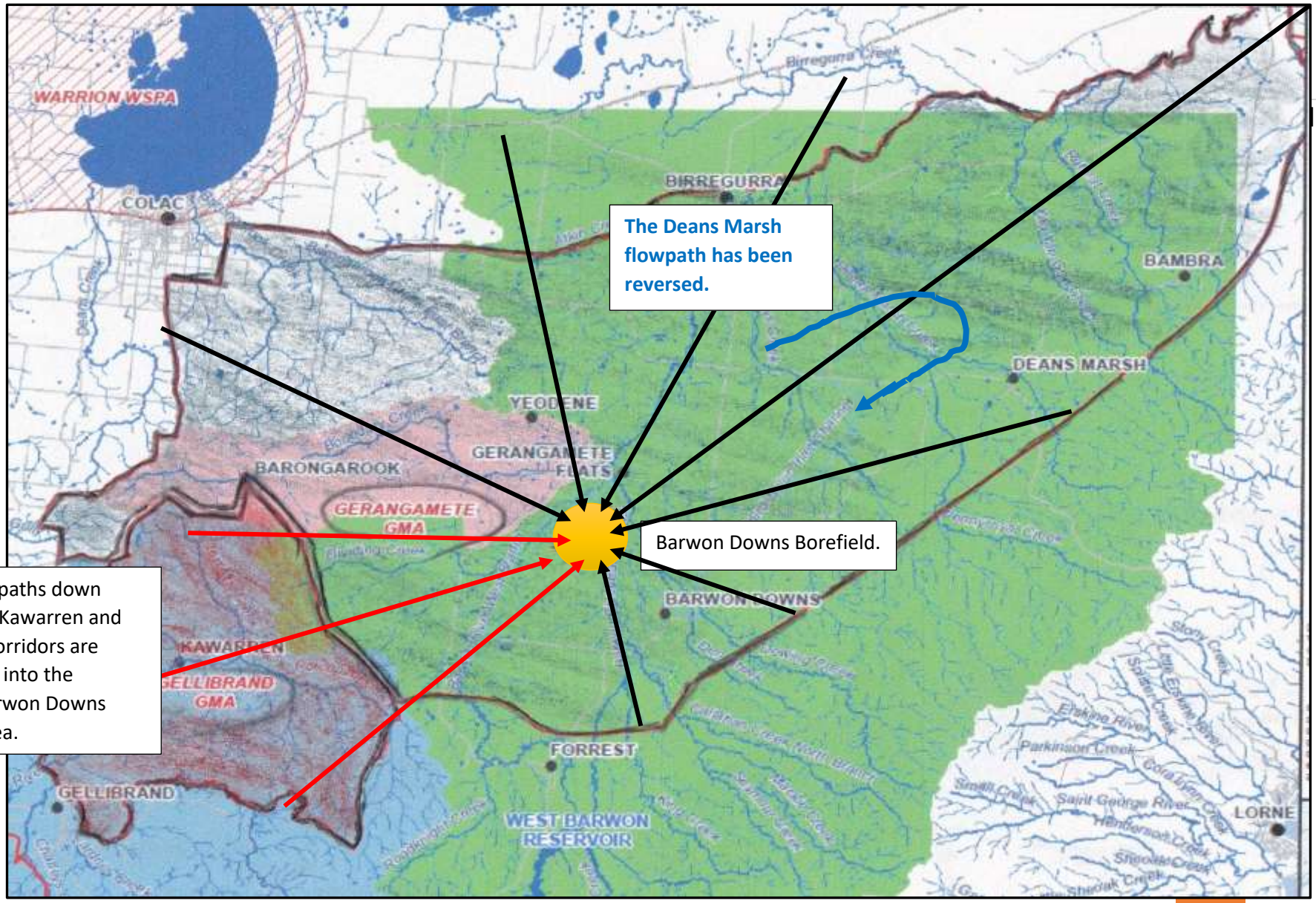
By 2019 Barwon Water finally accepted that groundwater extraction from the Barwon Downs Borefield was unsustainable under the present and projected pumping regimes. In March 2019 Barwon Water did not proceed with its extraction renewal application.

2019. Remediation Work Begins.

Remediation work commenced on *some* of the observable impacts created from over extraction.

Impacts Resulting from Mis-Management and Mining of the Aquifers in the Gerangamete GMA.

1. At least 480 km^2 of area has come under the residual drawdown influence from the Barwon Downs Borefield.
2. Drying up and or polluting farmers' Stock and Domestic water supplies.
3. Every indication that early in 2019 seven calves died as a result of toxic contaminated water.
4. Numerous Groundwater Dependent Ecosystems radically impacted.
5. Boundary Creek turned from a gaining to losing stream.
6. Potential Acid Sulfate Soil sites transformed into Actual Acid Sulfate Soil sites. The Big Swamp has been identified as the highest known Freshwater Inland Actual Acid Sulfate Soil site in Australia.
7. The Big Swamp has also been recognised as one of the worst top three Actual Acid Sulfate Soil sites in Australia.
8. The cone of depression created at the Barwon Downs Borefield is de-watering the adjoining Gellibrand Groundwater Management Area (see page 30).


WARRION WSPA
COLAC
BIRREGURRA
BAMBRA
DEANS MARSH
YEODENE
GERANGAMETE FLATS
BARONGAROOK
GERANGAMETE GMA
BARWON DOWNS
KAWARREN
GELLIBRAND GMA
FORREST
GELLIBRAND
WEST BARWON RESERVOIR
LORNE
The Deans Marsh flowpath has been reversed.
Barwon Downs Borefield.
Aquifer flowpaths down through the Kawarren and Gellibrand corridors are being drawn into the depleted Barwon Downs Borefield area.

9. Recharging flow-paths into the aquifers have been dramatically altered.
10. The aquifer flowpath towards Deans Marsh has been reversed (see page 30).
11. Drying out of peat has turned carbon collecting sinks into carbon releasing systems.
12. In this process of drying and burning of the peat other toxic gases are released to the atmosphere.
13. Acid water and toxic heavy metals resulted in a 30 km fish kill down the Barwon River in 2016 & 2018.
14. Loss of platypus colonies, fish species, yabbies and other freshwater species.
15. EPBC listed species occur within the impacted areas.
16. Untold impact on stygofauna. One of the benefits of a healthy stygofauna is its ability to purify aquifer water.
17. Soil structure and composition radically changed.
18. The creation of toxic pollutants leaching into and contaminating the aquifers.
19. Loves Creek in the Gellibrand GMA has had its baseflow reduced by approximately 50%.
20. A cone of depression has been created under the village of Kawarren.

Future Impact Possibilities.

a) Disruption of the equilibrium of salinity in the subsurface layers that have stabilised over eons.
b) Downward vertical leakage out of the aquitards and other higher level structures taking some time to manifest with untold/unpredicted consequences.
c) A longer than estimated period for the Lower Tertiary Aquifers to recover, presently estimated at 50-100 years.
d) Water resource management decisions based on the conclusions and recommendations of unvalidated reports that have not been evidentially verified.

The Gellibrand Groundwater Management Area Story.

Decisions of the 1990s.

In the 1980s Barwon Water was set to begin groundwater extraction from the Gellibrand Groundwater Management Area at Kawarren for urban use in Geelong. However, investigations in the early 1990s determined several things that put a stop to any such development.

- Surface and groundwater resources within the Gellibrand River Catchment were already overallocated.
- Extraction of 3 GL/year at Kawarren would dry up the Gellibrand river.
- The Gellibrand River is iconic with the best River Blackfish in Victoria.
- EPBC listed Grayling are present.
- Introduced Redfin have not colonised the catchment.
- Platypus colonies thrive.
- The Yahoo Creek, a tributary of the Gellibrand River system, contains a unique assemblage of native fish species and has a comparable population of River Blackfish rivalling those of the Gellibrand River.
- Legislating and implementing the most basic environmental summer survival flow for the Gellibrand River would cause Western District towns such as Camperdown, Terang, Timboon, Cobden etc. to run out of water during drought.

2007. Barwon Water to Implement a $200 million Groundwater Extraction at Kawarren.

Despite the 1990s findings, in 2007 Barwon Water attempted to extract 16 GL/year of groundwater at the Kawarren Borefield. This proposal included land acquisition, roading, treatment plant, extraction pumps, piping to the Geelong system, electricity supply etc.

Minister for Water Tim Holding, cancelled the Permissible Consumptive Volume of zero per year and gave Barwon Water permission to proceed with this development.

Local communities opposed this proposal and 24 hours before the case went to VCAT in September 2009, Barwon Water under advice, withdrew the application to proceed.

2018 Impact from the Barwon Downs Borefield on the Gellibrand Groundwater Management Area.

The Gellibrand Groundwater Management Area is connected to the Gerangamete GMA and as at 2018 the drawdown created in the Gerangamete GMA …

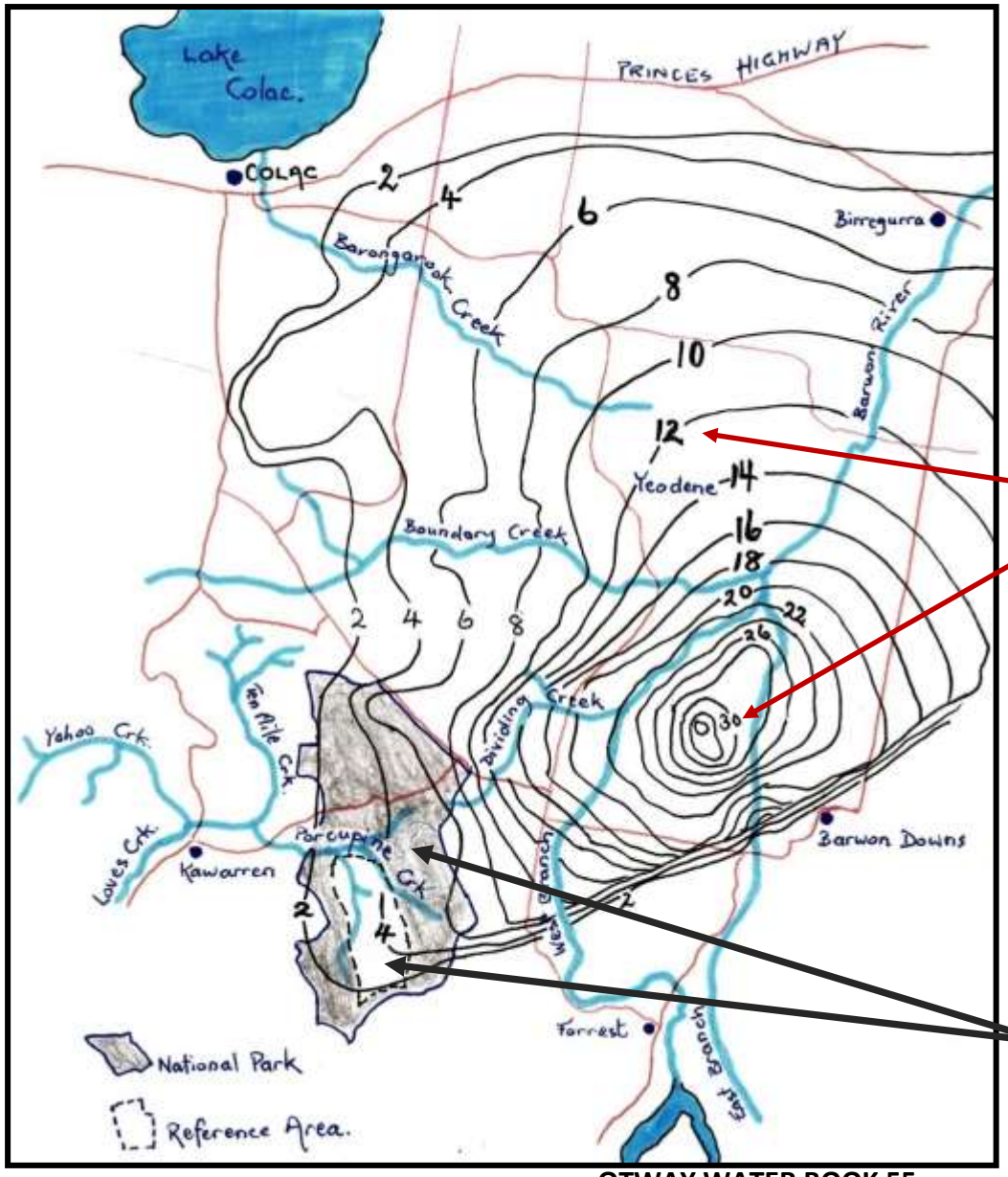
- sucks water away from the Gellibrand GMA resulting in a 50% reduction in Loves Creek base flow,
- has caused a cone of depression to form under the village of Kawarren, and
- has resulted in a reduction in the baseflow of the Gellibrand River over a substantial section of the river.

Gellibrand GMA Reference Area and National Park.

The Gellibrand Groundwater Management Area has a Reference Area reserve found within a National Park. As the following map indicates (page 34) both the Reference Area and the National Park are well within any drawdown influence resulting from groundwater extraction at the Barwon Downs Borefield.

A Reference Area is a particular area of land that contains a close to pristine environment, or a specific natural asset that is not to be impacted from any human action, proposal or intervention. The idea being, that this area will provide an untouched source of genetic diversity, or some other natural asset that has the potential to be beneficial to the advancement of positive human endeavour.

Groundwater extraction from either the Gerangamete or Gellibrand Groundwater Management Areas must not be allowed to continue. The integrity of both the National Park and Reference Area would be assured with perpetual preservation of the aquifers within these two GMAs.



2001-2002 residual drawdown impact contours shown in metres.

National Park and Reference Area.

Both areas can be impacted from groundwater extraction from either the Barwon Downs, Kawarren or Gellibrand Borefields. This map shows what the drawdown influence was depicted by Barwon Water back in the early 2000s.

CONCLUSION.

It has taken thirty seven years to come to the conclusion and determination that groundwater extraction greater than 400 ML/year from the Gerangamete and Gellibrand Groundwater Management Areas cannot be sustained without devastating social and environmental impacts.

The Labour State Government has also reached this conclusion and legislated in June 2019 that extraction in the Gellibrand Groundwater Management Area be limited to ZERO ML/year, while reducing the Gerangamete Groundwater Management Area groundwater extraction by over 99%. That is a reduction from 20,000 ML/year down to 239. The 239 ML/year covers current farmers' licences that will be reviewed when they come up for renewal in 2025 and 2030. The Government's message could not be clearer – leave these two Groundwater Management Areas alone.

The case has been presented and proven that both these Groundwater Management Areas must be protected from human interference. Even though this latest legislation protects these areas in the short term, at the "stroke of a pen" the Minister for Water could change this over night as was done in 2008, when the then Minister for Water Tim Holding, cancelled the zero extraction for the Gellibrand GMA allowing Barwon Water to proceed with a $200 million groundwater development at the Kawarren Borefield. Barwon Water withdrew its application the evening before going to VCAT appeal. It then took until June 2019 to reinstate the Gellibrand Groundwater Management Area Permissible Consumptive Volume to zero extraction. This on off protection cannot be allowed to happen again.

Not only will declaring the area of these two Groundwater Management Areas as a Subterranean National Park and making it much more difficult to access groundwater resources, the aquifers' preservation will allow the surface waters to look after themselves and return to a natural state of health.

Even though this is a very small area of the Otway Ranges, the Gerangamete and Gellibrand Groundwater Management Areas must be preserved in perpetuity as a Subterranean National Park.

Some Clarification.

The Otway Ranges Subterranean National Park.

In this Otway Water Book 55 proposal to declare the Gerangamete and Gellibrand Groundwater Management Areas a Subterranean National Park has been motivated and driven by the appalling impacts resulting from groundwater mining for urban use in the Greater Region of Geelong. Understandably, the way the proposal has been presented in Book 55 has led readers to focus on the water issues at play. As Book 55 states, if humans looked after the aquifer ecosystems then the surface water ecosystems will look after themselves. In the Otway Ranges a natural and healthy connection between the subsurface ecosystems and the surface ecosystems is critical and unique. And, water is one of the major influences dictating the health of the region. Therefore, a concentration to water issues.

However, there is a much bigger picture at play than just water issues in this proposal for a Subterranean National Park. The bigger picture is encapsulated in the aims and objectives of the National Park Act, 1975.

"… ***to preserve and protect features in a Park of archaeological, ecological, geologically and scientific interest.***"

Also, in the Preamble to the National Parks Act it states…

"…***certain Crown land characterised by its predominantly unspoilt landscape, and its flora, fauna or other features … reserved and preserved and protected permanently for the benefit of the public.***" A subterranean park can do this in "spades."

As with National Marine Parks where minor changes are required, the wording of *unspoilt landscape* could be replaced, with *unspoilt earth structures*.

Professional Advice.

LAWROC Landcare Group sought professional advice on options that are available to provide a long term protection from any future over exploitation and mismanagement of water resources within the Otway Ranges especially in the Barwon Downs Borefield area of influence. Part of this advice included comment on the Otway Ranges Subterranean National Park proposal.

The following dot points are based on this advice.

- Under current law the declaration of a Subterranean National Park ***is possible***.

The Friends of the Barwon Inc., support the proposal but under advice state "…***the required legislation would be exceedingly difficult to enact***…" Difficult but not impossible.

- It is not unusual for surface National Parks to be delineated by reference to vertical depth. Such as Marine National Parks; the Castlemaine Diggings National Park and the Greater Bendigo National Park. It is clearly possible to declare a Subterranean National Park for the Gerangamete and Gellibrand Groundwater Management Areas.
-

An example of the wording could be…

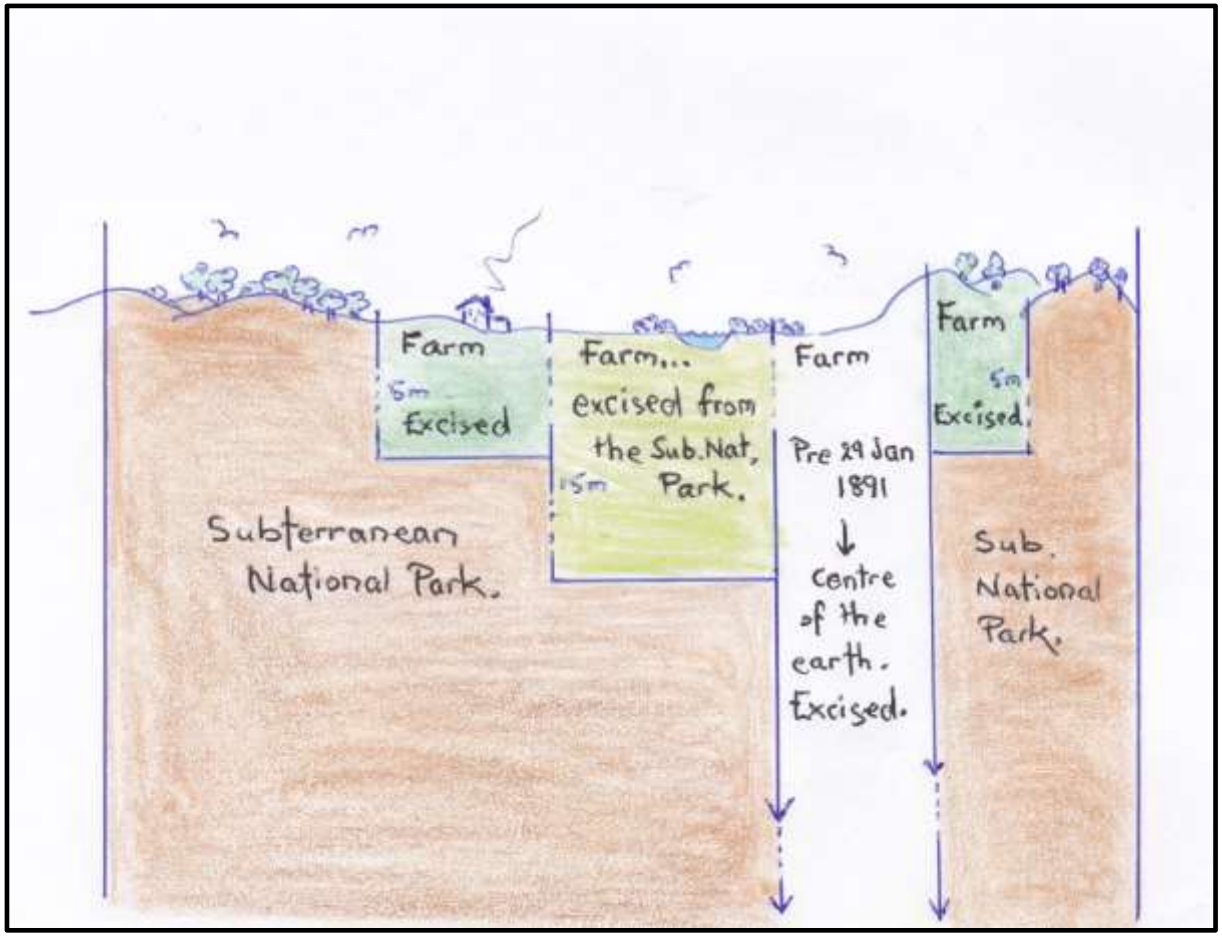
The Gerangamete and Gellibrand Groundwater Management Areas would be described as parcels of land including land delineated on official plans to the extent that the land is:

(a) Crown land below land of private freehold land holders,

(b) Below any government controlled land,

(c) Below any public ownership, and to a depth of 3000 metres.

Where there is will there is a way.



The Subterranean National Park will wrap around and under farms and any other form of landholding not controlled by the State of Federal Governments.

It is possible. All that is required is the will to do it and an Act of Parliament.

Benefits of the Park (see page 13)**.**

- Subterranean ecosystem will be protected.
- Surface ecosystems dependent on a healthy subterranean will be supported.
- Landholders above the Park can be assured of a natural, healthy and sustainable environment under and or around their farms.
- The Subterranean Park will be easy to manage and extremely cost effective for the State Government.