

OTWAY WATER BOOK 23

Gellibrand Groundwater Management Area, Surface and Ground Waters by Malcolm Gardiner

C



Water Wheel Powered Saw Mill at Beech Forest, early 1990s.

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Front Cover by Lyn Parrot.

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INTRODUCTION.

The Otway Ranges have undergone massive changes since European settlement. Its resources have been utilised and exploited. Very few features remain unmodified. For example the forests and the timbers within them were thought to be of such a quantity that harvesting the old growth timber would never see the resource depleted.

"... no other forest in the colony contains such a wealth of this valuable timber." (Secretary Central State Forest Board, 1875⁽⁷¹⁾.)

Many examples of similar statements can be found in the works of Hebb⁽⁷¹⁾ written in the late 1880s describing the high quality and abundance of valuable timber.

"There is a supply inexhaustible in the Otway Forest of timber of the finest quality..."

Clearing and timber harvesting of the old growth forests accelerated with mechanization and from this point the Otway Ranges began to undergo a change that may never be reversed.

"In contrast to thousands of years of aboriginal occupation the brief period of European settlement in the Otway region, commencing in the late 19th century, has brought about widespread and permanent environmental change."⁽⁴¹⁾

The need for a water supply for the many towns and settlements being established in the Western District and along the coast realised the building of dams and drawing off of water from many of the rivers and streams flowing into Bass Strait and the Southern Ocean. In Colac & District Water Board's "A Trust In Water,"⁽⁹³⁾ a 100 year history 1880 – 1990 of Colac's water supply, McCormick writes how "…harnessing the bountiful water resources of the Otways had been achieved…" Throughout this 100 year period the water harvesting had more than doubled with each generation. However, it was never contemplated that the resource would ever run out. The concern was the manner in which it could be captured and transported for anthropogenic uses.

Stock, rural domestic, irrigation and urban use seemed to have little impact on the plentiful supply of good quality drinking water. This supply of water was viewed in a similar fashion to the available timber, it would never run out. However, demands increased and by the late 20th century large quantities of groundwater extraction for urban use placed such an added burden upon the water resources, coupled with climate change and drought, that it was becoming obvious that there was an over

allocation of surface and ground waters. The acceptance that a high percentage of the summer surface flows was in fact overflow from groundwater could no longer be ignored. Unfortunately it was found that the same water had been allocated twice, once as groundwater and once as surface flow.

Around the 1980s an environmental consciousness moved people to demand that the utilization of resources in the Otway Ranges be undertaken in a much more sensitive manner. MacMillan, Kunert & Blakers,⁽⁹¹⁾ Rice,⁽¹⁰³⁾ Tunbridge & Glenane,⁽¹²⁴⁾ Zampatti, Bradshaw & Lewis,⁽¹⁴⁴⁾ Farmar-Bowers⁽⁴³⁾ and others put forward a compelling case that the Otway Ranges was a unique part of the world where parts of the forests and ecosystems had remained relatively isolated from human interference since time began. The Otway Ranges were also referred to as an "island" of biological significance. The argument was strongly put that this uniqueness should be recognised and all efforts should be made to preserve what values remained. The Victorian Sate Government in 1988 in its State of the Environment, Inland Waters report,⁽¹³⁶⁾ recognised that species and environmental processes could not tolerate changes in water quality or significant systemic change.

The headwater sections of the Gellibrand River and its tributaries are a fresh water system that has undergone many of these changes and continues to face threats from over allocation, pollution and degradation. This is one of the largest catchment within the Otway Ranges and the utilization of the water resources from this system have been under considerable pressure for some time. This book attempts to describe the past and present situation highlighting the reasons why high quality sensitive planning that has been lacking in the past, should be implemented when considering future water utilization projects.

The majority of the material in this book concentrates on the Gellibrand Groundwater Management Area (GGMA).

While reading this book keep in mind the Victorian State Government was one of the first states to sign up to the 2004 National Water Initiative. This involved making a commitment to:

Prepare water provisions for the environment Deal with over allocation or stressed water systems Register water rights and standards of accountability, and Meet and manage urban water remands.

Some of the aims of this National Water Initiative are:

To improve public access to information

To manage surface and groundwater in an integrated manner

- To return over allocated groundwater to a sustainable level, and
- To develop effective water accounting.

Unfortunately successive Victorian State Governments have only been successful meeting urban water demands. This is a rather dismal performance and does not look like improving in the foreseeable future. The commitments and aims agreed to in the National Water Initiative have made little change to the deplorable mismanagement of the water resources of the Barwon and Gellibrand River Catchments of the Otway Ranges.

Public access to information remains extremely difficult to obtain No total water balance accounting has been done

Groundwater continues to be mined

Surface water is over allocated

The State Water Holder has no record of any holdings for any system in the Otway Ranges

The State Water Register does not take account of unpaid stock and domestic water rights

The Victorian Auditor General has found... *"The Department of Sustainability and Environment (DSE) and water corporations do not know whether groundwater use is sustainable."*⁽⁸⁴⁾

Further to this the Victorian State Government's assertions⁽¹⁵⁸⁾ that attaining the agreed goals as outlined in the National Water Initiative,⁽¹⁵⁷⁾ is reported in generalities. Little of substance is provided. When asked for the documents supporting these assertions, the Department of Environment and Primary Industry has been unable to provide any document that relates in a meaningful way to either the Gerangamete or Gellibrand Groundwater Management Areas. Some of the documents mentioned in Victoria's statement of goals achieved under the National Water Initiative are:

The Sustainable Water Strategy,

Groundwater Management Plan,

Surface Water Management Plan,

Regional Water Strategy, and the

Victorian Water Account.

As with the earlier books in the Otway Water Book series, this books summarise, adds to the ever unfolding story of mismanagement of water resources in the Otway Ranges, foothills and plains. An effort has been made to concentrate on the Gellibrand River Catchment and Groundwater Management Area but as always the dilemma of the Boundary Creek fiasco keeps intruding.

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CHAPTER ONE



LOCATION MAPS & DESCRIPTION of the Gellibrand Groundwater Management Area.

Map Source: Corangamite Catchment Management Authority Regional Catchment Strategy Plan 2013-2019.



On 2 November 2006, the Victorian Government published the Victorian Government Gazette, G44, in which the Permissible Consumptive Volume (PCV) Groundwater Order 2006 stated that all depths for groundwater extraction from the Gellibrand GMA be set at zero. The order stated.

"...Taking effect on 2nd November 2006...the total volume of groundwater that may be taken...under the Water Act or any other Act...must not exceed the volume specified in the Order..." in the Gellibrand Groundwater Management Area this was set at ZERO.

Previously, in 2004/05, the Victorian Government State Water Report, stated that... "...the PAV(now PCV) for the Gellibrand is set to zero due to the concerns...raised in studies...about groundwater pumping adversely affecting baseflows to the Gellibrand River."

In the Sustainable Water Strategy, Central Region published by the Victorian Government in October 2006 (p. 320), the Government states...

"The Government will issue new entitlements or licences to extract additional groundwater ONLY within the permissible consumptive volumes after existing commitments are met and if dependent ecosystems and aquifer health are protected."

The Gellibrand Groundwater Management Area had been assessed and described as a GMA that should not be stressed any further. Its water resources were at best fully allocated. However, in July 2008 the then Water Minister Tim Holding made a poorly informed decision and Gazetted G28, deleting the section removing the zero component of the Gellibrand Groundwater Management Area from the 2006 Order, allowing a stress test pump to proceed at Kawarren.

(Deleted, "Gellibrand groundwater LEGL/04-134 All formations 0 management area.")

In a letter dated 28 August 2008, Ref: DSEO54974, File CS/03/3003, Minister Holding wrote this,

"On 19 July 2008, the PCV for the Gellibrand GMA was set at 625 million litres. The PCV operates for 13 months from the date of its gazettal to allow SRW to issue a licence if SRW decides that BW's application should be approved..." (BW being Barwon Water)

Two months later, in October 2008, Southern Rural Water issued a licence to Barwon Water for the extraction of groundwater from the Kawarren Borefield. Eight groups of local residents took the case to VCAT and Barwon Water (BW) withdrew its application 24 hours before the VCAT appeal was to be heard.

It is assumed that as the 13 months has expired the PCV has reverted back to zero. However, in Chapter 19 "Misinformation, Ignorance and Generalities," page 139, tells a different story of omission and intrigue.



MAP SOURCE: Barwon Region Water Authority (Barwon Water)

The Gellibrand Groundwater Management Area covers approximately 88 km². 12 km² of outcropping aquifer material to the north of the Gellibrand GMA has been interpreted as the recharge zone for groundwater in the Gellibrand Groundwater Management Area and has been calculated as a flow through of around 1900 ML/yr.⁽⁷⁶⁾

In a 1982 study it was stated that the aquifer system contributes between 13%-24% of the baseflow to the Gellibrand River.⁽¹⁴⁰⁾ "The major proportion of the groundwater throughflow is reported to ultimately discharge into the Gellibrand River."⁽¹⁴⁰⁾

A 2012 report by SKM⁽¹¹¹⁾ calculated 100% of summer baseflow in the Gellibrand River is from groundwater.

Other creeks within the GMA receive the majority of their baseflow from the same Eastern View Formation aquifer.⁽¹¹¹⁾



MAP SOURCE: Department of Sustainability & Environment, Victorian State Government.

The Gellibrand Groundwater Management Area is largely centred around Kawarren. It shares a common boundary with much of the Gerangamete GMA to the east and north and is separated from the Newlingrook GMA in the west by several kilometres.

The Gellibrand River flows through the Gellibrand GMA and has many perennial flowing tributaries...

- Loves Creek
- Yahoo Creek
- Serpentine Creek
- Spiny Horn Creek
- Porcupine Creek
- Ten Mile Creek
- Arkuna Creek
- Pompa Bill Creek
- Alkemade Creek

Many of these small tributaries are regarded as nursery sites for the replenishment of biota in the larger streams and rivers of the Gellibrand Catchment.

The Gellibrand GMA has many bushland reserves, picnic reserves, a National Park and a Reference Area.



<u>MAP SOURCE</u>: Woodward-Clyde⁽¹⁰⁸⁾

CHAPTER TWO

Utilisation of the Water Resources.

The Otway Ranges water resources have been harnessed and diverted in numerous ways to provide water for a multitude of anthropogenic uses as far to the west as Warrnambool; to the north Cressy; south to the coastal towns and east to Geelong.

The water resources utilised by the Colac District Water Board came under some threat late in the 1960s when the Geelong Waterworks and Sewerage Trust (now Barwon Water) flagged the need to augment its existing water supply system. Up to this period Geelong made extensive use of the surface water resources in the Barwon River catchment. However, the availability of the resource appeared to be reaching a critical stage. In 1979 the Gellibrand River Inquiry was opened examining the water needs of the south western area of Victoria and by the end of this project particular attention was given to Geelong's water needs.

This inquiry led to the publishing of a report in 1989⁽⁹⁷⁾. Appendix One summarises many of the recommendations set out in this report and these recommendations highlight and provide a general impression of common sense, vision, and a hope that the water management of south western Victoria was in good hands. Sadly, 24 years later, many of these recommendations have fallen well short of realisation.

Otway water has also been utilised for a variety of endeavours including; forestry, mining, gravel extraction, urban development, road construction, drainage of wetlands, dams, weirs, a bottled water industry, fire fighting, irrigation, farm and domestic pursuits and in the early years of the timber industry water was harnessed to power saw mills.

Of course mention must be made of the passive uses of the Otway waters. These are activities that rely on this water source but don't actually take the water from the rivers, creeks, springs, soaks and wetlands. Tourism and recreation, in its many forms, such as walking the streams and waterfalls, canoeing, fishing, camping, swimming, photography and simply admiring the beauty of the Otways are examples of much valued uses. But perhaps the most passive and least considered of users are the flora and fauna that make up the ecosystems of the Otways.

The water resources of the Otway Ranges including the Gellibrand Groundwater Management Area, form an integral part of the region, and if managed correctly will help maintain a balanced and healthy environment for generations to come.

CHAPTER THREE

The Value of Water in the Gellibrand Groundwater Management Area.

A. ...as an Ecosystem

An ecosystem is a basic functional unit of nature comprising plants and animals and their nonliving environment of air, water, soil and rock, intimately linked by a variety of biological, chemical and physical processes. The living and nonliving components interact among themselves and with each other; they influence each others' properties and both are essential for the maintenance and development of the system. Earl and Bennett⁽⁴¹⁾ determined that the Otway Ranges supports a diverse array of floristic vegetation communities providing a wide variety of habitats for native fauna.

As an example, in the Colac Herald dated 20 February 2015, page 6, Kristen Leed of Corangamite Catchment Management Authority – Waterwatch, highlights the connectedness between rivers and estuaries and the important role a healthy river plays in maintaining a healthy seafood industry. As a nursery and food source estuaries, such as the Gellibrand River's, support an array of diverse and abundant native fish that are important commercially and for recreational fishers.

It is also stated in the Victorian Department of Health's 2010 "Protect Our Water, Protect Our Health" document,⁽²⁶⁾ "Water is essential to sustain life."

Jacques Leslie writes that "...the delusion that humans are exempt from nature's dominion.." is a too often held belief that unfortunately leads to a gung ho, she'll be right mate attitude sanctioning environmentally impacting behaviour.

Healthy ecosystem including the Gellibrand River Catchment ecosystems must not be treated in such a fashion.

B. ...as a Backbone

The Corangamite Catchment Management Authority (CCMA) in a 2013 document⁽²¹⁾ states that, *"The Gellibrand River is the backbone of the Otways , supporting life, industry and recreational activities."* The CCMA also identifies, in its River Health Strategy (2006), the Gellibrand River as a priority waterway for ecological value and an essential source of urban water supply.

C. ...as a Major Tourist /Recreation Destination.

In 1984 Koehn⁽⁸⁰⁾ wrote that the Gellibrand River system as a whole was seen as a major recreation and tourist destination and had to be regarded as an important economic asset. This is still the case.

The Department of Water Resources⁽³⁵⁾ commented that the environmental significance of the Gellibrand River has long been recognised and is regarded as having very high conservation values, particularly in view of the relatively low level of catchment and stream modification and river regulation. Such systems in Victoria are regarded as rare.

D. ...as a Fishery

Tunbridge & Glenane⁽¹²⁴⁾ and Tunbridge⁽¹²⁵⁾ when making recommendations for an environmental flow regime for the Gellibrand River in 1988 and 1997, stated that, *"The Gellibrand River and tributaries contained 12 species of native fish and only one introduced species."* Tunbridge also stated that, *"The Gellibrand River is therefore of very high value because it provides extremely secure and excellent environmental conditions for biota."* Only 11% of rivers in Victoria contain predominantly native fish and very few carry such a diversity of species. *"This faunal assemblage, with four species of galaxiids and two species of lamprey is therefore of special conservation value." "The river also carries the best population of blackfish, both in number and size of fish, of any river in Victoria."*

Victoria has seven rivers that are known to carry large sized blackfish. The Gellibrand River contains the highest percentage of large sized blackfish out of the 146 Victorian rivers known to contain blackfish.⁽¹²⁵⁾

E. ...as an integral Part of Human Health and Welfare

The direct and indirect processes and attributes of a healthy surface/groundwaterdependent ecosystem are extensive and human welfare is inextricably linked to ecosystem health.⁽⁹⁶⁾

Some of these benefits, to humans, as mentioned in the Australian Journal of Botany, Special Issue: Groundwater-Dependent Ecosystems 2006,⁽²⁾ are:

- Farm and domestic water
- Nutrient regulation
- Soil formation
- Gas regulation
- Prevention of soil erosion
- Regulation of water flow
- Water purification
- Tourism and recreation
- Carbon sequestration
- Food and raw materials
- Genetic and medical resources
- Nursery function.

Human dependency should not only be concerned with potable water. *"In addition to the human need for water, it has become increasingly clear that the maintenance of a supply of water for the environment is equally important to human welfare"* Eamus et al.⁽⁴⁰⁾

In 1997, Costanza et al.⁽²⁵⁾ calculated 17 global estimates on how much value to human welfare some of these water ecosystem services are worth. Three of them include atmospheric gas regulation at US\$1.3 trillion; waste treatment US\$2.3 trillion and nutrient cycling at US\$17 trillion.

In 2007 benefits of a healthy water ecosystem in the Otways was still on the whole taken for granted. Unfortunately until an ecosystem fails and an expensive solution is required no economic credit and little significance is given to it.

"Given their significance, one might expect that ecosystem services would be prized by markets and explicitly protected by law." (Third Australian Stream Management Conference 2001)

Water management authorities must do more than provide lip service to the importance of healthy water ecosystems. In regard to water management Koehn et al. ⁽⁸⁰⁾ states *"Solutions to most stream environmental problems are readily available and the cost of implementing them must be weighed against all benefits achieved and the cost of further damage."*

F. ...as a Primary Contact & Recreation Environment

The Victorian State Government includes the term "Beneficial Uses" in a number of its documents. These references to Beneficial Uses and the accompanying statements are made in an effort to ensure the protection of existing rights and potential uses of groundwater throughout Victoria. One of these Beneficial Uses is Primary Contact and Recreation with the environment and its association with surface and groundwaters.⁽¹³⁹⁾⁽¹²⁹⁾

In 2010 Lewis⁽⁸⁷⁾ had this to say regarding the critical link between health and our environment, "…river creatures and plants are dependent on healthy river systems to survive and flourish. Less obvious or often completely taken for granted, is the fact that humans also need such places to not only survive but flourish. This is not only because we need clean drinking water, healthy air and tree growth to clean up the CO₂, or water for our various businesses. Many of us live here (otway Ranges) for the same reasons people visit— it is beautiful, interesting, invigorating and healthful. Research in fact shows that, despite the fact that most of us live in increasingly artificial places, human evolution over millions of years has genetically wired us to need contact with nature for optimal wellbeing; study after study shows that we heal faster in contact with nature, our mental health improves as well as our physical health...

Two of the most significant likely future public health issues, with huge costs to individuals and governments, are steep rises in depression and obesity. Activities that encourage contact with nature can very directly address both issues. It is clear that as a society we need to cherish our natural and especially our wild places as never before."

These very same sentiments are voiced, echoed and strongly emphasised throughout Parks Victoria, State Government of Victoria's, latest campaign justifying its slogan of *"Healthy Parks, Healthy People."*

A 2008 joint initiative between Parks Victoria and Deakin University produced a literature review ⁽⁹²⁾ of 343 references dealing with the human health benefits of contact with nature. This research indicated that "...*humans may be dependent on nature for psychological, emotional, and spiritual needs that are difficult to satisfy by other means*..." This review also finds that access to nature plays a vital role in human health,

wellbeing, and development that has not been fully recognised. "That the natural environment is a key determinate of health is unquestioned." "Contact with nature is defined as viewing natural scenes, being in natural environments, or observing, encountering or otherwise interacting with plants and animals."

The Healthy Parks Healthy People study⁽⁹²⁾ concluded that research shows contact with nature has a multitude of benefits to humans, including,

- reducing crime,
- fostering psychological healing,
- reducing stress,
- boosting immunity,
- enhancing productivity,
- promoting and facilitating healing,
- improving concentration, and
- improving mental capacity.

"Parks and other natural environments are a fundamental health resource, particularly in terms of disease prevention." Initial evidence indicates positive effects on,

- blood pressure,
- cholesterol, and
- outlook on life.

There is a very clear message that parks and other natural environments are fundamental settings for health promotion and the creation of wellbeing for public health. There can be no doubt that the Gellibrand Groundwater Management Area is currently catering for the majority of these water dependent assets and values. However, a constant vigil must be kept to ensure that the protection of these assets and values is maintained.



Loves Creek.

CHAPTER FOUR

Environmental Flow Requirements

Environmental flow is best defined as *a flow regime that will maintain and where possible enhance species diversity and populations of aquatic life.*

The Southern Rural Water (SRW) document for the Gellibrand River Stream Flow Management Plan⁽¹¹⁸⁾ defines environmental flow as,

"An environmental flow is a flow that aims at maintaining or improving environmental values associated with aquatic ecosystems."

This is a significantly different definition from the one given at the start of this chapter. An environmental flow should, at the very least, maintain the ecosystem not merely "aim at maintaining" it, as the SRW definition proposes.

Perhaps the reason for wording of the SRW definition in this way becomes apparent when reading the water management recommendations found in the Gellibrand River Stream Flow Management Plan. This plan allows Wannon Water to reduce the Gellibrand River's flow to zero at both the North and South Otway extraction pumping stations in times of extremely low flow.

Any water that is not utilised by man, under this plan, is called a passing flow and, "*The flow share aims to ensure a passing flow for the environment...*"⁽⁹⁵⁾. However, if existing human water rights are needed to such a degree that the river dries up then there will be no passing flow. To argue or state there is an environmental flow allocated under the terms of this plan seems a nonsense.

In the Corangamite Catchment Management Authority's (CCMA) Assessment of the Environmental Flow Requirements for the Gellibrand River – Recommendations, 2006⁽²⁴⁾, it states that *"... it is recommended that additional and more comprehensive analysis of the system be undertaken prior to finalisation of the environmental water requirements for the Gellibrand River."* No progress has been made in 8 years.

It seems doubtful that there will ever be a time when finalisation of the environmental flow requirements for the Gellibrand or any other creek or river in the Gellibrand Groundwater Management Area will be achieved and an appropriate water allocation be made. There have been multiple environmental flows recommendations made over the last 30 odd years without any allocations being made.

When bulk entitlements and water allocation decisions are being made environmental flow recommendations are no doubt considered. However, these flow *recommendations* are not binding, poorly represented and most often only given the minimum of consideration.

While more environmental studies are being called for and no environmental flows allocated, water extraction for human consumption takes priority and continues unabated.

It would appear that the fear of incorrectly allocating the appropriate water requirement for an ecosystem is one of the reasons an allocation is never made. However the availability of water for human consumption does not suffer the same restriction. As the circumstances change, the water allocation for humans is altered accordingly and invariably is increased. The same principle should apply to the environment; allocate environmental water and as new research becomes available then environmental water allocations can be altered. But once an environmental flow is allocated it should not, at some later date, be compromised because of man's inability to plan ahead. Future water demands should be anticipated, planned for and development strategies implemented to meet these demands. Any environmental flow, once allocated, should only be modified after extensive and comprehensive scientific scrutiny.

25 years ago in 1989 the Natural resources and Environment Committee (NREC – see Appendix One) recommended that environmental flows for the Gellibrand Catchment be implemented as a matter of course. This has never been done.

A. Tunbridge/Glenane/Koehn⁽¹²³⁾⁽¹²⁴⁾⁽¹²⁵⁾⁽¹²⁶⁾

When this NREC recommendation was made Tunbridge/Glenane and Koehn had already conducted numerous studies including recommendations for environmental flows regimes.

B. Smith

In 1989 Smith⁽¹¹⁶⁾ confirmed the importance of the fisheries of the Otway Ranges as significant tourist and recreational assets but he also acknowledged that the Otway Forest encompasses a variety of large and small streams which support a significant representation of the States freshwater fish resources, a resource previously overlooked. He noted that the small native fish *"…are mostly secretative and not easily observed. Their diversity, abundance, distribution and status are also generally not well known."*

C. Zampatti & McGuckin

As part of the Kawarren groundwater extraction studies in the 1990s Zampatti and McGuckin⁽¹⁴³⁾ included the small streams and creeks of the Loves Creek Catchment, a tributary of the Gellibrand River. Some extremely interesting observations were made. When the Loves Creek Catchment was investigated the distribution and composition of fish assemblages was found to be significant and, at some sites, unique in the Otways. The co-existence of certain species had not previously been recorded in the Otway Forest. The size of the blackfish population suggested that Loves Creek should be given the same recognition as the Gellibrand River. The Gellibrand River, as previously noted, is regarded as one of the best blackfish rivers in Victoria.

A question that naturally follows would be to ask what other streams and creeks in the Otways, if investigated, would be found to be "unique".

D. Zampatti, Bradshaw & Lewis

In 1996 Zampatti, Bradshaw and Lewis⁽¹⁴⁴⁾ in the second report of a three year study on the Loves Creek Catchment streams, recommended significantly higher minimum environmental flows than those recommended in 1988 by Tunbridge and Glenane.⁽¹²⁴⁾

E. Cameron & Vertessy (studying macroinvertebrates)

In 1998, Cameron and Vertessy⁽¹⁴⁾ recommended that flow levels suggested by Zampatti and co-workers should be followed until a comprehensive study is undertaken that primarily focuses on environmental flows and aquatic invertebrates in the Gellibrand catchment. This was never done and neither was the third year of the Zampatti studies done. The Cameron and Vertessy report also stated that a significant study of environmental flow preferences of macro invertebrates was required as there was a paucity of published information available. No known freshwater macro invertebrate study in the Gellibrand area has ever been conducted in an attempt to fill this void.

F. The Unknowns

It is truly amazing that there still remains such a paucity of information on much of the flora and fauna of the Otway Ranges. The gaping black holes of knowledge noted by MacMillan, Kunert, Rice, Zampatti, McGuckin, Lewis, Bradshaw, Cameron, Vertessy, Farmar-Bowers, Stanley, Tunbridge, Glenane, Koehn, Smith, Earl, Bennett, Blackers, Leonard, Humphreys, Lakey, Richard, Rankin, Butcher, Carr, Muir – to name a few - in large part still exist today.

This apparent scant regard to the environment is reflected in the 2008 State of the Environment Report.

Dr. McPhail⁽⁹⁴⁾ tabled his State of the Environment Report in the Victorian parliament late in 2008. It is a most interesting and in many ways an alarming report. Perhaps if more rivers and streams had been allocated environmental flows then the following extracts from this report may never have seen the light of day.

Following are some extracts taken from the Summary of the McPhail report.

- Page 9, 10 & 25. The State Government recognises that river health is an important indicator of overall environmental health of which man is an integral part. However, "To date the environment has been the loser," and as a consequence so is man.
- Page 9. "The last assessment of river health in 2004 found that only one fifth of major rivers and tributaries in Victoria were in good or excellent condition."
- "... of rivers and wetlands... 21 fish species, 11 frog species and 29 species of waterbirds are threatened, and only 14% of riverside vegetation along major rivers and streams in Victoria was found to be in good condition..."
- "...no statewide study of the extent of our wetlands has been undertaken since 1994"
- "...more than a third of our naturally occurring wetland area has already been lost and over 90% of the wetlands on private land has vanished."
- Page 10. "In August 2008, groundwater levels in half of the most highly developed or potentially stressed groundwater areas were lowest on record."
- "Many rivers are not getting enough water to maintain their condition."
- "...the degraded state of many of our rivers shows that the way we manage our water resources has not secured the health of our inland waters."
- "Adequate flows and environmental water reserves have not yet been agreed for many rivers and aquifers across Victoria."

"It is cheaper to protect the environment than it is to restore it, but it is even cheaper to degrade it."

(State of the Environment Report 2008)

CHAPTER FIVE

Loves Creek Catchment Water Balance

It is extremely difficult to sustainably manage a resource if the contributing factors influencing the resource are only partly understood. In any form of management critical decisions and successful outcomes can only be made if the managers have an adequate data base on which to make informed decisions. In regard to water allocation and use, the development and compiling of a quality total catchment water balance audit is crucial. When Southern Rural Water allocates a water extraction licence, seldom if ever, is a total water balance known or undertaken.

In 2007 realising that the groundwater and surface water resources in the Loves Creek Catchment were under threat once again of being extracted and sold for use outside the Catchment, the LAWROC Landcare Group decided to compile an audit of the water resources within the Loves Creek Catchment to gain some idea of where water came from and where it went. Was there any spare resource not being utilised?

The Loves Creek catchment is approximately 83 km² and has numerous water features. This catchment forms an important part of the Gellibrand River Catchment and is within the boundaries of the Gellibrand Groundwater Management Area.

The thought of Barwon Water extracting extensive amounts of groundwater from the Loves Creek Catchment for use in Geelong created some concerns within the local Kawarren community.

- It appeared that the local community was to have little say in the extraction and sale of the water resources for urban use outside of the catchment,
- this project was seen as threatening the availability of an essential local community resource,
- the demand for extraction of water from the Otways for urban use was increasing and this demand did not appear to be based on sound management principles,
- residents within the Catchment were becoming alarmed that the limited water resources were seen as infinite by people outside the Catchment,
- "locals" felt that there was not enough water to service the present allocation, demands within the Catchment let alone to service unfettered urban sprawl needs from outside the Catchment,
- there appeared to be no one adopting the precautionary principle, and
- the above concerns were not being taken seriously so there was little likelihood that the gathering of supporting evidence, that could stand up to scrutiny, would be gathered.

Was there a water resource not being utilised? Part of the answer seemed to be to draw up a total catchment water balance. That is, compile data that showed exactly what water is available and how it is presently used and so determine whether there was any left over for additional allocation. The success of carrying out such an ambitious plan depended on catchment landholders' participation and co-operation. The task of compiling this data had not been as simple as first thought. However, a draft was able to be developed with an amazing amount of local community co-operation, consultation and participation.

It was hoped that local and state authorities would assist but that was not to be the case. Two drafts were compiled but unfortunately the statutory authorities were not inspired enough to become involved. The last draft was finished in 2009.

LAWROC realised that its efforts could be improved upon but by taking into account rainfall, runoff, stream flow, groundwater recharge, groundwater extraction, loss of groundwater to other catchments, stock, domestic, urban and licensed use of water, evapotranspiration, farm dams, effluent from homes and agriculture, climate change and any other factor influencing the water resource within the Catchment, a reasonable report was compiled.

To assist with the audit, the work of Evans⁽¹⁴⁵⁾ was used as a guide. He outlined a set of parameters required when conducting a total catchment water balance. Internal Interchange

•

zone

Rainfall to soil

Rainfall to surface water

household/agricultural

Surface water to soil – unsaturated

Extraction for consumptive use-

Return from consumptive use

Water stored in the catchment

- Farm dams off stream
- Dams on-stream
- Aquifer(s)
- Saturated soils
- Soils in the unsaturated zone •
- Stream channels

Inflow into the catchment

- Rainfall
- Returns from consumptive users (homes/agriculture etc.) •

Outflow

- Evapotranspiration from soils and aquifers
- Evapotranspiration from surface waters
- Transpiration from vegetation
- Consumptive use within the catchment
- Consumptive use outside the catchment
- Surface flow out of the catchment
- Aguifer flow out of the catchment

Considering that nothing like this had ever been attempted before the final document was a credit to the LAWROC Landcare Group.

The strong sense for current and future wellbeing of the water resources throughout the Loves Creek Catchment was apparent with each of the 96 residents interviewed. Each resident was responsible for and reliant on a daily supply of water that they collected and or stored themselves. No homes were connected to town water. Many residents extracted water from Loves Creek or its tributaries for toilet use. Others washed their clothes in it when it was not turbid. Observation of the quantity and quality of the water in the streams of the catchment were a daily experience.

Long before the audit had been completed it was obvious that the water resource of the Loves Creek Catchment was over allocated. The resource was fully allocated.

Overallocation as defined in the Australian National Water Initiative⁽¹⁵⁷⁾ are...

"situations where full development of water access entitlements in a particular system, the total volume of water able to be extracted by entitlement holders at a given time exceeds the environmentally sustainable level of that extraction for that system." In 2004 the Victorian Government was one of the signatories of this initiative.

This extract from the discussion section of the report best tells the story...

When comparing the data collected for stock and domestic use <u>only</u> it is abundantly clear that the surface water in the Loves Creek Catchment is already over allocated.

- 90 days over the dry period of summer would have 108 MI flow down the Loves Creek system.
- If all of the stock and domestic users were to take their full allocation of 116.3 ML during this same period Loves Creek could be dried up for the entire 90 days.
- If for argument sake any <u>one</u> of the 50 (plus) stock and domestic users extracted their 2.2 ML on any one day this would be enough to dry the creek up.
- Even if on the same day each entitled landholder extracted a fraction of the flow in the Loves Creek system this could also be enough to dry out the creeks and streams in the Catchment.
- Added to this bleak picture is the fact that there are other landholders still to be interviewed who are likely to have stock and domestic water extraction rights.
- At least one of the irrigators has the right to pump at any period during the year. If exercised during summer this would accentuate the problem. In fact exercising this licence could by itself dry up the Loves Creek system.

The only possibility for further utilisation of the water resource would be collection and storage during winter flushes.

If ever conducted, it would not be surprising if other water balance audits conducted within the Gellibrand Groundwater Management Area were to come up with similar results.

Perhaps one of the most telling influences not taken into account when Southern Rural Water considers the amount of resource available and provides water extraction licences, would appear to be that of Stock and Domestic use. Stock and Domestic use is not generally recorded on Southern Rural Water's data base. It would also appear that until very recently groundwater and surface waters have been calculated as two different resources. As discussed in another chapter, SKM state it would appear that 100% of summer flow in the Gellibrand River is in fact groundwater discharge. In the absence of rain, summer flowing streams are fed from groundwater. This resource should not be allocated twice, once as groundwater and then allocated again as surface water.

Conducting a total water balance audit would reflect sound management practice.

CHAPTER SIX

Threats to the Social, Economic and Environment Viability of the Gellibrand Groundwater Management Area.

Unfortunately the majority of the threats to the social and economic wellbeing of humans and the environment within the Otway Ranges are mostly human generated. Food production, timber harvesting and an unquenchable thirst brought about by population growth have placed huge demands upon the resources of the area. Although not particular to this part of the world, man quite often loses sight of the fact that the well being of humans depends on the wellbeing of the environment in which they live.

Climate change compounds any influence as does impact from such things as tourism, fire, subsidence, chemicals, insecticide and herbicide application. One off isolated events in themselves may appear inconsequential but have an accumulative effect that over time are significant. One such recent incident in 2009, within the Gellibrand Groundwater Management Area, occurred when works on the Olangolah Reservoir were undertaken to raise the overflow wall to cater for the eventuality of a one in 100 year flood event. **The Olangolah Reservoir Event.**

The State Government decreed that reservoirs must have the capacity to handle serious flooding in light of climate change. In 2005 SKM conducted an ecological review of the Olangolah Reservoir upgrade. "*The objective of the assessment was to identify any ecological issues that may require further consideration and any regulatory approvals required in relation to proposed works at the respective sites*." Report WCO3444. The findings of this review can best be summed up with this extract.

2.1 Review of Threatened Species

Eleven (11) threatened vascular plant species and fourteen (14) threatened animal species have previously been recorded within a 5km radius of the survey site. Due to the disturbed nature of the construction site associated with the original reservoir construction and ongoing maintenance, none of the threatened plant species are expected to occur, or were identified within the site. Similarly a lack of suitable habitat conditions would result in none of the threatened terrestrial animal species occurring on site. The riparian environment may provide suitable habitat for the aquatic species, however, no major alterations to the already modified aquatic environment are expected to occur as a result of site works.

3. Site Condition

3.1 Olangolah Reservoir

The proposed works at the Olangolah Reservoir involves placing fill material on the existing dam wall as well as fill placement and concrete works near the spillway. As the dam wall and spillway are constructed features, no remnant vegetation was located on the area to be disturbed. The construction site is surrounded by high quality remnant vegetation, with Wet Forest occurring as the dominant EVC, with small areas of Shrubby Wet Forest and Cool Temperate Rain Forest also occurring within the drainage line below the site. No remnant vegetation will be impacted upon as a consequence of construction activities at the site.

The areas which are subject to construction activities as part of the dam upgrade works include areas previously cleared. The areas associated with construction appear to be regularly maintained, and is derived of a mix of weed species and some pioneer Wet Forest species.

SINCLAIR KNIGHT MERZ

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PAGE 4

SOURCE: Barwon Water, SKM report WCO3444.

17 January 2008 the upgrade work on the Olangolah reservoir began. During the final stages of the development the spillway first spilt on 27 May 2009.

"...which would have included high turbidity runoff from the rainfall events around 2nd May and 18 May." (Barwon Water correspondence with the EPA gained under FOI, EPA doc. Ref. FOI 2205-64723.)



SOURCE: Copied from video taken June 2008. This is the end of the spillway at the Olangolah Reservoir showing approximately 30 cm of relatively clear water flowing into the Olangolah Creek. Not silt laden as described by Barwon Water.

And so began a series of disastrous events. During works the pipe from the reservoir to the Colac Service Basins was ruptured on several occasions. Unfortunately these rupture events coincided with heavy downpours of rain.

"...*it was not a feasible option for us to stop work and wait for dryer conditions.. Access along the track was critical to completion of the works.*" (Barwon Water correspondence with the EPA gained under FOI, EPA doc. Ref. FOI 2205-64723.) The service basin pipe was located under the access track.

This is akin to the attitude that "...my little bit of degradation will not even be noticed..." and therefore it can be accepted. Unfortunately the accumulative effect is a different story.

The following timeline outlines the Olangolah Reservoir works...

17 November 2005

Project No WCO3444, "Olangolah Reservoir Upgrade – Ecological review," was completed by SKM.

30 November 2005"

"Representatives from BRWC and Colac Otway Shire (planning officer) met to discuss the proposed scope of the works and to undertake the initial Environmental Impact Analysis."⁽⁶⁸⁾

17 January 2008

Site works commence.

10 April 2008

BRWC conducted an Environmental Audit and reported that at the time there were no issues identified in regard to runoff and sediment into local waterways.

Sometime during this period access into the Olangolah Reservoir via Turtons Track became too dangerous from slippery wet conditions The major access was changed from above the reservoir to below via Forrest and along the pipeline track.

16 April 2008

Access along the pipeline track into the site became difficult except by 4WD. The use of Marukus trucks could continue work despite the environmental condition of the track, wet, boggy, slushy and all but impassable.

29 April 2008

6 metres of ruptured supply pipe running under the pipeline track was repaired. **2 May 2008**

2 IVIAY 2008

Another unknown amount of supply pipe was repaired due to damage caused by haulage vehicles.

3 May 2008

4.3 metres of supply pipe repaired under the track due to damage from haulage vehicles.

5 May 2008

4WD access impossible. Moxy trucks destroyed the access road.

7 May 2008

Bulldozer needed to pull 4WD vehicles along the track. There had been wet conditions for a month. First time the BRWC Project Manager noticed a potential siltation problem.

9 May 2008

BRWC representative had to be pulled out of a bog on the track. (The report does not say whether this representative was on foot or in a vehicle. From the state of the track as observed in June it could have been either or both)

Moxy trucks could no longer operate due to the conditions.

<u>Source</u>: Copied from video taken June 2008 (EPA).

Moxy truck covered in mud and slush sitting on the pipeline access track.



<u>SP</u> 0:14:47 -°° 028

SOURCE: Photographs copied from video taken June 2008 (EPA Copy).

The state of the access track made walking an extremely tedious task and there was a constant threat of having one's boots sucked off.

BRWC verbally advised the contractor of the silt runoff issues that needed to be rectified. An email to this effect was sent to the EPA. (Strangely, an FOI request on 25 September 2008, asking the EPA for all



correspondence between the EPA and Barwon Water did not contain this email. The reply, EPA Ref:

FOI 2205-64723, did say that some material had been withheld. Why such an innocuous email would



be part of that material withheld is hard to comprehend.) **22 May 2008** Project Completion reached with the completion of earthworks at the site. **28 May 2008.**

The Gellibrand River was observed as flowing an opaque reddish brown dirty colour at the Colac to Gellibrand Road Bridge. Tributaries flowing into the Gellibrand River near the Gellibrand township

were flowing crystal clear water.

Friday 30 May 2008

At the confluence of the Barramunga Creek and the Gellibrand River it was observed that the Gellibrand was flowing this reddish brown slug and the Barramunga Creek was crystal clear (Andrew Daffy – pres. com). The Barramunga Creek is many kilometres upstream of the Gellibrand township.

The EPA hotline was contacted by several concerned local residents. At this stage local residents were not aware of the source of this slug of polluted water.



Pictures taken of the Gellibrand River Raffertys Road bridge (Marina Lewis).



Tuesday 3 June 2008

By Tuesday the Gellibrand River had change from a dirty opaque reddish brown to a milky white colour.

Wednesday 4 June 2008

EPA officers were attending a LAWROC Landcare meeting in Gellibrand and were taken to observe the state of the Gellibrand River. By this time the river had returned to a brackish brown. The problem seemed to have gone away.

Thursday 5 June 2008

3.9 metres of supply pipe ruptured under the access track - caused by haulage vehicles.



SOURCE; Copied from video taken June 2008. Some of the broken pipe casing.



SOURCE; Copied from video taken June 2008.

The pipeline track running alongside the Olangolah Creek was in a deplorable state with mud and slush from the track in many cases having been graded off into the creek bed.

Thursday 5 June 2008

Late Thursday the river was once again a terrible opaque colour at the Colac/Gellibrand Bridge.

Friday 6 June 2008

I spoke to two officers of the EPA and it was stated that officers of Barwon Water had spoken to them and stated similar complaints had been directed to Barwon Water complaining that Charleys Creek and Loves Creek were also experiencing the same dirty water conditions that the Gellibrand River was being subjected to. *"It is quite possible that water of similar turbidity levels would have flowed down the Gellibrand River from its various tributaries around the time."* This quote was in Barwon Water's correspondence to the EPA gained under FOI, EPA doc. Ref. FOI 2205-64723.

Friday 6 June 2008

The EPA officers had given local residents the EPA hotline at the meeting on the 4th and advised them to use this line in the event of any other problem. Several residents notified the EPA of the new slug.

Saturday/Sunday 7/8 June 2008

Knowing that Charleys Creek was flowing clear running water, as it had for an extended period, and alarmed at such nonsensical statements stating tributaries were also running turbid, I conducted a quick survey of the residents along Loves Creek.



Charleys Creek 8 June 2008 clear running water.

The location of this picture is five metres upstream from the confluence of Charleys Creek and the Gellibrand River – crystal clear.



Loves Creek 8 June 2008 clear running water.

Monday 9 June 2008

The following two text boxes have been taken from an email I sent to the Geelong branch of the EPA, Monday 9 June 2008 11:32:59 AM.

When talking to Erica and yourself directed to them complaining that C water conditions that the Gellibrand Creek had been running clear for we same dirty water as the Gellibrand v Loves Creek was close to crystal cle The week before this the Gellibrand has been the case since last Thursda	ast Firday, it was said that Barwon Water had similar complaints harleys and Loves Creeks were also experiencing the same dirty presently was subjected to. I expressed my opinion that Loves eks and that this statement that Loves was experiencing the 'as absolute nonsense. As you saw on 5 June 2008 (Wednesday) ar and the Gellibrand was relatively clean running water also. was running very, very dirty water. This has happened again and y the 6 June 2008.
There are 19 residents with land that contacted - namely the set as a interviewed and the results are as for Questions asked: 1. Do you live along Loves reek? 16 2. Have you complained to Barwon quality of Loves Creek? 16 said NO about the darkish water he was extra He states that the running water ove 3. Have you noticed any deteriation is months, that you felt was out of the months, that you felt was out of the Months in being the other. 4. Do you mind if I give the EPA in you? All people interviewed said this	Loves Creek runs through or beside. One resident has not been nd two are absentee landholders. All other residents have been lows. said Yes. Water in the last 12 months regarding the look of a poor water complained approximately 6 months ago cting for the garden from a deep pool were his pump is located. this pool is clear to brackish brown. In the water quality in Loves Creek anytime in the last 12 bordinary and needed to be investigated? 15 said NO. R Geelong your telephone number name if they wish to speak to s was OK
5.In the last two weeks can you rate a. crystal clear b.clear c. milky 6. How often do you observe Loves	contained in the comments to follow. the water quality appearance in Loves Creek as d. dirty/opaque e. brackish.? Creek?

The names, telephone numbers and responses were included in the email.

It seems most obvious that the Barwon Water statement that Loves Creek has been experiencing the same type of "slug" that has been released into the Gellibrand River, is absolute "garbage." Barwon Water have no grounds on which to insinuate that the Gellibrand "slug" they appear to be responsible for, is a natural and commonly experienced occurrance in the Gellibrand River tributaries and catchment. An experience that these other creeks are also having at this stage.

If a formal complaint is required then Please regard this as a formal complaint. The Gellibrand River is being polluted high at the source of its beginning. I believe that it is coming down from the Olangolah Creek tributary.

I would appreciate it to be informed as to the results of any investigation and be told the source, the reasons why, how it took place and when the "slugS" were allowed to get into the Gellibrand River system and what actions have resulted.

That night I received several phones calls stating that the source of the slug coming down the Gellibrand River was most possibly works being carried out at the Olangolah Reservoir. These phone calls appeared to be prompted from the survey conducted along Loves Creek.



Charleys Creek clear water mixing with the opaque waters of the Gellibrand River. 8 June 2008.

Tuesday 10 June

A colleague and I walked into the Olangolah Reservoir early in the morning and took videos and photographs.

In an email the EPA stated that I would be kept posted on developments.

6 July 2008

By the 6th July nothing had been heard of from the EPA. A site inspection by the EPA should have triggered immediate action. However, no visit had been made.

Not having heard anything and fearing that a sight inspection had not taken place a copy of the work's site video was made.

7 July 2008

I dropped a covering letter and a copy of the video into the Geelong branch of the EPA.

8 July 2008

The EPA emailed BRWC to please explain and provide the site management plan.

16 July 2008

EPA made its *first* visit to the Olangolah Reservoir.

12 September 2008

Two months later the EPA issues a Pollution Abatement Notice.

17 October

GHD engaged as an environmental auditor

5 December

Scope of the environmental audit accepted

4 February

Environmental Auditor staff visited Olangolah Reservoir.

6 February 2009

I asked the Managing Director of Barwon Water for copies of:

- The contingency plan for high rainfall events
- The flora and fauna survey that was completed, and
- The vegetation clearance and re-vegetation plan.

24 February 2009

As the above request was denied an FOI was sent to Barwon Water requesting these items.

14 April 2009

The FOI reply stated that no specific contingency plan for high rainfall events was developed.

No vegetation clearance and revegetation plan was developed.

The flora and fauna survey was supplied. This was the 17 November 2005 SKM document referred to above. Up until this time this document was not known to exist.

23 April 2009

An FOI was sent to Barwon Water asking for a copy of the environmental auditor's report.

12 August 2009

A copy of the auditor's report dated 12 August 2009 was sent to me. Finalised at last, or so I thought.

31 March 2010

A reply to another FOI elicited another and different copy dated 10 February 2010. *"Please find attached CD re Olangolah Reservoir Upgrade Works Report (February 2010) following on from previous FOI Requests."* (Barwon Water Ref: 15/260/0007C(2).) The CD contained a slightly different version to the August report. This 2010 report had been signed off on 23 December 2009. The front covers and conclusions to the 2009 and 2010 final reports can be found in Appendix Six. I was mildly intrigued enough to superimpose the Environmental Auditor's signature from the August 2009 report over the one found in the conclusion of the February report and found them to appear to be identical. However, in this day and age reports are quite often signed off with an electronic signature and this would explain the similarity. The difference in the two final reports cannot be easily explained.

However, one difference between the reports worth noting is the inclusion of this statement in the later 2010 version...

"Discussion with EPA Environmental Audit Unit during scoping of the audit agreed that the focus of the audit was to focus on management and system failings that lead to a possible risk of harm to the environment, rather than determining the significance of the impact."

Residents of the area were more concerned with risk to the environment and their watering infrastructure than they were to management and system failure. Surely the impacts on the environment should have been taken into account. However, conducting the audit close to 8 months after the fact would have posed one or two difficulties establishing the amount of impact.

Both versions of the final report include a section on Beneficial Uses and included this table.

Table 2 Protected Beneficial uses of Water relevant to th	is Audit			
Beneficial Use	Cleared Hills & Coastal Plains			
Aquatic Ecosystems that are:				
largely unmodified				
slightly to moderately modified	\checkmark			
highly modified				
Water suitable for:				
primary contact recreation	✓			
secondary contact recreation	✓			
aesthetic enjoyment	\checkmark			
indigenous cultural and spiritual values	\checkmark			
non-Indigenous cultural and spiritual values	✓			
agriculture and irrigation	 ✓ 			
aquaculture	✓			
industrial and commercial use	✓			
human consumption after appropriate treatment	✓			
fish, crustacean & molluscs for human consumption	1			

Surely the final audit should have included impacts to these Beneficial Uses especially when extensive discussions took place with local residents at a special meeting called by GHD. These residents conveyed first hand information covering the extent of the impact that they had experienced.

In both the February 2010 and the August 2009 GHD reports, it was stated that the primary focus of the report was potential impact to surface waters.

"Impacts to surface water form the primary focus for the audit including potential impacts on the receiving environment, being the Gellibrand and Olangolah Rivers."

However, this primary focus is not reflected in the conclusion and recommendations section of both reports (see Appendix Six.). The audit concentrates on the avoidance of future management failures.
The Environmental Audit Report...

Barwon Water Olangolah Reservoir Upgrade Works 53V Environmental Audit August 2009.

To say that the result of the environmental audit report was scathing of the management and systems failure would be extremely generous.

There were three pages outlining how future works should be carried out so that similar problems never arise again. There were three pages of risk assessment of critical aspects that outlined the likelihood of re-occurrence, consequences and risk. Twelve of them were classed at High risk of reoccurring if changes in management where not carried out in future operations. Four were in the medium risk category.

Fourteen of these issues were classified as...

"Environmental damage or a release to the environment resulting in extensive, long term but reversible harm to a segment of the environment, OR

Environmental damage or a release to the environment resulting in moderate harm to species habitat or ecosystems of high conservation value or special significance, Or

Less than 5 years to recover."

How such poor environmental awareness and incompetence is possible in this day and age is beyond belief. But a bigger concern is the tardiness in which the EPA reacts to reports of environmental degradation. But what else can be expected from an understaffed, under resourced authority.

What actions the EPA took once this report was finalised is not known and can only be obtained through a Freedom Of Information request. Why the EPA cannot say what the outcome involved without the initial cost of \$25:70 to lodge an FOI, is beyond belief.

Another seemingly inconsequential impact - Unsustainable Groundwater Extraction. Another slow and insidious impact that is poorly understood by the general public and seldom acknowledged by those authorities that should know better is the influence that takes place as a result of unsustainable extraction of groundwater. This is called water mining.

Evans⁽¹⁴⁵⁾ states that the nationally agreed definition of sustainable yield for groundwater systems is as follows,

"The groundwater extraction regime, measured over a specified planning timeframe that allows acceptable levels of stress and protects dependent economic, social and environmental values."

When groundwater is extracted faster than it can be replenished within a reasonable time frame there are consequences that can be immediate, but more often than not, take a considerable time to manifest themselves. Many of these consequences can take decades to right themselves if in fact this is ever possible.

Impacts include:

• Subsidence: where spaces previously filled with water compact. The earth's crust is lowered, sometimes with disastrous results.

- FIRE: As the saturated and semi saturated zones become water depleted the risk, incidence and intensity of fire is increased. If dried peat is involved and catches fire it can smoulder for decades.
- Peat swamps: dry out and if they contain Potential Acid Sulfate Soils they can turn to Actual Acid Sulfate Soils producing tonnes of acid and heavy metals that pollute and ruin the integrity of both the surface and ground waters, rendering them useless.
- Streams/springs/soaks: dry up, agriculture, fire fighting capacity and the environment suffer as a consequence.

Unfortunately, with the Barwon Downs Borefield extractions SKM and Barwon Water have adopted a totally different definition of sustainability (see Appendix 7, page 157). This definition does not take into account the social economic and environment impacts that may take place at the surface.

Chapter 13 discusses in detail the impact groundwater mining from the Barwon Downs Borefield is having on the Gellibrand Groundwater Management Area.

With water mining the ability for "mother nature" to maintain an environment conducive to human wellbeing becomes compromised. The ecology of an environment will evolve and adapt to these changing conditions but whether man is capable of such adaption is doubtful. Scarcity of potable water, desertification, acid waters, heavy metals and the like will not allow human habitation to continue as it was. Amazingly there has never been any social impact monitoring.



This a picture of a peat wetland in the Gerangamete Groundwater Area that shows signs of subsidence, fire and Actual Acid Sulfate Soil impacts as a result of unsustainable groundwater depletion.

Future impact - Unconventional Gas Mining.

Unconventional Gas Mining is another threat facing the Otway Ranges, foothills and plains. The amount of water per fracking episode, and each bore can be fracked many times, varies depending on which "authoprity" is asked. The amounts stated varies from very small to huge. Even the State Government authority set up to answer such questions accurately, the Department of State Development Business and Innovation, is unable to provide a response (see Appendix 8).

CHAPTER SEVEN The Khouri & Duncan Report.

In 1993 Khouri and Duncan of HydroTechnology (now part of Sinclair Knight Merz) reviewed the Otway Water Supply System that sources water from the Gellibrand. Townships supplied from this system include Warrnambool, Camperdown, Simpson, Cobden, Lismore, Derrinallum, Terang, Noorat, Glenormiston and Allansford.

The study was to identify a reliable source for urban water that would place no additional stress on the Gellibrand River. The following quote taken from the section of the Khouri⁽⁷⁹⁾ report, headed "*Reasons for the Study*," is a consequence of this.

"A clear direction to examine alternative sources of water, which may have lesser environmental impacts than enlarging existing headworks and ensured that no additional water was extracted from the Gellibrand River was given to planners of future supply works."

The principle aim of Khouri and Duncan's study was to review the water resources of the Otway System and determine appropriate timing and capacity of developing the Curdie Vale groundwater as augmentation for Warrnambool. The fourth of the seven objectives of this study was "... *To assess the impact of environmental flow in the Gellibrand River on the current and future system security of supply*..." to the Wannon Water supply system.

At the same time that Khouri and Duncan were carrying out this study there was an investigation taking place examining the possibility of extracting huge volumes of groundwater from the Kawarren Borefield for consumption in the Geelong region. The water at the Kawarren Borefield passed under Kawarren surfacing into the stream bed of the Gellibrand River. The findings of the Khouri/Duncan report had a profound influence on the Kawarren Borefield investigation.

Findings and statements from Khouri and Duncan study relevant to the 1990s Kawarren groundwater extraction proposal were...

- 1. State Government policy dictated that future allocations and water resource development proposals were to include environmental flow requirements of the Gellibrand River and should be given equal consideration with any other demands.
- 2. Allocating a minimum environmental flow would impact on current and future security of the Otway supply system.
- 3. Environmental flow requirement was likely to become a critical issue in the near future.
- 4. If an environmental flow was allocated an alternative approach would be required in times of reduced flows – namely, reduce the environmental flow at the same time as imposing water restrictions and reductions on all other users. In this scenario level 4 restrictions would necessitate that the minimum environmental flow allocation be reduced by four fifths.
- 5. The most significant factors in threatening system security were the implementation of environmental flow requirements.

- 6. Introduction of environmental flow requirements in the Gellibrand River would have immediate and significant impact on system security. The system would operate well below acceptable security criteria.
- 7. It was suggested that the environmental flow allocation be flexible.
- 8. In 1993 the summer flows of the Gellibrand River were heavily committed.
- 9. In times of severe drought, river flows became very low. In 1968 the flow was 17 ML/day at Carlisle (stream flow gauging station No. 235208).
- 10. Both the North and the South pumping stations had the capacity to dry up the Gellibrand River if the flow in the River fell below 20 ML/day.
- 11. Simpson, Camperdown, Lismore, Derrinallum and Cobden's water supply would be prone to fail in a drought if the recommended survival environmental flow was allocated in the Gellibrand River.
- 12. Any proposal for implementing of environmental flow requirements would require immediate system augmentation to maintain system reliability at acceptable levels.

The Khouri Duncan study concluded that if the most basic of Tunbridge's environmental flow recommendations had been allocated to the Gellibrand River during the last drought the above mentioned towns in point 11 would have run out of a water supply.

In fact if the minimum recommended survival environmental flow had been allocated to the Gellibrand River, Wannon Water would have had considerable trouble sourcing water for the Warrnambool system even in so called "good" summers. Add to this the natural decline in flow due to drought would be catastrophic. As most of the summer flow in the Gellibrand River is groundwater overflow, extracting groundwater from the Kawarren borefield would seriously compound the problems even further. Climate change adds another dimension that was not considered at the time. Not to mention the huge volumes of water required if unconventional gas extraction was to be allowed.

To make the suggestion that a basic, survival environmental flow could be reduced and flexible, shows a complete lack of understanding of the significance of survival flow to the ecosystem.

The Khouri Duncan report makes it blatantly obvious why there has <u>never</u> been an environmental flow allocation made to the Gellibrand River or any of its tributaries in the Gellibrand Groundwater Management Area. Presently, there is not enough water to cater for all Beneficial Uses during drought and summer periods. To extract groundwater at Kawarren before it surfaces in the Gellibrand River would place an additional stress on the river reducing the already over burdened summer water resources This was the very reason zero groundwater extraction was declared for the Gellibrand Groundwater Management Area. Insufficient water resources.

Environmental Water Reserve (EWR) for the Gellibrand River.

It would appear that the term environmental flow has been replaced by environmental water reserves called EWR. If this is the case then any EWR allocation to the Gellibrand River should be allocated in such a manner that allows a daily summer flow rate – not stated as it presently is, as a yearly bulk allocation.

The complete EWR allocation for the Gellibrand River flows into the sea during winter. There isn't any water that can be kept in reserve for use during summer. For summer survival of the water dependent ecosystem the EWR is of no benefit. Even though an EWR for the Gellibrand appears more than adequate on paper in practise it is useless. There is no provision providing a summer daily environmental flow.

CHAPTER EIGHT

SUMMER SURFACE FLOWS and GROUNDWATER BASEFLOWS

It is critical that any future water harvesting/utilisation development acknowledges the connectedness between surface and ground waters. In the past regulators have blindly regarded these two resources as separate entities. By not recognising this relationship the water available has often been allocated twice. During the summer months when the streams continue to flow the base flows in the system comes from groundwater discharge. Despite the regulators non acceptance of this, a series of reports spanning decades have shown this to be the case.

WILLIAMSON'S REPORT 1982

An early report, by Williamson ⁽¹⁴⁰⁾, states that if groundwater was to be pumped from the Kawarren bore site, in all likelihood the groundwater that would naturally flow into the Gellibrand River could be stopped. In fact the water sourced by the river from further up the Gellibrand catchment could be encouraged to flow back down into the unconfined aquifer over a 17km reach of the Gellibrand River bed, flowing back towards the depleted Kawarren borefield. This report, and others that followed, state that this induced recharge via streambed infiltration as a result of pumping from bores at Kawarren, would cause the Gellibrand River to cease flowing during the drier summer months along much of its reach above the Gellibrand township.

LEONARD'S REPORT 1984

By far the most comprehensive study on Otway Ranges aquifers conducted up to this period was Leonard's work.⁽⁸⁶⁾ Leonard's research formed the foundation on which many of the later studies have been based. It is quite amazing that the many projects undertaken since vary little from the conclusions Leonard arrived at in 1984.

DEPARTMENT OF WATER RESOURCES' REPORTS 1988

The Department of Water Resources reports^(27,28) doubted that groundwater extraction at Kawarren was sustainable whereby the impact on the Gellibrand River system could be limited to an acceptable level.

STANLEY'S REPORT 1991

In 1991 the Rural Water Commission tabled a comprehensive and detailed preliminary report on the groundwater resources of the Kawarren area.⁽¹¹⁹⁾ Stanley determined that between 1500 ML/year and 3000 ML/year flowed out of the Kawarren aquifer into the Gellibrand River. If 3000 ML/year of this groundwater was extracted Stanley calculated that the base flow in the Gellibrand River would be reduced by 28%. However, this could only be confirmed if the Kawarren aquifer was placed under a stress test pumping regime.

HYDROTECHNOLOGY'S REPORT 1994

HydroTechnology⁽⁷⁸⁾ confirmed that there was a strong connectivity between surface and groundwater in the Gellibrand township area. Extracting 2000 ML/year of the flowthrough in the Kawarren aquifer had been calculated to reduce flows in the Gellibrand River by 10%. **BARWON WATER'S REPORT 2012**

In SKM's report for Barwon Water on the Newlingrook Groundwater Investigations⁽¹¹¹⁾ it is stated that discharge from the groundwater system to the Gellibrand River ranged from 0.05 - 1.40 ML/day/km and on a broader scale comprised 52% of the river flow. However, groundwater flow is close to 100% of the flow during the dry periods of no rainfall.

All of these reports strongly indicated that groundwater extraction at Kawarren would place unacceptable stress on flows in the Gellibrand River system. The Khouri Duncan report⁽⁷⁹⁾ puts this speculation beyond any doubt – extraction at Kawarren is not sustainable at any level.

CHAPTER NINE

1990s and 2000s Attempts at Groundwater Extraction from the Kawarren Borefield.

In 2007 the State Government's first option for augmenting Geelong's water supply was to extract 16 GL/year (one GL = 1000 million litres) from the Kawarren Borefield. The last time the Government pursued this idea of opening up the Kawarren Borefield during the early to mid 1990s, investigations and studies at the time found that...

- 1. surface and groundwaters were already over allocated,
- 2. applying the most basic of environmental flows on the Gellibrand River would cause many Western District towns to run out of water in a drought episode,
- 3. extracting 3 GL/year would in all likelihood dry up 17 kilometres of the Gellibrand River upstream from the Colac Lavers Hill Bridge in Gellibrand,
- the Gellibrand River and tributaries supported the best native Blackfish populations in the State, and as a consequence...
 "The Government, through DCNR, has withdrawn funding at this time and requested that all work cease on the project."⁽³⁰⁾ (1995). The project being the

extraction of groundwater from the Kawarren and or Gellibrand Borefields.

Regardless of these findings the Government and Barwon Water continued with its 2007 endeavours and Barwon Water issued a Service Contract number 10643⁽⁴⁾ to SKM that included the investigation of a 16 GL/year extraction at Kawarren, land acquisition, roading, pipeline easements, powerline construction, pumping station sites, purification plants etc. The budget put aside for this venture was \$200,000,000.

The ensuing 2 year campaign by locals to have this stress pump conducted in a manner reflecting 2007 economic, social and environmental values as well as hydrological values, saw Barwon Water withdraw its application 24 hours before a VCAT hearing. The Kawarren and Gellibrand community did not want to be subjected to the same processes and investigations that were employed for the Barwon Downs Borefield 1987-1990 stress test pump.

However it took another three and a half years to obtain a final report for those aspects of the project that had been finalised or were close to completion.

The historical events leading up to the availability of this report are alarming, interesting and highlight the insidious way government authorities can perform their duties supposedly in the best interests of the public, but get it so terribly wrong. The following summary is such an example and is a collection of documented entries scattered throughout the Otway Water Books.

1980s-1990s

Numerous environmental flow studies were conducted throughout this period. However, recommendations have been repeatedly ignored to this day.

1989

After an exhaustive decade of hearings the Natural Resources and Environment Committee (NREC) tabled an extensive and comprehensive series of recommendations for water resource development in the South-Western Victoria district (see Appendix One, page 143). The NREC was a multipartisan parliamentarian committee and could not entertain any option which would further stress the Gellibrand River until all groundwater investigations and findings were completed.

Pre 1991

Stanley ⁽¹¹⁹⁾ in 1991 stated that five conventional constant rate pumping tests had been conducted on units within the basal tertiary aquifer system in the Kawarren region. It was reported that the tests done at the Kawarren bore did not put sufficient stress upon the resource to enable a reasonable assessment of the environmental impact of sustained pumping. A longer and more stressful pump was required. Stanley made many recommendations on updating existing bores, drilling extra observation bores in strategic locations and the carrying out of pre pumping environmental studies. After these things were completed the decision to proceed with or abandon a test, would be made.

However, Barwon Water wanted to proceed and were ready to conduct a stress test pump at the Kawarren Borefield without further delay.

On 22 February 1991 John Mc Donald (Rural Water Commission-now Southern Rural Water, Ref: dga 1 6mh 1) applied to the EPA for the relaxing of the law so that heated water being pumped from the Kawarren aquifer could be dumped into Loves Creek, he wrote the following: "*The test is designed to occur during the period of low surface water flow, late summer, and will be conducted over a one to three month duration. The extracted water, some 15 – 20 ML/day, will be piped or channelled into Serpentine or Loves Creek*". At 20 ML/day this would equate to approximately 1800 ML extracted over a three month period and exceeded the natural flow by a factor of 6.

John also wrote, "As stated in almost all accompanying documents this test is designed to significantly stress the system so that the regional resource and environmental effects of sustained long term pumping from the Kawarren region can be assessed with any surety."

In a similar letter to the Regional Manager of the Colac Region of the Department of Conservation and Environment, John wrote that a test pump in 1984 conducted by the Department of Minerals and Energy, and reviewed by an independent consultant, *'…agreed that the test pump did not sufficiently stress the aquifer system in order to quantify the magnitude of the aquifer – stream interaction and the determination of the regional recharge area."*

The local community was extremely alarmed at this considering there were numerous other aspects, besides heated water, in regard to the physical and chemical properties of the extracted water being dumped into the Loves Creek system, aspects that had not been resolved, not to mention work recommended by Stanley that had not even commenced. Resident resistance lead to the formation of a Kawarren Borefield Steering Committee. This

committee encompassed meaningful local input and representation. The following studies resulted, reflecting many of Stanley's 1991 recommendations.

Early 1990s

As a result of the consultative process with the Kawarren Borefield Steering Committee and Stanley's recommendations the following studies were conducted:

- 1. Spring and Soak Monitoring
- 2. Fish Studies & Environmental Flows
- 3. Macro-invertebrates & Environmental Flows
- 4. Aquifer/Stream Interaction

Comment on these studies:

1. Spring and Soak Monitoring

Even though this monitoring may have been conducted in an ad hoc fashion an attempt was made to ascertain the significance of the springs and soaks in the area. However the main emphasis given was centred on the significance of these springs to landholders. The environmental aspects were poorly considered and reflect the thinking of that period. The significance of wetlands not associated with landholder domestic and agricultural interests were never considered. By May 1995 routine monitoring of the springs and soaks had been suspended.

2. Fish Studies & Environmental Flows

Zampatti et al.⁽¹⁴⁴⁾ completed two parts of a three-part study by 1996. Unfortunately the third part of the longitudinal study was never completed. However, the work that was completed was very significant. Loves Creek should be given the same recognition and status, with regard to blackfish, as the Gellibrand River. In 1996 Zampatti and his co-workers recommended significantly higher minimum environmental flows than Tunbridge and Glenane. Sadly no environmental flow has ever been allocated.

3. Macro-Invertebrates & Environmental Flows

Butcher, Richards and Rankin reported in 1994⁽¹⁰⁴⁾ on the Gellibrand River catchment monitoring program. An integral part of this program was the ascertainment of appropriate management strategies to minimise deleterious impacts on the aquatic environment. Environmental flows were part of this investigation. Cameron and Vertessy⁽¹⁴⁾ followed up this work and in February 1998 recommended that the flows levels outlined by Zampatti and his co-workers should be followed until further studies were done on macro-invertebrates and their biological needs. They reported that there was a paucity of published information available on the environmental flows preferences of macro-invertebrates.

By October 1999 the eleven monitoring sites in the Gellibrand catchment were reduced to three, the environmental flow aspect of the study was dropped and the overall and final report of the programme was lumped in with the Thomson, Wimmera and Glenelg final report.⁽¹²⁸⁾ Nothing eventuated.

4. Aquifer/Stream Interaction

In 1994 in the HydroTechnology (SKM) Gellibrand River Resource Evaluation,⁽⁷⁸⁾ it was recommended that pumping groundwater from the Gellibrand area be no longer a consideration. This recommendation agreed with the Victorian State

Government's assertion that if a natural unregulated flow is less than the survival flow, there should be no extraction of water.

However the most damming of reports was the one conducted by Khouri et al. in 1993. This report concentrated on the Newlingrook area and was investigating the security of water supply to the Wannon Water system. The significance of the results of this report and its impact on the Kawarren investigations was not realised for some time. However once it was, this sounded the death knell for any extraction from the Kawarren and or Gellibrand borefields. Or so it was thought. Khouri et al. determined that the security of the Wannon Water system could not be assured if the <u>minimum</u> environmental flow as described by Tunbridge and Glenane was to be implemented.

As a consequence of these findings stream flow gauging stations on the Yahoo, Ten Mile and Porcupine Creeks were decommissioned, spring and soak monitoring ceased, the environmental flow considerations and allocations were never implemented, fish studies were not completed and macro-invertebrate studies downgraded to insignificance. Any groundwater extraction from the Kawarren borefield was not possible without incurring unacceptable consequences to the security of Wannon Water's supply and the environment.

The conclusion to be drawn from these studies was that the Gellibrand River summer water resources were over allocated and to extract groundwater at Kawarren would put the Gellibrand River and many of its tributaries under further and unacceptable stress. The security of Wannon Water's water supply would be placed in jeopardy and social and environmental impact in the Kawarren/Gellibrand communities would be profound. Impacts on the Gellibrand River would be felt the full length of the river.

For the Victorian State Government to stand firm on its commitment in regard to maintaining and enhancing river health, pumping at Kawarren was not an option.

This is amply reflected in this quote of 1994 by HydroTechnology (SKM), "It is anticipated that large scale extraction in the Gellibrand-Kawarren region will have an influence on flow, in particular Yahoo and Ten Mile Creeks, similar to the effects noted at Boundary Creek due to pumping at the Barwon Downs wellfield." The thought of a repetition of the disastrous impacts felt along Boundary Creek was horrifying.

Existing bores were updated, drilling extra observation bores in strategic locations were completed and the carrying out of pre pumping environmental studies were implemented even if not completed. After these things were done the decision to abandon a test at Kawarren was made. This appeared to be the end of any groundwater extraction proposals from the Kawarren Borefield.

1997

In 1997 Sinclair Knight Merz, when considering the Barwon Downs wellfield, had this to say. *"The purpose of the PAV* (Permissible Annual Volume) *is to provide the rural authority with a* *limit to which groundwater licences may be issued within the GMA, based on the long term sustainability yield of the aquifer system.*" A statement applicable to all GMAs.

1999

In the March of 1999 Woodward Clyde⁽¹⁴²⁾ prepared a comprehensive report for the Department of Natural Resources and Environment recommending that the Permissible Annual Volume (PAV) for the <u>Gellibrand</u> Groundwater Management Area (GGMA) be set at ZERO.

2006

On the 2 November 2006 the Victorian Government published the Victorian Government Gazette G44⁽¹³⁷⁾ in which the Permissible Consumptive Volume (PCV), Groundwater Order 2006 was brought into legal affect. The order states "...Taking effect on the 2nd November 2006...the total volume of groundwater that may be taken...under the Water Act or any other Act...must not exceed the volume specified in the Order..." In this Order the PCV for the Gellibrand GMA was gazetted at ZERO megalitres per year.

2006

In 2006 the Department of Sustainability and Environment commissioned GHD⁽³¹⁾ to conduct a review of the Newlingrook Groundwater Management Area. This report recommended that if there is to be any groundwater extraction investigations done in the area that it be in the lower southern reaches of the Newlingrook GMA, as far away as possible from the Gellibrand GMA in the north east. The intention being to have as little impact on the Gellibrand GMA as possible.

2007

Despite the studies and findings from the 1990s Barwon Water was once again preparing to extract groundwater from the Kawarren Borefield. The planned date for a 3 month stress test pump was set for December 2007. The first Kawarren residents heard of this proposal was in June 2007 and so began a deplorable lack of community involvement.

- 1. Barwon Region Water Authority (Barwon Water) approved a Service Contract No. 10643⁽⁴⁾ dated **11 May 2007**.
- 2. Early in June a Kawarren landholder was informed verbally that a test pump was planned. There would be little noise and no inconvenience caused. The landholder requested this in writing.
- 3. **15 June 2007** a letter was recieved. This was the first correspondence sent to anyone in the Kawarren area stating that a test pump was planned for Kawarren.
- 4. **12 July** a small number of landholders in the immediate area were notified of the proposal.
- 5. **18–20 July 2007** an unauthorised preliminary 48 hour test pump was conducted at the Kawarren Borefield.
- 6. Dr. Martin Kent, CEO Southern Rural Water, was asked 10 November 2007 for a copy of the conditions, reasons and permit allowing Barwon Water to conduct a preliminary test pump at Kawarren in July. An answer 28 December 2007 stated that *"I am advised that SRW did not issue an approval for the pumping test. However, given the small volume of groundwater extracted, our attention is focussed on the*

proposed and far more significant, three month pump test." Six million litres of extracted water being dumped into the Loves Creek system is a little more than insignificant and surely required conditions for its quality or quantity. A local would be in serious trouble if they conducted a similar extraction and dumped the water into a stream. Otway Water Book 3⁽⁵⁴⁾ deals with this episode in detail.

- 7. On the Monday after the one and only Friday advertisement in the Colac Herald calling for people to attend a question and answer session, over ninety people turned up at the Colac office of Barwon Water demanding some form of public consultation and involvement. A meeting later in the year, in Gellibrand, was promised.
- 8. With only a few days notice from Barwon Water this meeting was held in the Gellibrand Hall.
- 9. **25 October 2007** at the public meeting in the Gellibrand Hall Barwon Water agreed to make documents available. Requests were made for:
 - a. Newlingrook & Gellibrand Groundwater Investigation- Kawarren Pumping Bore Assessment Report 28 August 2007. This report had already been sent to the Environment Protection Authority (EPA) for its approval, and
 - b. The consultants brief for the investigations (later to be known as Service Contract No. 10643)

Over 230 people attended this meeting.

- 10. By **31 October 2007** neither of the promised documents had arrived so an email was sent asking for the report sent to the EPA.
- 11. **1 November 2007** a second specific request was emailed to Barwon Water, asking for SKM's brief for investigations at Kawarren.
- 12. **2 November 2007** a reply from Barwon Water by email, stated that the two documents requested would be placed on Barwon Water's web pages. In this email it also stated that *"Evidence of the DSE acknowledgement that the Gellibrand GMA should be included in the study,"* would also be included on the web site.
- 13. 7 November 2007 as none of these documents were on the web site by this date a copy of the report to the EPA was requested in person at the Geelong offices of Barwon Water. Scott Dennis (Barwon Water) provided this EPA document and Service Contract No. 10643 (the SKM consultant's brief). The DSE confirmation was yet to "arrive" from the DSE.
- 14. By **11 November 2007** the Barwon Water web site included the EPA report and the Service Contract documents <u>BUT NO</u> document providing evidence of *"DSE confirmation of the project scope."*
- 15. Late in **November 2007** the Barwon Water web site included the DSE confirmation document.
- 16. This DSE confirmation document was dated the 15 July 2007.
- 17. An email was sent **21 November 2007** to Campbell Fitzpatrick (DSE), the writer of this confirmation. The email asked was this confirmation, dated the 15 July 2007, the first approval given by DSE to proceed with the Kawarren groundwater investigations.
- 18. 23 November 2007 Brett Spicer (DSE), replies saying the "...agreement on the scope of the appraisal was reached between the two parties on 15 June 2007."

As with so many aspects of this test pump proposal at Kawarren it is extremely difficult to determine who is responsible for what, who is accountable and what type of democratic process is taking place.

To the question when did the Department of Sustainability and Environment give permission to Barwon Water to proceed with investigations at the Kawarren borefield is an instance where it has been most difficult to obtain an informative and accurate answer to a specific question. Readers will most likely come to the same conclusion that I arrived at. It appears permission was given after the investigation process was well and truly underway.

How is it possible to issue a Service Contract for this work in May 2007 when permission to carry out the project was given on the 15 June <u>or</u> the 15 July 2007? Considering the scope and enormity of the contract one can only imagine the amount of time it would have taken to prepare such a document. Preparation would have commenced well before the 10 May 2007 when the contract was issued?

Also why did it take until the middle of November 2007 for the Campbell Fitzpatrick letter to be put on the Barwon Water Web site? This letter of confirmation that appeared in November, was dated the 15 July 2007 and was addressed to Paul Northey of Barwon Water. This letter stated *"Evidence of the DSE acknowledgement that the Gellibrand GMA should be included in the study*." Why couldn't this be produced when it was first asked for months earlier?

Late in 2007

The proposed 2007 stress test, pumping 6 ML a day of heated groundwater over a three month period into a 2.2 ML a day average summer stream flow, would alter the way the ecosystems normally function in the Loves Creek and Gellibrand River catchments. A discharge of this size would influence conditions in the entire length of Loves Creek from the discharge point and would also have a significant influence on the waters flowing in the Gellibrand River. Lack of public consultation, involvement and transparency with this project did not instil any confidence in the local community that the Newlingrook/Kawarren investigation would be carried out any better than the groundwater extraction stress test pump conducted at the Barwon Downs Borefield some years earlier. And so began the torturous task of attempting to involve local participation in the implementation of the Newlingrook/Kawarren Borefield investigations.

28 August Preliminary Test Pump Report.

This 2 day test pump had several objectives such as, was the bore still operational. Another objective was to prepare a report for the EPA with the object of gaining Environment Protection Agency (EPA) permission to discharge 6 ML/day into the Loves Creek stream system during the three month test pump. The EPA was being asked to check that the groundwater being discharged into the surface streams was not going to cause significant environmental impact so that the pump could proceed post haste.

Once LAWROC Landcare Group obtained a copy of the 28 August preliminary test pump report, it was scrutinised and commented upon. This extensive, lucid, clear and comprehensive analysis was sent to the Environment Protection Authority (EPA) 4 December

2007, for its consideration. Suffice is to say that Barwon Water was asked by the EPA to resubmit its report. This report dated 17 December 2007, has been dubbed as the 17 December Report.

Early 2008

Early in 2008 Barwon Water was asked for a copy of the 17 December Report. The email reply was short and to the point. (Tuesday 5 February 2008 11:22:47 AM)

"I would like to clarify that I said that I could not provide you with a copy of the noted report because it was (and still is) in DRAFT format."

"A copy of the finalised program will be posted on our website for everyone's viewing." (Personal email to me as follow up to phone discussion and earlier email, 30 January,.)

Throughout the preceding few months numerous phone conversations and emails were exchanged with the Geelong branch of the EPA. Unfortunately questions were in large part ignored. One that has never been answered is this, *"Have the many discrepancies and inaccuracies and failings of the July preliminary test pump, as related in this crit, been resolved?"* (email 14 Feb 2007) No reply.

The EPA had been sent the 17 December Report and would not release it as it was Barwon Water's report. The same email asked, "*Does that mean that the EPA will be making decisions based on a draft report?*" No reply.

Late 2008

Having little success gaining access to the draft or final copy of the 17 December Report a Freedom Of Information (FOI) request was made. The request was denied as the document requested was a draft internal working document to aid in the development of the final document. The final document has never been forthcoming and has never been posted on Barwon Water's website.

The Regulatory Reference Group

To further incise the local residents it became known that Barwon Water had convened a *Regulatory Reference Group* of stakeholders in the Kawarren Borefield investigations and that this group had been established sometime in August 2007. Barwon Water denied access to the minutes of these meetings, attendance at meetings or representation from local "*affected parties*." To make matters worse this Regulatory Reference Group comprising representatives from 10 authorities (The Department of Sustainability and Environment, Southern Rural Water, Parks Victoria, the EPA, the Corangamite Catchment Management Authority, Wannon Water, the Colac Otway & Corangamite Shires and Barwon Water & SKM consultants) authorities, with regulatory and jurisdictional powers, were not exercising their responsibilities when queried over basic jurisdictional matters.⁽⁵⁵⁾ These matters amounted to six pages and not one of the 6 authorities approached was prepared to address the concerns.

After requesting minutes of the Regulatory Reference Group minutes through a Freedom Of Information application, a reply (Barwon Water Ref:15/260/0007A(6)) arrived in late February 2009. Strangely the reply stated the minutes were granted in full but the minutes were not included. The envelope only contained two reports that were not even requested. Some days later after a phone call query, the minutes arrived. These minutes were for the first meeting and were dated 10 August 2007. There had apparently been no other meetings up to February 2009 and after reading the minutes it could not be understood why such a fuss had been made denying access to them.

The Consultative Process up to 2008 (See Appendix Two, page 148)

While reports were being requested, denied, delayed and accessed through the slow FOI process, Southern Rural Water called for submissions regarding Barwon Water's "*Expression of Interest regarding Pump testing of a Groundwater Bore*" at Kawarren. <u>One</u> advertisement to this effect was placed in the Colac Herald. Submissions had to be in by 18 February 2008. Unfortunately the address to send any submissions to was incorrect. However, over 30 submissions opposing the expression of interest were lodged. Southern Rural Water decided to put aside a day and night session for these objectors to verbally present their cases. This was held on 10 April 2008 in the Colac COPAC building. Approximately 23 objectors took up this opportunity.

Community involvement and engagement appeared at long last to be happening. However, 14 days after these verbal submissions (23 April 2008), Water Minister Tim Holding made it abundantly clear that there was to be no community involvement, engagement or discussion of any consequence that would change his mind. The Permissible Consumptive Volume was altered and Barwon Water would be given the licence to proceed. In the same letter the Minister wrote "...any long term licence application from Barwon Water will be subject to public consultation." How disappointing. Why would Minister Holding take any more notice of the public consultation process in the eventuality that a long term licence was applied for when he was completely ignoring the process by issuing a short term licence for the stress test? His decision to proceed with issuing this short term licence had not been conveyed to the licensing body, Southern Rural Water. SRW was still deliberating.

And so, the Southern Rural Water consultative process continued. The objectors to the granting of a licence saw this as simply tokenism, farcical to say the least and an elaborate window dressing attempting to "kid" local communities into thinking that a democratic process was being followed.

In October 2008 Southern Rural Water granted Barwon Water its licence to proceed with a short term groundwater stress test pump at the Kawarren Borefield. The Water Minister's emphatic decision made five months earlier was to be carried out. Why have a public consultative process?

However, eight groups of people lodged appeals against the decision with VCAT, resulting in Barwon Water withdrawing its application in June 2009 twenty four hours before the hearing was to commence

The 9 September 2008 Report

The best way to cover this particular part of the unfolding fiasco at the time is to copy Chapter 5, in full, from Otway Water Book 10. It is ironic that the 17 December Report 2007 could not be released because it was in draft format, yet, the 9 September 2008 Report was in draft form and had been placed on Barwon Water's website. The following 14 pages are as they appear in Otway Water Book 10. Reference numbers to the bibliography have been changed to match the bibliography in this book. References to pages have been changed in a similar fashion and some references to other chapters in book 10 have been omitted to facilitate easier reading.

(Appendix Five is another Statutory Declaration that has been declared since this chapter in book 10 was written and supports the two Statutory Declarations found on pages 55 and 56 below).)

CHAPTER 5

Barwon Water's Sinclair Knight Merz Report 9 September 2008, "Stream Trigger Levels For 90 Day Pumping Test."

(Draft 4)

The next stage in the Kawarren groundwater test pump was the preparation of trigger levels designed to protect the landholders' rights and the integrity of the environment. The "Stream Trigger Levels For 90 Day Pumping Test" was designed to do just this.

However, this Chapter demonstrates that this report is poorly prepared, full of inaccuracies and is based on dubious and doubtful assumptions. Further, Barwon Water does not appear to be overly concerned with this lack of professionalism used when preparing this report. The initial request for clarification and correction of inaccuracies has been ignored.

<u>Access to the 9 September Stream Trigger Levels Report</u> (Referred to in the rest of this Chapter as the "9 September Report").

Obfuscation (to bewilder, confuse, darken, obscure and to stupper) by Barwon Water has been a major concern and gaining access to this report has been no different. Even though the following letter was penned some time before 9 September it highlights the manner in which the Kawarren/Gellibrand community had been treated up to this period.

Malcolm Gardiner

1805 Colac Beech Forest Road Kawarren Vic 3249 08-07-2008

Peter Morgan Manager Asset Planning Barwon Water PO Box 659 Geelong 3220

CV7569364 Express Mail

Peter,

Following our lengthy discussion at your offices in Geelong yesterday I am aggrieved on several points that I would like to draw your attention to.

- 1. Taking over 50 days to date, to provide information that is to be made available under Licence 893889 is a little annoying considering the information asked for should be at your "finger tips."
- 2. For you to say it is not a high priority to provide this is also infuriating.
- 3. To need another few weeks is also disturbing.

However the thing that most upsets me is the spin and rhetoric that both you and Tony Belcher were prepared to feed me especially when you specifically stated that a fresh start is needed and Barwon Water will now be making an attempt to get the process right.

(I was told at this meeting that it was part of Tony's job prescription to liaise with our communities – as of November 2009 Tony has not done any liaising what so ever.)

We spoke about the 48 hour test pump last July 2007. This discussion covered the fact that the crit written by members of this community on the SKM 28 August submission to the EPA accurately

discredited much of the contents of this document. We spoke about the fact that you have denied access to the 17 December resubmission to the EPA on this test.

We also spoke about those people most involved in the Kawarren groundwater investigations process and who the various stakeholders are. It was my impression that you agreed that the residents of Kawarren and Gellibrand were indeed significant stakeholders. We spoke about the one meeting the Regulatory Reference Group has had back in August 2008. (This should have been 2007) Yet you allowed this discussion to proceed and not once did you...

- 4. State that there is a Regulatory Reference Group of stakeholders meeting in Colac on Monday the 14 July 2008. (No one to my knowledge from this area has been given an invitation to this)
- 5. Recently you have sent another report to the EPA titled "Newlingrook and Gellibrand Groundwater Investigation – Pumping Test Water Quality and Ecological Monitoring," and you made no reference to this when you know our community wants access to this type of material.

The rhetoric and spin you fed me yesterday reinforces the contemptible way in which you treat people who fall under your umbrella as outlined in the Statement of Obligations set down by the Government and your customer policy set out on your web site.

As I said to you both yesterday this valley has a extreme range of people with various backgrounds and they do not appreciate being treated in this way.

And as I stated clearly yesterday, Barwon Water has to prove to this community that it is open, transparent and willing to engage people it affects with meaningful dialogue. Yesterday was a perfect time to start but unfortunately this latest episode reinforces the facts, beliefs and perception that Barwon Water is a law unto itself.

Malcolm Gardiner.

Cc: EPA Western...Chairperson Barwon Water.

On 7 December 2008 whilst browsing the Barwon Water web site, three months after the 9 September Report was prepared, the 9 September Report was found on the site. A copy was

SKM	Stream Trigger Levels for 90 Day Pumping Test	
	Appendix A Analytical Modelling Sensitivity Testing (Hunt, 2003)	
14	SINCLAR KNOT NERZ I VIVES Project VANNEST Letvice/America_Leter Tryper Lavels for 18 any Next 10 Laye-Pril. Styper Lavels for 18 any Next And Acad Acad 21	

downloaded. Unfortunately the 2 pages of Appendix A were un-readable .

- 22 January 2009 a letter was sent to Michael Malouf, Managing Director of Barwon Water, asking for a readable copy.
- The reply stated that this could only be done via a Freedom of Information (FOI) request.
- An FOI was sent 24 Feb 2009, highlighting the particular pages that couldn't be read.
- The reply (Barwon Water's Ref:15/260/0007A(7)), was exactly the same, the Analytical Modelling Sensitivity Testing was blacked out in four sections. Appendix A was still un-readable.
- Months later in 2009, as part of Southern Rural Water's supporting argument for granting Barwon Water a licence to conduct the test pump at Kawarren, it provided this 9 September

OTWAY WATER BOOK 23. Gellibrand GMA, Surface & Ground Waters.

Report and these pages were identical to the ones already acquired, un-readable and useless.

• No further attempt was made to obtain a readable copy. However, the post script on page 66 adds intrigue to this part of the story.

The scene was being set for another period of confrontation with those authorities not prepared to be open, accountable and transparent with major community stakeholders in the development of the Kawarren borefield investigations.

The First reading.

The first reading of the 9 September Report was enough to realise that this report was desperately in need of considerable proofing and verification of facts, clarification of assumptions and rewriting at the most basic level.

In the same month Michael Malouf was being asked for a readable copy of the 9 September Report the following 5 page letter was sent to Carl Bicknell in an attempt to begin some form of dialogue.

PAGE1

24-01-2008 (this should have read 24-01-2009) Mr. Carl Bicknell Barwon Water PO Box 659 Geelong Vic 3220

Sender Number DLO0099384

Dear Carl,

Re: the SKM report on Trigger Levels for the Newlingrook Groundwater Investigations, 9 September 2008, as posted on the Barwon Downs website.

I have a number of concerns with this Draft 4 Report. The first of these deal with the stream flow data presented for Porcupine and Pompa Bill Creeks.

In the middle of page 13 under point 2, is a clear example of inaccurate and poor work done compiling critical information. The Statutory Declaration found on page two clearly demonstrates that Porcupine Creek does not display ephemeral flow patterns. This needs to be clarified in the final report. It must be reported accurately. Where it incorrectly states that the summer flows of Porcupine Creek are zero, it needs to be rectified as the Porcupine Creek has never naturally stopped flowing.

I take exception to the comment that the "veracity" of my data collecting for Pompa Bill Creek needs to be checked and is only "semi reliable." Part of my statutory declaration may assist this process (see pages 54-56). I would appreciate this being clarified before the final report is completed.

The spelling of Pompa Bill Creek needs to be corrected in the final report.

This report has another piece of poorly reported information. At no stage would I have ever said Pompa Bill Creek had never ceased to flow in the last 15-20 years. There is a distinct difference

between the 15-20 years as stated in this September report by SKM, and over 40 years as sworn in my statutory declaration. I would anticipate that this be rectified as well in the final report. I would appreciate a reply to this letter.

Yours sincerely,

Malcolm Gardiner

PAGE2

State of Victoria - Evidence Act 4050
State of Victoria — Evidence Act 1958 [JP/DOJ.1/2000]
STATUTORY DECLARATION
I, PETER GOLDON MACDONALD, [full name]
of 130 MACDONALO'S ROAD KAWARREN UC 3249, [address]
DANY FARMER, do solemnly and sincerely declare that: -
Our family first moved to Kawarren in February 1945. Grandad, Sydney MacDonald and Dad, Gordon MacDonald dairy farmed together at 195 MacDonald's road. In 1971 due to ill health, Granddad Sydney MacDonald had to leave the farm. Then I Pe- ter MacDonald joined the dairy farming partnership with Gordon MacDonald until 1979 when I purchased 190 MacDonald's road. Since 1945 the pools in Porcupine creek have never been dry at the bridge on Mac- Donald's road. Since the gauging station on Porcupine creek was installed beside the bridge, the only time the flow has stopped at the gauging station was when I have been pumping (diverting) water to the dairy tank.
Lacknowledge that this declaration is true and correct, and I make it with the understanding and belief that a person who makes a false declaration is liable to the penalties of perjury. Declared at <u>Kawarren</u> in the State of Victoria, this 14^{th} day of <u>Jawary</u> 2009 Before me, Signature of authorised witness $151 \le 31609$ Gas Blice
The authorised witness must print or stamp his or her name, address and title under section 107A of the Evidence Act 1958 (eg. Justice of the Peace, Pharmacist, Police Officer, Court Registrar, Bank Manger, Medical Practitioner, Dentist)

State of Victoria – Evidence Act 1958
STATUTORY DECLARATION
I MALCOLM LAW) COOD) TO
(full name)
of 1805 COLAC LAVERS HILL ROAD
Refined, do solemnly and sincerely declare that:-
In regard to: Draft 4, 9 September 2008 "Stream Trigger Levels For 90 Day Pumping Test"
Newlingrook Groundwater Investigation. Prepared by Sinclair Knight Merz for Barwon Water.
And in regard to:
Pompa Bill Creek that has many of its source springs originating on the property of "Kersbrooke" 1805 Colac Lavers Hill Road, Kawarren, Victoria 3249, 22A Lot 2 Parish of Yaugher.
This property was purchased in the early 1960s in partnership with my parents. One of the features
of this property was its permanent supply of running water that had never been known to cease flowing. This creek partly originating from springs in this property has since been named Pompa Bill Creek.
Since "Kersbrooke" was purchased I can testify that Pompa Bill Creek has never dried up and has always had a steady flow throughout the year, including summer flows. This record of uninterrupted flow has been the case for over 40 years.
A measuring device was installed on Pompa Bill Creek in 1989.
The two sheets, marked "Pompa Bill Creek Records," summarises the height data collected.
I acknowledge that this declaration is true and correct, and I make it with the understan and belief that a person who makes a false declaration is liable to the penalties of perjury.
Declared at
in the State of Victoria, this 18^{44} day of
DECEMBER 20
Before me, Man J. Hallwern Signature of authorised witness
PRINCIPAL COLAE P.S.
The authorised witness must print or stamp his or her name, address, and title under section 107A of the Evidence Act 1958 [Vic (eg. Justice of the Peace, Pharmacist, Police Officer, Court Registrar, Bank Manager, Medical Practitioner, Dentist)





PAGE5



Ten months later, the end of November 2009 and there has been no reply to this letter.

After having written to Barwon Water early in January 2009 showing a specific interest in the 9 September Report and considering that this was Draft 4, four things should have been abundantly clear to the officers of Barwon Water.

- 1. It had been an oversight not including the Kawarren/Gellibrand community in the first three drafts,
- 2. every effort should be made to rectify this in future,

- 3. "mistakes" made in the content of Draft 4 should be responded to and rectified, and
- 4. correspondence deserved some form of reply. As at November 2009 there has been no reply. (Note: still no reply June 2015.)

To gain support and confidence of local residents and to tap into the wealth of local knowledge would normally be regarded as a desirable outcome. There appeared to be little effort made to achieve this.

For The Record.

The following crit on the 9 September Report formed part of the presentation that had been prepared for presentation at the VCAT hearing.

The introductory blurb that accompanied the PDF file of the 9 September Report found on the Barwon Water web site, contained material requiring comment.

The blurb stated and the comment is:

- It is agreed that Newlingrook is the area identified in the Central Water Strategy as the Groundwater Management Area to be investigated. NOT Kawarren or Gellibrand. The assertion that the Strategy says this has continually been made by residents of the Kawarren/Gellibrand community since June 2007 and yet the entire document 9 September Report 2008 is based around a test at Kawarren.
- That Barwon Water has no intention of taking water from the Kawarren area for 20 years. Yet Service Contract Number 19643 includes investigations into pipelines to Geelong, land acquisition, pumping stations, an additional borefield in the area, powerline accessibility and the feasibility of extracting 16 000 million litres a year.
- 3. The Gellibrand GMA has subsequently been included in the Newlingrook studies. The inadequate justification of this inclusion is clearly demonstrated in Chapter 6, Otway Water Book 10..
- 4. The Kawarren test pump has been included because insufficient information about the Kawarren aquifer is known. The strongest of protests has been made regarding the lack of acknowledgement by Barwon Water of the numerous studies completed in the Kawarren/Gellibrand district.
- 5. 470 ML over three months to be extracted. The recommended test pump extraction in the 1990's was to be 2000 ML, 650 ML in the summer of 2007-08 and in July 2008 the Water Minister gave permission for 645 ML to be extracted.
- 6. The extracted and then treated groundwater to be dumped into the Loves Creek catchment. No indication has ever been disclosed how the water will be treated.
- 7. An assurance that the test pump will not cause any unacceptable impacts on the surface water flow or the environment. Nothing has been provided that gives this assertion credit.
- 8. Seven new observation bores will be tested for 24 hours only. What this means has never been disclosed.
- 9. The current study will assess impacts on...
 - groundwater resource
 - surface water
 - groundwater dependent ecosystems
 - other aquifers
 - the environment
- 10. Barwon Water has developed...
 - A water level
 - Water quality
 - Ecological monitoring program

- A stream trigger level monitoring system to ensure any potential impacts are detected early
- A program that will scale back or stop the test completely if these trigger levels are reached.

This blurb reads extremely well and should instil confidence that the test pump is being run and managed in the best possible way. However, this is not the case. Perhaps one of the reasons this trigger level report is so poorly done is that Barwon Water maintain a secretive and closed to scrutiny attitude, while failing to involve the Kawarren/Gellibrand community in its endeavours. The following crit concentrates on the 9 September Report and is quite scathing in its content.

Page One of the 9 September Report

- This report states, "The following report outlines Barwon Water's response to specific issues raised in the public submissions in relation to the impact of the pumping test on flow in the nearby streams." This report does not do this nor does it answer the multitude of specific issues raised in public submissions. The 9 September Report confirms previously expressed fears and adds many more to the long list of concerns.
- 2. Ground water baseflow **"is"** significant⁽¹⁴⁶⁾ and is not an **"if"** as described on this introductory page.
- 3. No evidence of the spring monitoring regime has been made available for scrutiny.
- 4. Having streamflow act as a surrogate trigger for springs has to be shown as sound practice and backed up with scientific data/reports and it hasn't been. "Due to the lack of baseline data and the fact that streamflow will act as surrogate for the spring flow impacts, spring flow triggers are not proposed." Considering that the stream flow gauging stations on the Yahoo, Ten Mile and Porcupine Creeks had been decommissioned back in the mid 1990s this is a most curious statement. In fact the locally collected spring flow data for the Pompa Bill Creek springs is more comprehensive and should not be dismissed out of hand in such a manner.
- 5. The Ten Mile and Porcupine stream flow gauging stations were recommissioned during 2008 but the Yahoo stream flow gauging station has not been reinstated. Consequently there is no accurate way to gauge the flow from this stream. Visual and bucket dipping is not an accurate means of determining flow with a stream this size.

Page Two

- 1. To say Loves Creek is the least likely to be impacted is ludicrous. Ten Mile, Yahoo and the Porcupine Creeks are tributaries and combine to form Loves Creek. Loves Creek is an accepting stream below the extraction groundwater point and above the Loves Creek stream flow gauging station. Also Loves Creek will have an extra 6 ML/day being dumped into it and there is the possibility of a multitude of small discrepancies that can occur with pumping rates. Small discrepancies in the flows of these creeks will not seem significant and may well not be discernable but constitutes a major factor in their flow regimes. For instance Porcupine Creek is lucky to have 0.1 ML/day summer flow.
- 2. Springs that "*could be potentially impacted...*" are not shown. No map has been provided and it is apparent that significant wetlands in the area to the north of the catchment are not to be monitored.
- 3. The area of unconfined aquifer of the Eastern View Formation (EVF) is not provided.

Page Three

1. This page refers to Appendix A. The Appendix A data is completely BLACKED OUT (see page 51). The data cannot be read. It would be good to see the full range of possible impacts under varying inputs into the modelling program but this is not possible. The 9 September Report has this to say about Appendix A, *"The results demonstrate a wide range of potential impacts on streams, depending on model input parameters. However, while the impacts are wide ranging, the percentage impact on dry season streamflow ranges from negligible to*

small." Bearing in mind that Appendix A cannot be read and much of the modelling data is "infill" guesswork little credibility can be afforded the crucial assumptions and conclusions drawn.

- 2. The potential flow losses from negligible to small are stated as up to 7% in Ten Mile Creek and up to 12% in Yahoo Creek. For such small summer flows these percentages should not be dismissed as insignificant.
- 3. As page 3 states, the impacts demonstrated are wide ranging depending on the MODEL inputs. The fact that the inputs used are based on a high degree of guess work throws considerable doubt on the value of the modelling.
- 4. Stating that the "...anticipated impact on Porcupine Creek is negligible..." should not automatically exclude Porcupine Creek from being closely monitored during any test pump.

Page Four

1. To say that the selecting of one "*proxy*" (Ten Mile Creek) as an indicator for the impact on the entire Loves Creek Catchment system is deplorable and dubious. Scientific proof that this is sound practice needs to be provided quoting studies that mimic the situation found at Kawarren.

Page Five

- 1. Pompa Bill Creek is spelt incorrectly and this needs to be corrected.
- 2. Selecting three springs for observation is ludicrous in the extreme. If this test is designed to investigate the environmental effects then it needs to be clearly shown that choosing three such springs from the numerous springs in the area is appropriate.
- 3. Springs representative of all aquifer levels should be monitored.
- 4. Baseflow springs feeding the streams in the areas high in the catchment should be monitored as these would be the first to dry.
- 5. Nested bores at these sites should be established.
- 6. If the spring surveys and stream flow gauging stations were not suspended in the 1990s perhaps the necessary data would be available and infilling with years of guesswork would not be necessary.
- 7. No pumping should occur until a comprehensive spring and stream flow monitoring program is implemented and maintained for at least 5 years. Given that Barwon Water will not be needing water from this area for 20 years this is not unreasonable.
- 8. No mention is made anywhere in this report regarding ongoing monitoring after the test pump ceases. The full extent of any impact could take place anytime after a test pump. This needs to be accounted for.

Page Six

1. To assume that one stream flow gauging station will indicate spring depletion is beyond words. This highlights the complete lack of a comprehensive study, responsible management and neglect and disregard to the Statement of Obligations set down as law that Barwon Water is obliged to follow.

Page Seven

- 1. This report can talk about percentiles and the like and refer to average annual stream flow reductions but the fact will remain that the flows in the Loves Creek catchment are fully allocated if not well and truly overallocated.
- 2. If we accept the EarthTech (2006) report quoted in the 9 September Report , that the minimum summer environmental flows in Loves Creek should be 6 ML/day, then this would in the strongest terms, indicate that there should be ZERO groundwater extraction from the Kawarren borefield.
- 3. 9 September Report states that this EarthTech recommendation has relied "... upon a field assessment and expert knowledge of a technical panel representing the fields of geomorphology, hydraulics, vegetation and macroinvertebrate and fish ecology." This

would appear to clearly demonstrate the quality of the work done to establish an ideal 6 ML/day environmental flow.

- 4. The Barwon Water report goes on to say that this ideal summer environmental flow is not met 46% of the time. The summer environmental flow is fundamentally groundwater yet Barwon Water maintains that the extraction of groundwater before it reaches the surface will have minimal impact. Illogical assertions.
- 5. This report then goes on to state that..."As the environmental flow recommendations do not apply to the current flow conditions in the Loves Creek Catchment, these recommendations are not suitable trigger levels for the pumping test," and sets trigger levels way below these environmental flows of 6 ML/day.
- 6. Even though the 9 September Report states expert knowledge has been used to develop an environmental flow regime, the 9 September Report disregards it because this flow has never been adopted. The 9 September Report sets the red trigger level for this test at under 1 ML/day.

Page Eight

- 1. To *assume* that the recent range of flows is satisfactory for maintaining ecological health and function is not a sound scientific basis on which to draw important conclusions.
- 2. The macroinvertebrate studies mentioned in the 9 September Report have not been made available for scrutiny.
- 3. The fish studies done in the mid 1990s have been disregarded.
- 4. Conducting comparative fish studies should be conducted to clarify "... whether fish communities are experiencing flow stress..."
- 5. The 9 September Report recommends that "... the pumping test should not cause flows in Loves Creek to drop below levels that are currently experienced," then sets trigger levels well below these current average levels.
- 6. Because the stream flow gauging stations at Ten Mile, Yahoo and Porcupine were decommissioned in the mid 1990s, much guess work and modelling had to be used to fill in the 13 year gap of none recording to arrive at some of these conclusions.
- 7. No explanation was given why the Yahoo stream flow gauging station was not recommissioned. Considering 1990 studies suggested its flow could be dried up in the event of a test pump at Kawarren, this is a significant omission.

Page Nine

1. From personal experience over 40 years it is difficult to accept the graph on this page to be a true representation of flows in the creeks in the Loves Creek Catchment. Loves has to have a higher flow graph at all stages as it is a combination of the other three tributaries of Ten Mile, Yahoo and Porcupine Creeks. This is wrongly represented in the graph. During the summer months of no rainfall events Ten Mile is always the next highest after Loves, then the Yahoo and finally the Porcupine. This order of summer flow rates was also the case during the 1980s and 1990s during the period these streams were being recorded. The data presented on this page must be revisited so that misrepresentation is avoided.

Page Ten

- 1. "Infilling" is an interesting term for lack of data that is replaced with guesswork. No consideration has been given to
 - a. the drawdown affect on the Loves Creek Catchment tributaries from the Barwon Downs borefield,
 - b. legal extractions for stock and domestic use, and
 - c. legal unregistered entitlements not presently being diverted.
- 2. Far too much of the data presented is based on "infill" calculations. To draw conclusions of various scenarios from this data as show in Appendix A, an appendix that cannot be read, is a most doubtful way of presenting a sound scientific document.

Page Eleven

- 1. On this page there is a table showing that during the dry summer season the flow in the Porcupine Creek is zero. The nonsense and poor researching allowing this statement to be made has been highlighted earlier in this Chapter. Also this table contradicts the graph found on page 9 of the 9 September Report.
- 2. The trigger levels have been calculated using "infill" data. From this data the Amber trigger level has been calculated within the natural range of the creeks and it is stated that "... therefore any short term impacts to the ecology of the creek as a result of flow reductions will be minimal." If taken over a two week period the concern with this theory is that an effect may not be immediately apparent. Also if Ten Mile Creek is the only trigger stream why is the 10th percentile applied to Loves Creek. As explained earlier the gauging station at Loves Creek is all but impossible to determine effects.

Page Twelve

This page discusses the trigger levels, levels significantly below the ones recommended by Earth Tech.

- 1. Let's consider this.
 - EarthTech recommend an environmental flow of 6 ML/day in the dry season for Loves Creek.
 - The 9 September Report recommends that "... the pumping test should not cause flows in Loves Creek to drop below levels that are currently experienced."
 - As a consequence SKM set the Amber One trigger level at 1.46 ML/day.
 - The Amber two level at 1.40 ML/day independent of the recent drought conditions, and
 - The Red Level at 0.75 ML/day which is 5.25 ML/day below the Earth tech recommended environmental flow.
 - It is stated that the Red Level <u>may</u> constitute a significant reduction in pumping or that the pumping test be stopped completely. This is to be determined in consultation with an ecologist.
- 2. Also on this page the reversal of any impact is based on guess work and modelling. Proof by way of similar groundwater investigations needs to be provided supporting this theorising.
- 3. The statement, "... *it takes into account the natural daily fluctuations and diurnal variations in flow..*" is puzzling and needs to be clarified for meaning.
- 4. How "...the maximum delayed impact on the streams would be in the order of three months," needs to be satisfactorily explained.

Page Thirteen

- 1. In the middle of this page under point 2 there is a clear example of the inaccurate and poor work done compiling critical information. The Statutory Declaration by Peter McDonald, clearly demonstrates that Porcupine Creek does not display ephemeral flow patterns.
- 2. This report sadly lacks credibility and nowhere within its pages can be found the influence that the drawdown from the adjoining Barwon Downs borefield has had on the Gellibrand GMA. The omission of determining any possible impacts that may be apparent on streams in the Gellibrand GMA and Kawarren area from the extraction at Barwon Downs, is sadly apparent.

Page Fourteen

1. If a member of the Kawarren/Gellibrand community were to recommend the actions as set out on this page in regard to monitoring Yahoo Creek, he/she would be laughed out of the country and ridiculed for lack of stringent scientific procedure. The Yahoo stream flow gauging station was regarded as a vital installation for data gathering when a test

pump was being planned back in the 1980s. Any change of this status needs to be explained.

2. It would appear that the reference to Table 6 should have been to Table 8. If taken as read this reference does not makes sense.

Page Fifteen

- 1. Besides this Table 8 is based on assumptions and doubtful data. It would appear to the uninformed that the implementation of any of the trigger recommendations could be delayed by 76 hours at the least, and by weeks at the maximum.
- 2. Southern Rural Water's records of diverters from the Loves Creek Catchment is also sadly lacking as explained in Chapter 5.

Page Sixteen/Seventeen

- 1. It seems incongruous that this report can base much of its findings on assumptions and infill guesswork and yet can doubt the "veracity" of locally collected data over 20 years from one of the designated trigger springs. To also refer to this data as "semi- reliable" could be taken as being extremely offensive. On what basis can it be justified that commonly accepted infill guesswork is any more reliable than actual first hand data gathering by a local resident? Logically this does not make sense. "... only Pomperbill Creek has the potential for obtaining a reasonable record of historical flows, based on data collected by the landholder (the veracity of this data needs to be checked however)."
- 2. "Due to the lack of baseline data at the three nominated springs, it is not possible to specify trigger levels with any degree of confidence." "We therefore propose only a very crude trigger system for springs..." The data collected over the years and the personal 40 years of local knowledge of the springs on Pompa Bill Creek is by far more reliable than the crude benchmarking proposed in the 9 September Report.
- 3. Considering the statement that Barwon Water does not plan any extraction within 20 years it is more than reasonable to delay any test pump until "semi-reliable" data is replaced with years of "accurate" and "reliable" data collected by credible experts. This applies to the spring monitoring, stream flow gauging, environmental flows and ecological monitoring so that any assumptions, guesswork and modelling based on "infills" and incomplete data can be replaced with accurate up to date data. The veracity of local data could also be put to the test.
- 4. As can be seen in the Statutory Declarations, presented earlier in this chapter, this report has another piece of poorly reported information. At no stage would the statement been made that Pompa Bill Creek had never ceased to flow in the "...last 15-20 years." Pompa Bill Creek has never stopped flowing in the last 40 years.
- 5. The following quote from page 17 of the 9 September Report highlights the lack of concern shown for local residents and the environment in the event that any of the three permanent trigger springs was to dry up. "The spring trigger levels should be subordinate to the stream flow trigger levels, and are not considered reliable indicators of the need for major intervention in the test, such as terminating the test, due to lack of reliable historic data (as described above)." If Pompa Bill Creek was to dry up during the groundwater extraction test, after having continued to flow freely for at least the last 40 years, this fact would be noted in the investigation records and the pumping would continue unabated. This is deplorable.
- 6. Given that these springs are the initial source of summer surface water flow in the streams it could be argued that any impact on the area would be first observed in the springs and wetlands in the headwaters of the creeks. Monitoring of these areas is vital and it is argued that they would form a better indication of surface impacts due to groundwater extraction.

Page Eighteen

Springs, wetlands and creeks that local residents and the integrity of the environment have relied on for decades should not be easily dismissed if the test pump dries them up.

- 1. The three springs to be monitored are not representative of the variety and diversity springs in the area. Effects cannot be noted if there is no monitoring.
- 2. The survey conducted of all springs in the area is not available for public scrutiny. The complete monitoring survey should be shown, mapped and the sources of the spring water determined.
- 3. Spring survey data collected in the 1990s has not been included in this data gathering process.
- 4. The three springs determined as trigger springs have continued to flow through the worst drought on record. The waters from these springs are a vital part of the viability of the farms they flow from and through. If any of these springs ceases to flow for any period of time during the test pump, the pump should be terminated immediately and the farmers compensated. If Pompa Bill Creek for example, was to cease flowing for any period of time this would be catastrophic for stock and domestic water supply, an occurrence never before experienced. No provision and or compensation arrangements have been organised for such an event. The 9 September Report suggests that a spring drying up is a notable event, perhaps unfortunate but definitely regarded as inconsequential with the test pump proceeding unabated.
- 5. There has been no provision for the implementation of the Ministerial Guidelines for Licensing Groundwater for Urban Water Supply – 2008. The licence issued to Barwon Water for the Kawarren test pump states it is for urban supply. Therefore the guidelines that have these things to say is applicable to this Kawarren borefield investigation:
 - a. "... the licensee (is) to compensate existing authorised groundwater users that are materially or adversely affected by taking of water under licence."
 - b. In this situation "... the licensee must compensate that person by providing: an alternative water supply at the cost of the licensee; or financial compensation in a manner agreed between the parties. The licensee must not materially affect any existing authorised user of water until compensation arrangements are put in place."
- 6. The springs and wetlands in the area first to experience any drawdown affect are not being monitored. Permanent headwater springs on the Yahoo, Ten Mile and Porcupine Creeks require ecological monitoring stations to be established not to mention the countless other creeklets feeding into the catchment.

Page Nineteen

- 1. For some unexplained reason the frequency of monitoring the stream trigger levels decreases as the test pump proceeds. For the uniformed this appears to be the wrong way around. As the test pump draws down the aquifer it would be expected that any detrimental influence would increase requiring more vigilant monitoring.
- 2. "Reporting against the trigger levels to Barwon Water/Southern Rural Water is proposed on a monthly basis. If any trigger levels are breached however, we will report this to Barwon Water/Southern Rural Water immediately."

These words are comforting especially when it is stated that any breach of a trigger level is reported immediately. The impression gained is that there would be a minimum period before remediation was initiated. However, with the monitoring regime being suggested a trigger level could go undetected for 13-14 days before any remediation commences and then another 76 hours is allowed for the completion of this work. The amount of social and environmental impact that could take place during this time frame could be significant and irreversible. The monitoring regime is totally inadequate.

CONCLUSION

This project as outlined in the 9 September Report is ill conceived, poorly researched, based on doubtful assumptions and modelling and contains gaping data "blackholes." All of these shortcomings, given time and research can be overcome. The environmental integrity of this area could then be assured.

Considering there now appears to be ample time to manage a thorough and competent research project before any test pumping, this would be an opportune time to put in place monitoring and investigative programs. The first part of such a project should be a desk top study collating the multitude of data and reports already conducted in the Kawarren and Gellibrand aquifer area.

In 1989 at the NREC hearings⁽⁹⁷⁾ held in Colac the Geelong and District Water Board (now called Barwon Water) representatives argued strongly that if Geelong was not to run out of water by the mid 1990s the water resources of the Kawarren/Gellibrand area had to be made available immediately. Barwon Water stated in 1989 that there was no time to conduct thorough longitudinal studies. However, in 2009, if the executive officers of Barwon Water are to be believed that there will be no need for Kawarren borefield water for at least 20 years, then there is ample time to instigate appropriate investigations.

Post Script:

Barwon Water was sent a Freedom Of Information (FOI) request on 5 October 2009 asking for a copy of the *final* report of the "Newlingrook Groundwater Investigation – Stream Trigger Levels for 90 day Pumping test." Up to this period of time the latest available edition of this report was DRAFT 4. The reply to the FOI arrived late in November. The covering letter (Barwon Water Ref: 15/260/0007c(2)) stated, "*Report attached. Draft 4 is the latest version, no final report produced.*"



OTWAY WATER BOOK 23. Gellib

CHAPTER TEN

The 2007 Kawarren Stress Test Pump.

When reading through the Otway Water books attempting to "drag" out and compile all of the episodes that had taken place over the years, it was noted that a stress test pump for the Kawarren/Gellibrand borefield area was often mentioned. However, little emphasis or discussion has been placed on this aspect before and does need to be dealt with.

Stanley ⁽¹¹⁹⁾ in 1991 stated that five conventional constant rate pumping tests had been conducted on units within the basal tertiary aquifer system in the Kawarren region between 1984 and 1991. The tests conducted at the Kawarren bore did not put sufficient stress upon the resource to enable a reasonable assessment of the environmental impact of sustained pumping. Unfortunately, the amounts of extracted groundwater during these earlier extractions were not mentioned. Stanley recommended that a longer and more stressful pump was required.

The test pump that Barwon Water scheduled for the Kawarren borefield early in 1992 was *"… designed to significantly stress the system so that the regional resources and environmental effects of sustained long term pumping from the Kawarren region can be assessed with any surety."* ⁽⁸⁸⁾ It was planned that over a four to twelve week period approximately 15-20 megalitres a day was to be extracted. However, to assess the environmental impact it was emphasized that base line data must be gathered before any pumping begins. Barwon Water had no plans to compile this data. The Barwon Downs Borefield scenario was to be repeated.

In 1994 Hydro Technology stated, *"A full evaluation of the resource potential of this region can only be established by an examination of the system under stress."*⁽⁷⁸⁾ The commonly accepted amount fell within the 15-20 ML/day range. As discussed in earlier chapters this 1990s test pump did not proceed.

However, in 2007 the Barwon Water Community Newsletter dated September 2007: "<u>Investigations</u> into the Newlingrook and Gellibrand Groundwater Management Areas," stated the following: "Up to six megalitres of groundwater a day will be diverted into Love Creek during the three month pump test in summer 2007-08." Barwon Water was proposing another stress test pump. At no stage has an explanation been given how this reduction in daily extraction was capable of determining the same outcomes that were recommended in the 1990s with 15-20 ML/day being extracted.

On the 9 October 2007 Randal Nott, of the Department of Sustainability and Environment, stated that Barwon Water would be stressing the system as hard as they can and that they wanted to go longer so they can actually see what the worst case scenario is (pers.com).

Depending on the source of information the amount of groundwater to be extracted in the 90 day period in 2007-08, varied from 470 ML to 650 ML. Puzzled over this ,clarification was sought through a FOI request early in 2009 (See Appendix Four). Barwon Water was asked the reasons and rationale behind the reduction in the amount of water to be extracted. The reply stated that no documentation related directly to this request could be located. It is quite extraordinary that an explanation for this dramatic reduction in groundwater to be extracted has never been given. There was no indication that technology had advanced that far that the extraction could be reduced by two thirds of the 1991 figures and still gain the results required.

CHAPTER ELEVEN

Efforts to Gain a Final Report on the Newlingrook/Kawarren Investigation

In 2007 Barwon Water let out Service Contract to SKM to proceed with a \$200,000,000 development of the Kawarren Borefield investigations. An illegal groundwater extraction took place in July of that year but by 2009 all work and monitoring ceased when Barwon Water withdrew its application to extract groundwater for the stress test pump. Even though the stress test pump and groundwater extraction investigation was abandoned in June 2009 it took another three and a half years to obtain a final report on work completed.

When it became known that a document had been written summing up the abandoned Kawarren Borefield development, attempts were made to secure a copy. The details of this endeavour are laboriously presented in the following pages and have been done so intentionally to demonstrate how obstructive and uninformative an authority can be.

- 1. Initial requests for this report fell on deaf ears and in October 2009 an FOI request asked for a final report on the "Newlingrook Groundwater Investigation."
- The reply to this request (Barwon Water Ref: 15/260/0007C(2)), dated 17 November 2009 had this to say:

Regarding: "SKM's final report on the "Newlingrook Groundwater Investigations." *There is no such report. The investigation was stopped before completion.*'

- **3.** However, after the Newlingrook/Kawarren investigations were abandoned SKM most definitely prepared a draft report and sent it off to Barwon Water late June/early August 2010, a year after the test was abandoned.
- **4.** A request for this draft report was made 17 August 2010 via a phone call to Barwon Water.
- 5. The 27 August letter on the next page, arrived as a follow up to this phone call.
- However, the email directly below and dated the 31st of August, was sent before the 27th of August letter arrived.

From: Mal Gardiner (otwaywater@yahoo.com.au) To: info@barwonwater.vic.gov.au; Date: Tue, 31 August, 2010 11:26:05 AM Cc: Subject: Attention Michael Watson	
Dear Michael, Following our conversation on the 17 August I would just like to remind you that you promised to look into providing me with a final report of the Newlingrook Groundwater Investigations.	
I would also like you to look into providing me with a coloured copy of the 2009-2010 Barwon Downs Groundwater Licence No. 893889 Gerangamete Area report that is sent to Southern Rural Water.	
Thanks, Malcolm.	85



ph book 12/8/10 promised to sort out the michael promised to sort out in delay. There is a finial report but m delay. There is a finial report but m

Our Ref: Your Ref: Enquiries To:

Phone query Mr M Watson 03 5226 2543

27 August 2010

Mr M Gardiner 1805 Colac-Laver Hill Road KAWARREN VIC 3249

Dear Mr Gardiner,

RE REQUEST FOR ACCESS TO REPORT

Further to our phone conversation 17 August 2010 in respect to obtaining a final copy of the SKM Newlingrook Groundwater Investigation report, I wish to advise:

- no final report on Newlingrook Groundwater Investigation has been completed
- following the Minister's agreement in June 2009 not to proceed any further with the Newlingrook investigation, Barwon Water requested its consultant (SKM) to document work completed to that date
- draft documentation of the work completed has been received this has not been reviewed or finalised
- the review and finalisation of the draft documentation is currently not a high priority.

Please contact me on 5226.2543 if you wish to discuss the contents of this letter further in respect to the availability of the report requested.

Yours sincerely,

manal Water

Michael Watson FOI MANAGER

CC:

Joe Adamski, General Manager Strategy & Technology Peter Morgan, Manager Asset Planning

Spoke to Michael 31/05/010. re: this (see ph book) or see 2 pages on. 61-67 Ryrie Street, Geelong, Victoria P.O. Box 659, Geelong, Victoria, 3220 DX 22061 (Geelong) Barwon Region Water Corporation ABN 86 348 316 514 Telephone: 1300 656 007 Facsimile: (03) 5221 8236

7. As a follow up, in September 2010 contact was made with Barwon Water inquiring into progress on the Newlingrook Groundwater Report and the 2009-10 Licence Number 893889 report.

8. 30 September 2010, the 2009-10 Gerangamete report arrived with the following letter explaining why the Newlingrook/Kawarren report was not yet available.

	Our Re Your R Enquir	if: lef: les To:	Phone query Mr M Watson 03 5226 2543	Barwo Water
	30 Sep	tember 201	0	
		telitore sources	-	5 <u>1</u>
	Mr M G 1805 C <u>KAWAF</u>	ardiner olac-Laver <u>REN</u> VIC	Hill Road 3249	
	Dear M	r Gardiner,		
<u>.</u>	RE	REQUEST	FOR ACCESS TO REPORTS – 23 SEPTEMBER 2010	
	Further Manage	to your ement Area	phone message, please find attached Gerangamete Groundwater .: Groundwater Licence 893889 - 2009/10 report.	
	In respe	ect to the N	ewlingrook Groundwater Investigation report, I wish to advise:	
	٠	no final rep	oort on Newlingrook Groundwater Investigation has been completed	
	٠	following to Newlingrood document	ne Minister's agreement in June 2009 not to proceed any further with the ok investigation, Barwon Water requested its consultant (SKM) to work completed to that date	
	•	draft docu reviewed c	mentation of the work completed has been received - this has not been or finalised	
	٠	the review	and finalisation of the draft documentation is currently not a high priority.	
	In discu of the re	ussion with eport.	the relevant manager, he is unable to give me a timeframe for completion	
I	Yours s	incerely,		
I	n.	hae	e Watson	
	Michael Foi Mai	Watson nager	·	n 3
n ng	Attach.			8
	CC:	Joe Adams Peter Morg	ski, General Manager Strategy & Technology jan, Manager Asset Planning	
l				
			1	
			а	
		ABN 86 34	gion Water Corporation 61-67 Ryrie Street, Geelong, Victoria Telephone: 1300 656 007 8 316 514 P.O. Box 659, Geelong, Victoria, 3220 Facsimile: (03) 5221 8236 DX 22061 (Geelong)	

9. After weeks of hearing nothing in regard to the Newlingrook/Kawarren report, the following email was sent.



10. 1 December 2010 a reply arrived.

From: Michael Watson (Michael.Watson@barwonwater.vic.gov.au) To: otwaywater@yahoo.com.au; Date: Wed, 1 December, 2010 9:20:22 AM Cc: Jill.Szalnowski@barwonwater.vic.gov.au; Subject: Request for Update.

Dear Mr Gordiner

Thank-you for your recent email seeking advice as to the reports requested. In response 1 can advise the following :-

As previously advised in Barwon Water letters dated 17th November 2009 and 27th August 2010, no final report has or will be produced for the Newlingrook groundwater investigation as the investigation was stopped before completion.

As previously advised in Barwon Water's letter dated 27th August 2010, draft documentation of partially completed work has been received. This has not been reviewed or finalised and the review and finalisation is currently not a high priority.

Regards, Michael

Michael Watson Company Secretary | General Manager Finance & Administration | Barwon Water 61-67 Ryrie Street (PO Box 659) Geelong VIC 3220 T (03) 5226 2543 | F (03) 5222 6875 | M 0417 544 108 | W www.barwonwater.vic.gov.au 11. Two months later, 18 January 2011.



12. 10 February 2011.

Print - Close Window
Subject:RE: Attention Michael Watson
From: Michael Watson (Michael Watson@barwonwater.vic.gov.au) To: otwaywater@yahoo.com.au
Date: Thu, 10 Feb 2011 14:31:18
Dear Malcolm,
Please note that I have been advised by the relevant Managers that to date there has been no progress on the SKM Kawarren borefield report and we are still awaiting Southern Rural Water comments and feedback on the Barwon Downs Licence Report and as such it is still in draft for amendment.

Regards,

Michael

BW has to have the licence report into SRW by 1 September, 60 days after the financial year ends. Then 7 days later the licence conditions say it must be made available to the public. It is now June 2014 and must still be in draft form.

13. Four months later, 22 June 2011.

Print -	Close Window	
Subjec	t:Re: Attention Michael Watson	
From:	Mal Gardiner (otwaywater@vahoo.com.au)	
To:	info@barwonwater.vic.gov.au;	
Date:	Wed, 22 Jun 2011 22:52:54	
Malco	olm Gardiner	
1805 0	Colac Lavers Hill Road	
Kawai	Tren	
Vic 32	49	
ph (03) 52 358 325	
www.	otwaywater.com.au	
Dear N	Michael,	
I was v along.]	wondering how the final report of the Newlingrook Groundwater Investigations is Have your "guys' had a chance to review the draft report yet?	coming
Cheers	S,	
Malco	lm.	
14. This letter arrived 14 July 2011, and it appeared there would be a final report after all despite earlier denials.

Sarwon Water
Our Ref: Your Ref: Email dated 22/06/11 Enquiries To: Michael Watson (03) 5226 2543
14 July 2011
Mr Malcolm Gardiner 1805 Colac Lavers Hill Road KAWARREN VIC 3249
Dear Sir,
Re: Final report – Newlingrook Groundwater Investigations
Further to your email of 22 June 2011, I wish to advise the draft reports need a significant eview prior to being finalised.
The Water Resource Planning Team (who should review these reports) is fully committed up to Christmas with preparation of the Barwon Water/Victorian Government Water Supply Demand Strategy. Ideally, we will wait until after Christmas to review the draft reports prior to finalisation by SKM. This would mean reports probably finalised by around April 2012.
Yours faithfully,
minael Watness.
Michael Watson General Manager Finance & Administration
Barwon Region Water Corporation
ABN 86 348 316 514
. 61-67 Ryrie Street, Geelong Victoria 3220 PO Box 659 Geelong Victoria 3220 тец 1300 656 007 FAX +61 3 5221 8236
www.barwonwater.vic.gov.au

15. April 2012 would be 34 months after the Newlingrook/Kawarren project had been abandoned. With no assurances that the report would be finalised even then an FOI was sent asking for a copy of the draft report.

Barwon Water Freedom of Information
BARWON REGION WATER AUTHORITYTelephone Local(03)5226 259561-67 Ryrie StreetTelephone Overseas+61 3 5226-2595PO Box 659 GEELONG VIC 3220Fax No. Local(03) 5221 8236www.barwonwater.vic.gov.auABN 86 348 316 514
Freedom of Information Act 1982 Access request form
NAME: MALCOLM GARDINER POSTAL ADDRESS: 1805 COLAC LAWERS HILL ROAD KAWARREN VIC 3249 TELEPHONE: BH AH(03) 52 358 325
DETAILS OF DOCUMENTS REQUESTED:
DA copy of the Skildraft documentation of partially completed work for the Wewlingrook groundwater investigations that you mentioned in an email dated Wed December 2010 9:20:22 pm - That was sent to me. (2) A copy of Barwon Water's EPA Licence.
FORM OF ACCESS REQUIRED: (Tick one)
(i)A copy of the document(s)Image: Comparison of the document(s)(ii)Inspection of the document(s)Image: Comparison of the document(s)(iii)Access in another form (specify)Image: Comparison of the document(s)
I understand that an application fee of \$21.00 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 Date Date Date 22/11/2011 Send request and chequernoney order (payable to Barwon Water) for \$21.00 to: FREEDOM OF INFORMATION MANAGER BARWON WATER PO BOX 659 GEELONG VIC 3220

- 16. Because the last FOI application fee was \$23.90 a cheque for this amount was included.
- 17. Even though the cheque was cashed in November it took nearly a month to process the application. This letter then arrived 9 January 2012.

Barwon Water

Our Ref: Your Ref: Enquiries To: F070311/B084690

Trevor Little (03) 5226 2511

3 January 2012

Mr Malcolm Gardiner 1805 Colac Lavers Hill Road KAWARREN VIC 3249

Dear Mr Gardiner,

Re: Freedom of Information request

I refer to your request of 22 November 2011 received by Barwon Water on 24 November 2011, in which you sought access to documents under the *Freedom of Information Act 1982* ("**Act**").

Please note that s 17 of the Act sets out the requirements for a request which complies with the Act and which requirements must be satisfied before Barwon Water can process the request. One of those requirements is that the request be accompanied by the relevant fee or be waived (in whole or in part), pursuant to s 17(2A) and s 17(2B) of the Act. The current fee payable on requests made pursuant to the Act since 1 July 2011 is \$24.40. Unfortunately, you have used an out of date request form to seek access and Barwon Water confirms receipt of your application fee of \$23.90.

In those circumstances and pursuant to s 172(B) of the Act, Barwon Water has determined to waive the shortfall of 50c in your application fee on 23 December 2011. Barwon Water will respond to your request as soon as practicable and in any case within the time period set out in s 21 of the Act. I note the due date for a decision to be notified to you will be 6 February 2012.

Yours sincerely,

Michael Watson FOI Manager

Barwon Region Water Corporation ABN 86 348 316 514

61-67 Ryrie Street, Geelong Victoria 3220 PO Box 659 Geelong Victoria 3220 TEL 1300 656 007 FAX +61 3 5221 8236

www.barwonwater.vic.gov.au

18. A reply to an FOI application must take no longer than 45 days. It took Barwon Water 30 days to decide whether to ask for or waive the 50c shortfall. Once Barwon Water agreed to the fee status on the 23 December, Barwon Water had another 45 days to

make a decision. Having waited for over a 1000 days for this report, this 75 day delay seemed inconsequential.

19. The FOI reply arrived 7 February 2012 and stated that the draft Newlingrook/Kawarren report was exempt from disclosure under **s 30(1)** of the FOI Act. The full explanation given by Barwon Water is as follows:

The rest of the documents are exempt from disclosure under s 30(1) the Act because disclosure of those document would divulge matter in the nature of opinion, advice or recommendation or consultation or deliberation engaged in between officers of Barwon Water in the course of, or for the purposes of the deliberative processes involved in the functions of Barwon Water. Those functions relate to, among other things, Barwon Water's processes in carrying out its statutory functions.

The documents are in draft form and have never been endorsed by Barwon Water. They were sought and provided to Barwon Water at the very early stages of Barwon Water's deliberative processes in relation to the Newlingrook Groundwater Investigation and are still pending consideration. No final decision has been made by Barwon Water in relation to the preliminary views and opinions set out in the draft documents.

Disclosure of the documents would be contrary to the public interest because the documents remains in draft form and consideration of them remains incomplete. Due to the preliminary nature of the documents, they do not in any way represent the decision-making process actually being undertaken by Barwon Water. Now do they reflect any final view taken by Barwon Water in relation to the issues canvassed in the documents. It is contrary to the public interest for preliminary, unendorsed and isolated opinions and advice from officers of Barwon Water to be disclosed, as disclosure would lead to misunderstanding and confusion about Barwon Water's actual views or actions. This is particularly the case given the technical and speculative nature of the contents of the documents, which relate to theoretical future projections and modelling based on events which may or may not occur. Disclosure would also damage the integrity of Barwon Water's decision-making processes, which is contrary to the public interest.

Barwon Water FOI Ref: F070311/B084690, 3 February 2012.

April 2012.

At least there was still hope that a report would eventually be available for public viewing. With this in mind and renewed encouragement, regular requests were made throughout 2012. Late in the year more emails were sent and received. 20. It appeared that the report was within reach.

Subject: RE: Kawarren Report
From: Justin Franklin (Justin Franklin@barwonwater vic.gov.au)
Deter Weder du 10 December 2010 11 07 AM
Date: Wednesday, 19 December 2012 11:27 AM
li Malcolm,
hanks for your emails. Sorry for the very slow response. I was a away for 3 weeks and I am still catching up on emails nd other work.
KM have advised that this report is almost complete and I hope to have it to you by the end of this week.
will also get back to you shortly about the questions you asked in your other email.
tegards
wears,
ustin Franklin Vater Resource Planning Coordinator Barwon Water 1-67 Ryrie Street (PO Box 659) Geelong VIC 3220 2 (03) 5226 2553 F (03) 5226 1716 M 0400 087 031 W <u>www.barwonwater.vic.gov.au</u>
Yrom: Mal Gardiner [mailto:otwaywater@yahoo.com.au] Gent: Wednesday, 5 December 2012 12:40 PM No: Justin Franklin Subject: Kawarren Report
Dear Justin.
s it possible to gain a copy of SKMs report that sums up the final work on the Kawarren groundwater orefield investigation that was postponed in 2009?
Ciao, Malcolm.

21. Finally after nearly four years a Newlingrook(Kawarren) Groundwater Investigation Report was available.

	http://au-mg6.mail.yahoo.com/neo/launch?.rand=cdbbotcdidrlr#mail
	,
Subject:	RE: Kawarren Report
From:	Justin Franklin (Justin.Franklin@barwonwater.vic.gov.au)
To:	otwaywater@yahoo.com.au;
Date:	Monday, 4 March 2013 9:57 AM
Hi Malcoln	n,
Hope you a	re well?
	F
Just letting	you know that we have put the Newlingrook/Gellibrand study report up on the Barwon Water web page. The link
15:	
http://www	barwonwater.vic.gov.au/learning/water-supply
X7 I	
You can do	wnload the report from the 'quick links' on the side of the page.
Regards,	
Justin Fran Water Pos	klin nume Planning Coordinator Barryon Water
61-67 Ryrie	e Street (PO Box 659) Geelong VIC 3220
T (03) 5226	2553 F (03) 5226 1716 M 0400 087 031 W <u>www.barwonwater.vic.gov.au</u>

Forty five months after the project was abandoned a final report was obtainable.

It would be most interesting to look into the payments arrangements made to SKM regarding this project. For example did SKM have to wait the forty five months for final payment? Because the project was terminated early was the contract arrangement paid in full?

CHAPTER TWELVE

The SKM 2012 "Newlingrook (Kawarren) Groundwater Investigations" Report⁽¹¹¹⁾

The Newlingrook groundwater investigations commenced in 2007, at a time when Victoria was well into a period of a long and severe drought. Barwon Water was looking at options to augment existing water supplies and one avenue of investigation was the development of the Kawarren Borefield. In fact, this was the Government's first option. Lack of local consultation; an arrogance to proceed at all costs; apparent ignorance of studies done on a similar failed venture in the 1990s; the exclusion of local residents concerns and a brief of procedure that included roading, land acquisition, power line supply, treatment plant, extraction bores closer to Geelong, pipeline construction and pumping stations led to appeals to be heard at VCAT. In 2009, 24 hours before a VCAT hearing Barwon Water withdrew its application to proceed with a stress test pump extraction licence. The Service Contract Number 10643, issued to SKM, was "dead in the water."

SKM reported that the project was stopped approximately half completed. The components that were almost completed were finalized and after nearly four years delay Barwon Water released the SKM, "Newlingrook Groundwater Investigation" report.⁽¹¹¹⁾ This report documents the studies that aimed at demonstrating the degree to which the Gellibrand River and other surface water features rely on groundwater discharge to maintain year round flows. Not a bad report.

Where is Newlingrook?

However, before reviewing this report it is important to look at how the Government and Barwon Water justified developing a new borefield in the Kawarren valley, a part of the Yaugher Parish. As discussed on pages 8-14 the Gellibrand Groundwater Management Area (GGMA) was designated as having a zero groundwater extraction limit. This was recognised in the Central Water Strategy.⁽¹³⁵⁾ However, the strategy also stated that groundwater extraction investigations could be undertaken in the Newlingrook Groundwater Management Area (NGMA), a Groundwater Management Area with groundwater extraction allowances.

In Gazette 44 (02/11/2006), the same year that the Central Water Strategy⁽¹³⁵⁾ was published, the Victorian Government set the groundwater extraction from the Gellibrand Groundwater Management Area (GGMA) at ZERO.

Under the Water Act a Water Strategy had to be developed for various regions within the State. The Central Water Strategy ⁽¹³⁵⁾ was one of these developed by the State Government. There is no reference in this Strategy recommending or categorising the Gellibrand Groundwater Management Area as an area to be investigated with the aim of extraction for urban use. However, the Newlingrook Groundwater Management Area is mentioned numerous times. This Central Water Strategy states the Gellibrand GMA is an area to be preserved and looked after, NOT to be exploited.

This Central Water Strategy reiterated the Gazetted zero groundwater extraction for the Gellibrand GMA. The Strategy also stated that Barwon Water could look at two options for additional water supply:

- 1. A connection to Melbourne, and
- Groundwater from the Newlingrook Groundwater Management Area (GMA). (It must be kept in mind that the Anglesea groundwater extraction project was well under way.)

However, the Central Water Strategy did include a footnote that said the Gellibrand Groundwater Water Management Area (GMA) could be investigated regarding groundwater and surface water interaction. Barwon Water and or the Department of Sustainability & Environmental officers misread this as a green light to move into the Gellibrand GMA and do whatever they wished.

This footnote in the Strategy most definitely did not include land acquisition, roading, treatment plants and several other infrastructure works as outlined in the Barwon Water Contract given to Sinclair Knight Merz. Barwon Water's main objective when investigating the Kawarren borefield was not to determine the interaction between groundwater and surface water. Barwon Water's main objective is demonstrated in the Service Contract 10643⁽⁴⁾ where it states that SKM is to investigate the extracting of 16 000 million litres per year, piping to the Geelong system and a multitude of other infrastructure works. This Central Water Strategy also contains this quote...

• "The Government will issue new entitlements or licences to extract additional groundwater only within the permissible consumptive volume after existing commitments are met and if dependent ecosystems and aquifer health are protected."

The intentions behind this statement were being ignored.

The 2004/05 Victorian Government State Water report had this to say...

• "... the PAV (now PCV) for the Gellibrand is set to zero due to the concerns... raised in studies... about groundwater pumping adversely affecting baseflow to the Gellibrand River."

The Central Water Strategy and the ZERO PCV for the Gellibrand GMA had been developed and signed off by the State Government for very compelling reasons.⁽⁴⁹⁾ The decision was made and reiterated often that the Gellibrand Groundwater Management Area was to be left alone.

Considering that the Gellibrand GMA was many kilometres closer to Geelong it made sense to the Government of the time to ignore the zero groundwater extraction limit, the kilometres of separation and any other distinction between the two GMAs (see page 10) and start investigations at Kawarren. This could have been seen as the most expedient and if it done "quietly" the stress test could be completed and infrastructure works begun before any questions were asked. Whatever the reason, the Kawarren Borefield investigation, sitting close to the centre of the Gellibrand Groundwater Management Area, was labelled as the Newlingrook Groundwater Investigation. Despite the Gellibrand and District local residents' displeasure Barwon Water steadfastly continued to use the name Newlingrook. Newlingrook being a parish district that was far removed from the locality of the borefield.



This appeared to the Gellibrand and Kawarren residents to be as ludicrous as naming a project taking place in Geelong the "Ballarat City Seaside Bay Development."

The Newlingrook Parish of the Carlisle River district is separated from the Yaugher Parish by the Moorbanool Parish. The Newlingrook groundwater area was originally called the Moorbanool groundwater area but was often confused with Moorabool, a name more synonymous with Geelong and Ballarat. Consequently the name change. Kawarren is in the Parish of Barongarook two parishes from the Newlingrook Parish.

Back to the 2013 Newlingrook Groundwater Investigation Final Report.

In the Executive Summary⁽¹¹¹⁾ of the SKM Newlingrook Groundwater Investigation report it states...

"The Gellibrand River was found to be highly connected to the groundwater system and was both currently and historically gaining along each of the reaches studied."



Discharge from the groundwater system to the Gellibrand River ranged from 0.05 – 1.40 ML/day/km and on a broader scale comprised 52% of the river flow and close to 100% of the flow during the dry periods of no rainfall. There is a *"...brackdrop of significant natural variability in baseflow*.⁽¹¹¹⁾

"Pumping could also induce greater leakage rates from the regional aquitard (the Clifton Formation) which may impact on springs fed from this formation."⁽¹¹¹⁾

"Groundwater pumping from the EVF aquifer would be expected to affect flow in the Gellibrand River."⁽¹¹¹⁾

The Executive Summary finished by stating that, *"It is recommended that a PCV be developed for the Gellibrand GMA that takes into account the likely strong connection between groundwater pumping and stream flow."*⁽¹¹¹⁾ Apparently consultants SKM, were not aware that a PCV of zero had already been declared and Gazetted years before. This declaration was based on very compelling investigations.

This 2013 SKM report repeated many of the messages that appeared in earlier reports dating back to the 1990s. The confirmation that the Gellibrand River and associated

tributaries in the Gellibrand GMA are "highly connected" to the groundwater system came as no surprise.

As explained on page 4 of the SKM report⁽¹¹¹⁾ the terms EVF, Dilwyn and LTA are often regarded as synonymous.

- EVF eastern View Formation
- Dilwyn aquifer
- LTA Lower Tertiary Aquifer.

Why Withdraw from the Stress Test Pump at Kawarren 24 hours before the VCAT hearing? It is interesting to note that in the Introduction of the final Newlingrook Groundwater Investigation the reason given for the 2009 withdrawal of the application to investigate the Kawarren Borefield, was due to other water sources becoming available. One reason given being the connection via a pipeline from the Melbourne system to the Geelong reticulated works. It was stated that this connection could provide Geelong with 16 GL/year supply.

Back on the 24th April 2008 over a year earlier, Water Minister Tim Holding MP, wrote *"In May 2007 the Government announced the connection to Melbourne was the preferred option."*^(59,page74) If this was the case why was Southern Rural Water under the impression that 16 GL/year from Kawarren was the preferred option and as a result was conducting a licence issuing process?

On the 27th of October 2008 Southern Rural Water justified issuing a licence to Barwon Water to proceed with the Newlingrook/Kawarren project. In its "Statement of Reasons – Barwon Water Kawarren Pump Test," SRW stated that, "As the Newlingrook aquifer is potentially a new source of water, the Government would prefer this to a Melbourne connection..." Interestingly the Kawarren Borefield was being investigated with the stated intention of extracting 16 GL/year, amazingly the same amount that Minister Holding referred to back in May. He stated this water would come from Melbourne not Kawarren. The Melbourne connection was the preferred option. Or was it?

Nearly a year later, on 5 August 2009 Warrick Nelson of Harwood Andrews Lawyers provided these reasons for the withdrawal of Barwon Water's application in a letter to the Senior Registrar, Planning and Environment List, Victorian Civil & Administrative Tribunal. "In an oral submission... I indicated that Barwon Water, as a consequence of the Anglesea groundwater project and the Melbourne-Geelong interconnector pipe project, both of which would be operational within a relatively short period, no longer sought to investigate the Kawarren groundwater option. I also indicated that it was only shortly prior to the 26 June hearing that Barwon Water received confirmation from external sources interested in the application endorsing its decision not to proceed," and… "Advice from the Minister for Water accepting that it was appropriate to no longer explore the Kawarren groundwater testing program was received by Barwon Water late on the 24 June 2009."

How much of this explanation for pulling out of the VCAT hearing at the eleventh hour is true or not, will never be known but the following things are...

• The Anglesea project was announced by the Victorian Water Minister John Thwaites of the Bracks Government era and was to be fast tracked to be in operation by

August 2008. The Anglesea borefield development had been given the "green" light for years.

• The Melbourne to Geelong pipeline with the potential to utilise desalination water appeared to be foremost in the Government's thinking since the desalination plant was muted.

To say these two projects were the reason for withdrawing from the Kawarren borefield investigations defies logic.

• The most curious fact would be that Barwon Water "...received confirmation from external sources interested in the application endorsing its decision not to proceed." What an unusual event that an unnamed "outside player" could have such an influence when communities the length of the Gellibrand River had been endorsing a Barwon Water decision not to proceed for 2 years. Perhaps the local communities were the outside player.

Recharge Potential.

The SKM report states that the Kawarren/Gellibrand Aquifer recharges where the aquifer outcrops at the surface margins. The most significant area of recharge is found in the Barongarook High Region. 40% of groundwater from this region flows to the east towards Barwon Downs while 60% flows south and southwest towards the Gellibrand River. In the Gellibrand River region the aquifer constricts and groundwater is forced to discharge into the river.⁽¹¹¹⁾

This 40%-60% may be the proportional movement of the groundwater flow but this flow, as stated by SKM, does not match the surface areas credited with supplying these flows. All reports on the Barongarook High recharge region appear to have the percentages the other way round. HydroTechnology⁽⁷⁶⁾ found that 16 square kilometres recharges the Barwon Downs branch of the groundwater flows and 12 square kilometres of recharge area supplies the Kawarren branch of the groundwater flows. This works out to be 57% recharging the east and 43% of the Barongarook High Region recharging the flows to the south and southwest towards the Gellibrand River. Did SKM get this wrong?

Spring Assessment.

The Newlingrook Groundwater Investigation report refers to the spring survey done by the Rural Water Commission (RWC, now named Southern Rural Water, SRW) in 1991. This 1991 survey identified a number of springs with their source either being from the outcropping EVF or the regional aquitard. From personal experience this spring survey appeared to lack any scientific vigour. The best way to describe the spring surveys is to copy an extract from pages 77, 78 and 79 from Otway Water Book One.

"As far back as 1984 Lakey⁽⁸³⁾ recognised the importance of carrying out a comprehensive spring survey of the numerous natural springs in the areas of the townships of Barongarook and Kawarren. Lakey surmised that, "...springs towards the Barongarook township would almost certainly disappear as a consequence of groundwater pumping", not to mention that the "...flows in both Ten Mile and Yahoo Creeks will very likely be significantly reduced and quite possibly eliminated."

To further justify a comprehensive spring survey Lakey said, "It may be that many of the springs in the area are not utilised and of no ecological significance and can therefore be considered as a waste of resource. A comprehensive

survey of these discharge features is required to determine their individual importance and need for preservation."

Farmar-Bowers ⁽⁴³⁾ made many references to the importance of conducting spring surveys and understanding how the springs could be affected in the Boundary Creek area. He writes about the Rural Water Commission (RWC) doing spring surveys in the Barongarook and Kawarren areas. The RWC began its surveys in 1984 on a very restricted basis. The objectives of these surveys were to determine the quantity, location, quality and use of the springs in the study areas. On reflection though, it would appear that this exercise was under resourced. The inadequacy of the survey is apparent when the Gellibrand Spring Survey and Census, done by the RWC, was only able to identify 6 springs and 2 wells in June 1984. Records on one spring along Boundary Creek were commenced in 1985 with ten others started in July 1986¹⁰⁶⁷⁾. Witebsky et al.⁽¹⁴¹⁾ indicated that these springs were monitored six times from November 1988 to May 1991 and added that unfortunately this monitoring did not commence until after pumping restarted in March 1987.

At a public meeting in July1988 a Department of Water Resources spokesman is reported as stating that spring monitoring was done by someone walking into a spring and seeing how far up their gumboots the water came^{(Colac Herald 11 Nov. 1988:Concern} at ^{GDWB} pumping groundwater). Comments such as this were one of the reasons a group of local Gellibrand and district residents formed the Gellibrand River System Committee.

This committee conducted a spring, soak, and well survey in 1989. Forty wells were identified with sixty odd springs around the Kawarren/Gellibrand area alone and that was not considered exhaustive. That these were on different properties, and the owners wanted them monitored on a regular basis, indicated the extent of the importance the landholders held for these water sources. When making submissions to the NREC hearings in 1989, the Gellibrand River System Committee and other residents from the area indicated that the impact of pumping groundwater on wildfire was a concern if springs, wetlands and soaks began to dry up.

The Rural Water Commission decided to observe a sample of these springs from the Kawarren/Gellibrand area. They were included in the ones being monitored at Barongarook with the aim of determining their importance to the residents and environment.Stanley⁽¹¹⁹⁾ recognised this spring monitoring as vital and recommended that the monitoring be continued in December and March of each year until a decision on a long term aquifer test pump was decided for the Kawarren borefield. Routine monitoring of the Kawarren springs was suspended around 1994 and would recommence prior to water extraction if groundwater pumping was to take place at Kawarren. This demonstrates an example of long term monitoring being suspended.

For the Boundary Creek area Witebsky et al.⁽¹⁴¹⁾ stated in 1995, that insufficient monitoring had occurred to enable the impact of borefield pumping on spring flow to be accurately determined. Also the ecological significance and conservation value of the swampy marsh areas adjacent to Boundary Creek had not been assessed. Little data had been collected on the springs and marshy swamps in the Barongarook, Kawarren and Gellibrand areas. Witebsky et al.⁽¹⁴¹⁾ said that, depending on the amount of water extraction at Barwon Downs, watertable recovery in the Boundary Creek area may take several years to recover after the cessation of pumping. This was also dependent on a reliable rainfall. Stanley⁽¹¹⁹⁾ stated the importance of establishing a pre-pumping baseline data. To be able to make accurate comparisons and monitor a situation the appropriate data must *be collected before, during and after any event – in this case the test pumping of* groundwater at Kawarren. But the same process of establishing pre-pumping data would be applicable to other scenarios, including Boundary Creek. Data on spring flows, impact on groundwater, surface water and spring users and impact on the environment, in the early years of the test pumping at the Barwon Downs borefield, was scant, hard to access and in general terms overstated as being done. However, Witebsky et al.⁽¹⁴¹⁾ in 1995, found that on the basis of limited data available borefield pumping did not appear to have had a significant impact on springs in the Boundary Creek spring monitoring area. But she does add that insufficient monitoring of spring systems had occurred to enable the impact of pumping on spring flow to be accurately determined. Spring systems connected to the groundwater along the western edge of the unconfined aquifer were likely to become intermittent and remain so for prolonged periods after significant extractions of groundwater. In September 1997 Barwon Water commenced to exercise its 12000 *ML/year extraction rights. By Witebsky's measure, extractions of this magnitude* were enormous."

(The only change to the continuity of this extract above is that the references have been changed to match the Bibliography of this book, Otway Water Book 23).

The data collected during the Spring Assessment conducted by SKM during the Newlingrook/Kawarren Investigation is extremely valuable but unfortunately is not as comprehensive as the work SKM did dealing with the Gellibrand River.

In the 21 December 2012 SKM report⁽⁵⁾ it stated that, "...the spring fed Pomperbill Creek on Malcolm Gardiner's property is recommended as a monitoring point. This spring has a suitable monitoring point where flows can be recorded." In actual fact there is another point upstream just below the most westerly springs that is as suitable. Because there is a change in EC levels and temperatures of the water between these two points it would be prudent to use both points as monitoring sites. However, the following extract from Appendix D, paints a slightly different story in regard to the suitability of the Pompa Bill Creek site(s).

"Steve to write section on recommendations for pumping test – essentially recommending that monitoring that was originally envisaged is not possible, except maybe Pompa Bill Creek.

1.2 Spring Discharge

One of the intentions of the spring survey was to assess whether it was possible to monitor the outflow of groundwater to the surface. Following the assessments, it became apparent that, no flow rates were able to be recorded at any of the sites as the nature of the discharge was diffuse, that is there was not one point at which flow could be channelled and measured. The dominant discharge mechanism at all of the spring sites is diffuse seepage, often identified as a "soak" and occasionally results in small amounts of runoff."

Spring flow on Pompa Bill Creek can most definitely be measured as can the spring flow on the Towers's and P. McDonald's properties.

Stream Flow Gauging Stations

In the Loves Creek Catchment four stream flow gauging stations were commissioned in an effort to gain an understanding of the surface flow regime in the catchment. However...

- 1. Love Creek Stream Flow Gauging Station (SFGS) Number 235234 The Loves Creek site was commissioned in 1979 and is still operational today.
- Yahoo SFGS Number 235240
 The Yahoo gauge started in 1985 and was decommissioned in 1994.
- **3.** Porcupine SFGS Number 235241 Started in 1986 and was decommissioned in 1995 and was recommissioned for the period April 2008 to July 2009 before being decommissioned again.
- 4. Ten Mile Creek SFGS Number 235239 This site became operational in April 1985 until 1995. As with the Porcupine station it was operational again for April 2008 to July 2009 before being shut down again.

It was a relatively easy task to recommission the Ten Mile and Porcupine stream flow gauging stations during the 2008-09 period of the Newlingrook/Kawarren Groundwater Investigations. However, due to undermining and erosion the Yahoo Station would have taken a considerable amount of money and effort to recommission and was consequently not used. Only visual observations and bucket dipping against a watch for flows, were made at the Yahoo Creek site. Throughout the 2008-09 period a continuous flow was recorded at both the Ten Mile and Porcupine Creek sites. Why no mention of or analysis of this data being reported in the Newlingrook/Kawarren report is somewhat baffling. Perhaps the answer can be found in the SKM 9 September 2008 Report that stated that the Porcupine Creek displays ephemeral flow patterns (see page 54-55) when in fact this is not the case.



Ten Mile Creek Stream Flow Gauging Station.

Ten Mile Creek Springs.

The Newlingrook Groundwater Investigation report states that Site 11 is the location where the flow in this branch of the Ten Mile Creek starts. From years of visiting the area the creek originates from the springs found in Maggios Swamp at Sites 12 and 13 as designated on the map below. The only culvert I know of in the area is at the location as marked on the map at Site 11. It would appear that these sites have been incorrectly marked on the map. Site 12 should be 11; Site 13 should be 12 and Site 11 should be marked as Site 13. This would make more sense with the table on the next page. Minor points granted, but what is important to note is the high level of connectivity between stream flow and the discharging Eastern View Formation.



	Site Description	Site Geology	Sprin	q Activity	Notes	
Ten Mile Ck 9	Creek channel	EVE	No	No	No evidence of spring activity, flow in Ck probably from springs further upsteam (TMC+42)	These entries
Ten Mile Ck 10	Tributary	Aquitard	No	No	Not a spring dry creek hed	appear to be
	moury	, iquitara	110		Location where flow in Ck	correct for
Ten Mile Ck 11	Creek channel	EVF	Yes	No	starts	
Ten Mile Ck 12	Creek channel	EVF	Yes	No	of stream	these sites.
•					Wet boggy ground either side	
Ten Mile Ck 13	Creek channel	EVF	Yes	No	through culvert	
					Wet ground around stream bank suggests groundwater	
Ten Mile Ck 14	Creek channel	Aquitard	Possible	No	discharge occurs at this site	
Ten Mile Ck 15	Tributary	Aquitard	Yes	No		
Ten Mile Ck 15A	Tributary	Aquitard	Yes	No	Dam on site obscures actual spring location	
Ten Mile Ck 15B	Tributary	Aquitard	Yes	No	-	
Ten Mile Ck 15C	Tributary	Aquitard	Yes	No	Spring above on site dam	
Ten Mile Ck 15D	Tributary	Aquitard	No	Yes	Vegetation type indicates past spring activity	
Ten Mile Ck 16	Creek channel	Aquitard	Possible	No	At flow gauge site. No boggy ground on stream banks.	
Ten Mile Ck 17	Tributary	Aquitard	Yes	No		
Ten Mile Ck 18	Creek channel	EVE	Yes	No	Location where flow in Ck	
Porcuring Ck 1	Creative abarrant	Annihand	Describic		Boggy ground maybe due to weir pool of nearby stream	
Porcupine Ck 1	Creek channel	Aquitard	Possible	NO.	gauge,	
Porcupine Ck 2	Creek channel	Aquitard	NO	NO	Dry creek bed	
Porcupine Ck 3	Creek channel	Aquitard	No	No	Dry creek bed	
Porcupine Ck 4	Tributary	Aquitard	Yes	No	Damp ground and vegetation type indicate spring activity	
Porcupine Ck 5	Tributary	Aquitard	Yes	No	Damp ground and vegetation type indicate spring activity	
	Creek channel	Aquitard	Possible	No	No evidence of spring activity	

Site 18 is on another branch high in the headwaters of the Ten Mile Creek and the springs in this area have flowed continuously throughout the last drought as have the springs in Maggios Swamp. It is interesting to note that downstream Sites 7, 8, 9 and 14 on the two branches of the Ten Mile Creek, all found in the Eastern View Formation, have been noted as showing no evidence of spring flowing activity. The use of the words "no evidence" suggests that the two branches of the Ten Mile are not gaining groundwater as they traverse over the outcropping Eastern View Formation. The flow in the creek at Sites 7, 8, 9, and 14 being attributed to spring activity further upstream. The use of the words "no evidence" tends to rule out the possibility that the two branches of the Ten Mile Creek are gaining streams throughout the full length they traverse over Eastern View Formation outcropping. The possibility that the Ten Mile Creek is a gaining stream is very high. No evidence will be found unless stream gauges are put in place. It is an easy task to determine

where a creek starts to flow but a much more demanding task determining any additional inputs of flow further downstream. Sites 7, 8, 9 and 14 could very well be sites of spring activity.

Another mute point is found in this quote, "The area where the EVF water level is above or at ground surface level is restricted mainly to channel axis of Ten Mile Creek, Yahoo Creek and Loves Creek (Figure 13). Springs in this area are likely to be completely or partially dependent on groundwater discharge to the EVF." Surely the underlined words in this quote should read "...discharge <u>from</u> the EVF." If the EVF water levels are above the springs, the groundwater would be the source of water for these springs.

Connection between the EVF and the Over lying Aquitard Material.

The Newlingrook Groundwater Investigation found that it is highly likely that the aquitard springs investigated in this study are hydraulically connected to the Eastern View Formation. However, any connection is unclear and requires further investigation. If there is a connection then the report that states "...a decline in EVF water levels could cause a decline in the discharge of the aquitard springs." indicates that spring data collection and observation before, during and after groundwater extraction would be critical, especially to those landholders relying on the springs and associated streams.

These springs should be monitored as a matter of course establishing a historical data baseliner. In the event that another attempt is made to exploit the water resources at the Kawarren Borefield. This data would go a long way towards ensuring that springs, wetlands and perennial streams are given due consideration.



Spring fed pool on Kersbrooke property at Kawarren.

CHAPTER THIRTEEN

Barwon Downs Borefield Connectedness to the Kawarren/Gellibrand Aquifer.

A genuine attempt to ascertain the impact upon the Kawarren/Gellibrand catchment from groundwater extraction at Barwon Downs, has not been a high priority on any of the Government authorities' agenda.

The west, south-west and southern boundary areas of drawdown from the Barwon Downs Borefield are of particular interest to the residents of the Kawarren/Gellibrand area. Their concern being this drawdown is having a significant impact on the Eastern View Aquifer Formation that discharges and maintains the perennial streams and wetlands in the Loves Creek and Gellibrand River Catchments.

In 1984 Leonard⁽⁸⁶⁾ had this to say, "*Creation of a cone of depression in the potentiometric surface in the Gerangamete area will distort the present flow pattern and absorb the northeasterly and southwesterly components of recharge from the Yeodene recharge avenue.*" In other words the flow pattern into the Kawarren/Gellibrand region will be lessened.

Leonard also stated that, "Underflow via the Barwon Downs Graben to the Gellibrand River catchment will cease; gradient reversal will result in components of recharge being drawn away in the northeast and southwest and from any as yet undelineated recharge zone along the Bambra fault."

Have these predictions actually happened? It would appear so.

The South-West Boundary.

On page 71, Appendix A, of a 2013 SKM Report⁽¹⁵²⁾ it refers to the southwesterly boundary and states that... *"The significance of this area is that it connects the Barwon Downs and Gellibrand groundwater systems, so it is important for identifying effects of pumping on the Gellibrand groundwater system including the Gellibrand River."* In the SKM Appendix A it was recommended that drilling 4 extra bores would clarify a conceptual model. It is also stated that drilling any less than 4 observation bores would be unlikely to provide any significant improvement on what can already be determined. Not that such a determination has ever been attempted since the notion of impact was first raised in 1984. Unfortunately, in the final text of the 2013 SKM Report it states the decision has been made not to drill any of these 4 extra bores. That is a worry. Perhaps the saving grace can be found in a comment of an SKM officer who mentioned in the third meeting of a Barwon Water Barwon Downs Groundwater Community Reference Group meeting in 2013 that there was already enough observation bore data in the area (see red circle on the map below) to determine the impacts that groundwater extraction at Gerangamete is having on the Kawarren/Gellibrand area.⁽¹⁵⁶⁾



MA{P SOPURCE: SKM report. (152)

However, if this is the case why does it state in Appendix A of the SKM report, there is a need to develop a conceptual model? And, hasn't this been done before? (see page 110) Looking back upon earlier studies it would appear that a conceptual model has already been done, or should have been done. Much of

this work was carried out in the early 2000s in preparation for presenting a case that the Barwon Downs Borefield licence be renewed in 2004. In addition, there is documentation that dates back even further to the early 1990s. This 1990s work provides some background into the way in which the Kawarren/Gellibrand streams fed by the Eastern View Formation, can be influenced from groundwater extraction at the Barwon Downs Borefield.

A Hydro Technology report⁽⁷⁶⁾ includes the following statements:

"The results from drilling undertaken in this program has provided sufficient data to accurately delineate the areas providing recharge to each sub-region."

Further..."The southern and more prominent hydrogeological divide separates groundwater flow towards the Barwon Downs sub-basin from that moving into the Kawarren sub-basin."

In another Hydro Technology report⁽⁷⁷⁾ this was stated:

"The hydrogeological setting in the Kawarren region has been well established following recent investigations." (1994)



Figure 7. <u>SOURCE</u>: Hydro Technology⁽⁷⁷⁾

Years before Leonard⁽⁸⁶⁾ found a similar delineation of the groundwater flows in the EVF.



Figure 8. SOURCE: Leonard⁽⁸⁶⁾



Figure 9. <u>SOURCE</u>: Hydro Technology.

The Hydro technology report⁽⁷⁶⁾ also has these things to say:

"A prominent ground water divide controls the direction of flow across the Barongarook High and into the Barwon Downs Graben. Flow is generally to the east towards Yeodene and to the south towards Kawarren and Gellibrand."

"... the groundwater divide will shift in response to extraction and the degree of rejected recharge to the surface water systems, streams and springs will decrease."



Figure 10. Conceptual Diagram.

This diagram represents the position of the aquifer divide between the Barwon Downs Borefield and the Kawarren/Gellibrand area, pre groundwater extraction. Figure 9 on page 94 clearly shows this divide.



Figure 11. Conceptual Diagram.

This diagram illustrates how the extraction of groundwater at the Barwon Downs Borefield draws water towards the extraction bores that would normally flow in the Kawarren direction. This shifting of the aquifer divide closer to Kawarren in the Ten Mile Creek Catchment lessens the amount of recharge going into the Kawarren region of the EVF aquifer and could explain why the Kawarren/Gellibrand observation bores hydrographs are continuing to decline even after 5 wet winters.(see Chart 2 page 97)



Figure 12. Conceptual Diagram.

Not only does this shifting aquifer divide have an impact on the recharging of the Kawarren EVF but once groundwater extraction ceases, the cone of depression continues to fill and level out, drawing water from further and further away.

The hydrographs from the Kawarren/Gellibrand Region (see Chart 2, page 97) show little to no response to five reasonably wet winters whereas during the same period the hydrographs in the Barwon Downs Borefield area of influence have shown considerable recovery (see Chart 1, page 97). The aquifer storage and recharge that normally affects the Kawarren observation bores to the southwest and west, appears to be drawn away.

The fact that *"The borefield was taken off-line in 2010 and has shown significant signs of recovery"* (Extract from Barwon Water media release issued Thursday 21 June 2012) needs considerable clarification and explanation as to what is exactly taking place at the Barwon Downs Borefield and why there are signs of a significant recovery, especially when, during the same period the neighbouring Gellibrand Groundwater Management Area hydrographs have continued to fall.

Besides having a profound effect on the water tables in the Gerangamete Groundwater Management Area there is every indication that the groundwater extraction at the Barwon Downs Borefield has also been impacting on the recharge and storage capacity of the Eastern View Formation aquifer in the Gellibrand Groundwater Management Area. Irrespective of what the new conceptual model shows, it seems imperative the 4 new observation bores recommended in the 2013 SKM report Appendix A, should go ahead. Especially if they can help clarify what is taking place on the west and south-western boundaries.



CHART 1. <u>Chart source</u>: Southern Rural Water. Observation bore at the Colac Forrest Road Bridge adjacent to Boundary Creek under direct influence from the Barwon Downs Borefield.



CHART 2. <u>Chart Source</u>: Southern Rural Water. Observation bore south west of the Aquifer divide in the Kawarren/Gellibrand area.

Why do the Kawarren/Gellibrand observation bore hydrographs continuing to track down even after 5 years of reasonable rainfall?





Chart Three Source: Victorian water Accounts 2012-2013.





Chart Four Source: Australian Bureau of Meteorology.

Even though rainfall deciles in Chart Three show a fall below average, it must be remembered that the Otway Ranges and foothills naturally have a very high rainfall and the 5 wet winters still should be better reflected in the Kawarren/Gellibrand hydrographs.



Chart Source: Victorian Water Accounts 2012-2013.



This deluge in the winter of 2010 saw the breaking of the worst drought on record and marked the start of a run of wet winters reflected by the recovery of water storages (see page 102); the Barwon Downs Borefield hydrographs beginning a continually upward trend (see page 97), but little response in the Kawarren/Gellibrand groundwater with the hydrographs continuing to track

down. The only two stock and domestic bores in the Gellibrand Groundwater Management Area extracting approximately 3 MI/year⁽¹⁶²⁾ could not in any way account for this continued decline (see Chart 2 page 97).



Six Months after this August deluge the Warrnambool Standard's front page runs with the heading... WETTEST EVER. "Rainfall records have been smashed..." (26-02-2011) The Western District rainfall records were once again rewritten.

The rains continued, reservoirs filled and so should the groundwater hydrographs respond with upwards trends. Not steep SO the Kawarren/Gellibrand hydrographs.

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

Colac Herald 2 December 2013



Aquifer level Increases by Kate Deppeler

wet spring has helped increase the water level at a Colac district aquifer.

The Warrion aquifer in farmland north of Colac, has risen a metre in a year.

The rain gauge at Colac Otway Shire Council's office has recorded 192.2 millimetres of rain for spring so far. Southern Rural Water's groundwater and

rivers general manager Craig Parker said the aquifer's levels were about a metre higher than the same time

last year. "Levels vary across the aquifer, but they are currently about one metre higher than they were this time last year, and in most areas are well above the levels seen during the drought," Mr Parker said. "Levels usually increase over winter and spring in response

to higher rainfall and little, if any, pumping, he said

Mr Parker said peo-ple could look online to see level movement in the groundwater. "Members of the pub-

lic can see changing groundwater levels on hydrographs for State Observation Bores across the region, via the "groundwater lev-els" handylink on the front of Southern Rural Water's web page," he said.

The information in this clipping, Colac Herald 2 Dec. 2013, indicating a positive one metre rise to rainfall in the Warrion aguifer, is the response that should be apparent also in the Kawarren aguifer. The exact opposite is the case. Kawarren hydrographs continue to track down.

In 2003 SKM reiterated that there was a divide, as noted in earlier studies, and seen in figure 13 below.



Figure 13.

Has the Modelling already been done?

In the early 2000s SKM modelled seven Barwon Downs groundwater pumping scenarios. These included conceptual models on the possible effects on the Kawarren area. The scoping study leading up to formulation of these scenarios is most interesting.⁽¹⁵³⁾

The scoping study was based around Nine Keys Issues identified by Barwon Water and the Government Department of Natural Resources and Environment. The fourth issue was... "Groundwater Divide. Use of a GHB condition for the model is recommended to enable interaction with the adjacent aquifer system to be simulated." (GHB - Groundwater High Boundary).

And the scoping study went on to state that... "... the proposed model will be designed to realistically model the groundwater behaviour in the vicinity of the divide." Also, when discussing the migration of the divided it states... "...the western boundary is well into the Kawarren area and hence the groundwater divide can be modelled..."

There seems to be no doubt that the potential impacts from the Barwon Downs Borefield on the aquifer divide, have already been modelled, or should have been. The scoping study made it quite clear that this modelling would be done.

"The following 'objectives' were agreed to be addressed in a groundwater modelling study of the Barwon Downs borefield."⁽¹⁵³⁾ One of these objectives being the groundwater divide.

"Groundwater divide – Determine the potential for migration of the groundwater divide at the boundary of the recharge area possibly causing reduced groundwater flow to the Kawarren area that may result in reduced baseflows in that region."⁽¹⁵³⁾

During the deliberations of the Barwon Downs Groundwater Barwon Downs Groundwater Community Reference Group, a request was made 21 January 2014 for a copy of these modelled scenarios. Around the same period other documents were promised but were not readily forthcoming. Unfortunately the officers of Barwon Water decided through the Barwon Downs Groundwater Community Reference Group documentation titled "Reference Group Issues and Prioritisation," to give the requested documents a medium to low rating. However, in the mean time the Barwon Downs Groundwater Community Reference Group was making decisions without being provided full disclosure of the background material. This seemed a most unusual way to function. Unable to gain copies of these reports through regular requests at the Barwon Downs Groundwater Community Reference Group meetings, a freedom of information request was submitted to Barwon Water (16 April 2014).

In due course the request was denied.

The following pages are copies of the FOI request and the reply.

BARWON REGION WATER CORPORATION BARWON REGION WATER CORPORATION Software PO Box 639 GELLONG VICE 3220 WWW BARWON REGION WATER CORPORATION GOT CONTACT: Software PO Box 639 GELLONG VICE 3220 WWW BARWON REGULAR ABN 86.348.316.514	
BARWON REGION WATER CORPORATION 61-67 Rytic Street PO Box 659 GEELONG VIC 3220 www.barwonater.vic.gov.au ABN 86348316514 Freedom of Information Act 1982 Access request form NAME: <u>Oalcolm Gardiner</u> POSTAL ADDRESS: <u>1805</u> <u>Gard Inter</u> POSTAL ADDRESS: <u>1805</u> <u>Gard Inter</u> POSTAL ADDRESS: <u>1805</u> <u>Gard Lavers</u> <u>Hill</u> <u>Roap</u> <u>Kaw ARREN</u> <u>vic 32.49</u> TELEPHONE CONTACT: <u>BH</u> AH <u>03</u> <u>52</u> <u>358</u> <u>325</u> DETAILS OF DOCUMENTS REQUESTED: <u>The names of the aquifers located in the upper Eastern Formation: the low formation and the aquifers in the middle Code for the date soperated and any date that the been collected who do the date soperated and any date that the been collected who do the date soperated and any date that the been collected who do the date soperated and any date that the been collected who do the sope Soudy <u>Who dates are were constructed</u> <u>a composite of the soperated and any date that the been collected who do the sope Soudy <u>Who dates are were constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the sope Soudy</u> <u>Who days</u> <u>a constructed</u> <u>a composite of the some Report is mentioned. <u>Could I have</u> <u>Climate Change Modelling report is mentioned. <u>Could I have</u> <u>composite that that rest</u> <u>from Sprin's why soude resear is mentioned. <u>Could I have a copy of the</u> <u>Climate Change Modelling report is mentioned. <u>Could I have a copy of the</u> <u>Climate Change Modelling report is mentioned. <u>Could I have a copy of the</u> <u>Climate Change Modelling report is mentioned.</u> <u>Could I have a copy of the</u> <u>Climate Change Modelling report is mentioned.</u> <u>Could I have a copy of the</u> <u>Climate Change Modelling report is me</u></u></u></u></u></u></u></u>	
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(iii) Access in another form (specify)	
I understand that an application fee of \$22.70 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 Date 16/4/2014 Send request and charge/money order (payable to Barwon Water) for \$22.70 to: BARWON WATER PO BOX 659	
GEELONG VIC 3220	



2 May 2014

Mr Malcom Gardiner 1805 Colac Lavers Hill Road Kawarren VIC 3249

Dear Mr Gardiner

Freedom of information request

I refer to previous correspondence in relation to your request to the Barwon Region Water Corporation ("**Barwon Water**") for access under the *Freedom of Information Act 1982* ("**Act**") to:

"1. The names of the aquifers located in the upper Eastern Formation; the Lower Eastern View Formation and the aquifers in the middle Eastern View Formation.

2. On page 33 of Barwon Water's "Barwon Downs Monitoring Program" Stage 1 Field Investigations and Monitoring Program Scope, it mentions former shallows bores in the area of site TB2 Big Swamp upstream of burnt peat. Could I have the location, depth, dates operated and any data that has been collected, who collected the data and why the bores were constructed?

3. A copy of SKM's modelling scenarios for extractions that resulted from SKM's July 2000 recommendations in the "Barwon Downs Groundwater Modelling Scope Study," by Hoxley.

4. On page 16 of the same Report as mentioned in point 2 above, a 2011 SKM Climate Change Modelling report is mentioned. Could I have a copy of this?"

The Act creates a right of access to documents of an agency. Section 13 of the Act states that the right of access is to be exercised "in accordance with this Act". Section 17 of the Act sets out the procedural requirements to be satisfied for a valid request for access to documents to exist.

One of those requirements is that the request must provide such information concerning the documents sought as is reasonably necessary to enable the agency to identify those documents. That is, an applicant must strive to define with as much precision as possible the documents sought in terms that will enable an appropriate officer of the agency to constructively search for those documents. If a request is ambiguous, unclear or otherwise ill defined, it does not comply with the Act and need not be processed. It should not be for the officers of the agency to be left guessing what documents you are actually seeking.

Barwon Region Water Corporation ABN 86 348 316 514

61-67 Ryrie Street, Geelong Victoria 3220 PO Box 659 Geelong Victoria 3220 TEL 1300 656 007 FAX +61 3 5221 8236 DX22061 (Geelong)

www.barwonwater.vic.gov.au

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In my view, your request does not provide sufficient information for me to identify the documents you seek. At present your request is ambiguous and unclear for a number of reasons.	
Parts 1, 2 and 3 of your request currently seek access to information and not documents. The right of access under s 13 of the Act is to documents and not information. As such, these parts of your request are not made in accordance with the Act.	
(a) In relation to Part 1, could you please confirm whether you are seeking access to a particular document or documents containing the 'names of the aquifers located in the upper Eastern Formation; the Lower Eastern View Formations and the aquifers in the middle Eastern View Formation' and, if so, specify the particular document or documents you seek?	
(b) In relation to Part 2, could you please confirm whether you are seeking access to a particular document or documents and, if so, specify the particular document or documents you seek.	
(c) In relation to Part 3, could you please confirm whether you are seeking access to a particular document or documents and, if so, specify the particular document or documents you seek.	
For the reasons stated above, a search for documents cannot reasonably be commenced until it is clear what documents you seek.	
Accordingly, I invite you to consult with Barwon Water with a view to amending or clarifying your request so that it is in a form which complies with s 17 of the Act and provides the information necessary to enable Barwon Water to identify the documents sought.	
Alternatively, you may wish to submit an amended request to clarify the issues raised above.	
Please note that until your request is made in a manner required by s 17 of the Act it cannot be processed and the 45 day time period within which a decision must be made on your request has not commenced to run.	
Application fee of \$25.70	
I also note the application fee which accompanied your request was overpaid by \$4.30. I propose to hold onto the balance and deduct it from any access charges that may be payable or, if none are payable, I will refund this to you when notifying you of any decision on the request.	
In anticipation of Barwon Water receiving an amended request, can you also state if you are willing to receive edited copies of documents (with exempt or irrelevant material removed) or whether you insist on receiving whole, unedited copies of documents.	

Barwon Water looks forward to hearing from you or receiving an amended request so that it may expedite addressing your information needs. If you have any questions I can be contacted on 5226 2547 or by email at Paul.Rawson@barwonwater.vic.gov.au. Yours sincerely Paul Rawson Manager Corporate Support Services **Barwon Water**

NOTE:

The requests for this information and other documents resulted from attempting to fill knowledge gaps and so be better informed. It seemed reasonable and logical to ask that data being referred to should be readily available to the Barwon Water Barwon Downs Groundwater Community Reference Group members on request. Blindly accepting things at face value sometimes leads to poor management decisions.
This letter below, apparently passed in the mail, with a letter sent from my lawyer that was asking for some clarification of the Freedom Of Information Act in relation to the above requests. No doubt this is not the end of the story.

	onWater			
Our Ref: Your Ref:	F079152			
Enquiries To:	Paul Rawson			
20 May 2014				
20 May 2014				
Mr Malcolm Gar	Irdiner			
KAWARREN	VIC 3249			
Dear Mr Gardin	ner			
Freedom of inf	formation request			
I refer to my lett	ter to you of 2 May 2014.			
April 2014. This information as v Without that info	was with a view to amending of was reasonably necessary for u formation no valid request existent	s to be able to identify ad under the Act.	st to provide such the documents you see	ek.
It has been mor received to con:	re than 18 days since I sent my isult or to amend your FOI reque	letter to you and no re est.	esponse has been	
As you have be change to your comply with s 1 you seek as is r	en provided with a reasonable request, I am unable to process 7(2) of the Act – you have not p reasonably necessary to identify	opportunity to respond s your request on the k rovided such informat / them.	l, and there has been no basis that it does not ion about the document	o ts
Accordingly, ple application fee	ease find enclosed a cheque for you sent to us with your Freedo	the amount of \$30.00 m of Information requ	in refund of the est.	
	\neg			
Yours sincerely				
CVX				
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Paul Rawson Manager Corpo Barwon Water				
Paul Rawson Manager Corp Barwon Water Cc Justin Frank	klin			
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It would be difficult for Barwon Water to argue the case of being open and transparent, and as a member of the Barwon Downs Borefield New Monitoring Program, Barwon Downs Groundwater Community Reference Group, it is

difficult to partake and make informed decisions when relevant documents are denied or take months, sometimes years to be provided.

The 26 July 2000 SKM scoping study⁽¹⁵³⁾ also stated that it was... " ... *considered quite likely that the drawdown cone has not yet reached the groundwater divide.*" However, this same SKM report⁽¹⁵³⁾ made it quite clear that the modelling would realistically give an indication of how the divide would be affected as groundwater extraction proceeded. "...the proposed model will be designed to realistically model the groundwater behaviour in the vicinity of the divide."

It would be most interesting to know what the 2000s models determined and see how relevant they are to today's proposed conceptualisation. However, these reports are not being released by Barwon Water, at this stage. There is considerable data that is yet to be made available and could have significant influence on the direction to be taken regarding these west and south-western corridors. And, is this another case of "old" data being ignored or overlooked? It would appear so.

After ten years of groundwater extraction through the last drought, and since this modelling was done, the drawdown cone has, in all probability, reached the divide as mentioned above. Asking that Barwon Water provides this data out to a point of zero drawdown, would seem to be a reasonable request but has also been denied on the grounds that the current licence conditions do not stipulate that this data has to be prepared by Barwon Water.⁽⁵⁷⁾

Also, in an SKM report⁽¹⁵⁵⁾ dated May 2001, it reaffirms that "*The extent to which groundwater may be harvested from the Kawarren area can be determined by the model from examination of flux across this boundary.*" Why the modelling report showing this is not being released is most baffling.

The Conceptualisation of the Western and South Western Groundwater Flow Flowpaths.

It could be argued that the results of the 2001 conceptualisation of impacts from the Barwon Downs Borefield on the Gellibrand Groundwater Management Area are no longer relevant. However, it would be extremely difficult to convince the farmers and landholders adjoining streams in the Loves Creek and Upper Gellibrand River catchments of this. They have witnessed dramatic declines in surface water flow and if the 2001 SKM report is to be believed why hasn't the examination of the flux across the boundary been released? The type of impact that the farmers are experiencing was feared as far back as 1982 when extensive groundwater extraction began. LAKEY's 1984 report confirmed these concerns.

"The impact of reduced waterlevels upon stream flow in Ten Mile and Yahoo Creeks and upon discharge from the numerous natural springs in the Kawarren and Barongarook areas is another important area of concern. While many of the springs in the Kawarren area are fed from the Clifton Formation and may not be significantly affected, other springs further north towards Barongarook Township will almost certainly disappear as a consequence of groundwater development and flows in both Ten Mile and Yahoo Creeks will very likely be significantly reduced and quite possibly eliminated, if seasonal recharge cannot adequately raise the water table to feed these effluent streams."⁽¹⁶⁸⁾



The Western Flank and South-West Flowpaths.

The blank pages 112, 113, 114 and 116 were left in a vain hope that draft studies that were not being released would become available in a reasonable timeframe. Unfortunately, this has not been the case and these studies may never see the light of day, not being finalised, and therefore not available for public viewing and scrutiny.

Perhaps, Otway Water Book 28, "The Western Front," may be able to report on these studies. It is anticipated that Book 28 will be finished late in 2015.

The South-West Flowpath.

Little consideration has been given to the groundwater inflows into the upper part of the middle reaches of the Gellibrand River (see Figure 14 below). Has there been any work done in regard to the sources of the groundwater that flows into this reach of the Gellibrand River? Does groundwater sourced from the Barongarook High flow under the Barwon Downs Borefield in south westerly direction and flow into this part of the Gellibrand River? Or is the area marked by the red circle an inflow that comes through the Loves Creek/Kawarren corridor?



Figure 14. MAP SOURCE: State Rivers and water Supply, Victoria.⁽²⁰⁾

The presentation given to the Barwon Downs Groundwater Community Reference Group on the 17 February 2015 dealt with this area of concern in some detail. However, the report that this presentation was based on is still in draft form and is not available for public comment.

Dewatering the unconfined aquifer would bring about springs drying up and creeks such as the Ten Mile and Yahoo losing much if not all of their summer flows and infiltration from the Gellibrand River streambed would be activated reducing the flows in this important Otway ranges river.

CHAPTER FOURTEEN

Another Glimpse or two at the Process of Public Consultation

It was obvious from the very first, in 2007, that Barwon Water was not interested in anything other than a cursory public consultation process in regard to the Newlingrook/Kawarren Groundwater Extraction Investigation. Perhaps it was still fresh in minds of the authorities that local concerns and input in the 1990s brought about a decision that groundwater extraction from either the Gellibrand or Kawarren Borefields was not an option without significant social and environmental impacts.

Including the following extract from Otway Water Book 2, August 2007, provides a glimpse at the way public consultation was to proceed throughout the whole sorry saga of the Newlingrook/Kawarren Investigation.

August 2007...It is most puzzling that there has been no press release, no public consultation nor any public display of Barwon Water's intentions regarding investigations planned for the Kawarren aquifer. Very little is known about the details of the December 2007 test pump. However, the test pump that was abandoned back in the mid 1990s was meant to be a 12 week pump and this tends to indicate that the 12 week pump in 2007 will follow a similar format. The December 2007 test pump has been kept very low key.

In recent times these events have taken place:

- 1. At Bunnings, Waurn Ponds in May 2007, three Barwon Water employees were observed manning a stall, handing out pamphlets and answering questions on the proposed Anglesea aquifer investigations.
- 2. From many press releases regarding these Anglesea aquifer investigations an article in The Echo, on 28 June 2007, advertised an open invitation to visit a newly opened borefield project office in Anglesea on Tuesdays. Maps and diagrams of the proposed borefield could be viewed, up-to-date information received, and any questions answered about the borefield by an officer of the borefield project.
- 3. Barwon Water had a section on its website devoted to the Anglesea borefield project, a dedicated Anglesea borefield email address and a phone number hotline. The pamphlet made mention of the Newlingrook aquifer some 20 km to the west of Kawarren as the next aquifer investigation area but no mention of the Kawarren aquifer can be found. This pamphlet was dated April 2007.
- 4. On the 12 June 2007 local Kawarren farmer, Rob Maxwell, was approached regarding preliminary test pump investigations planned at the borefield site on his property for August 2007.
- 5. A follow up letter stated that community consultation was planned for July following identification of affected parties. It did not say in which year the consultation was to take place. The consultation did not happen in July 2007. This letter indicated that after the August preliminary pump a three month test pump was planned from December 2007 until March 2008.

- 6. The Colac Herald on 22 June 2007 and again on 2 July 2007 mentioned investigations taking place at Newlingrook. Still no mention of the Kawarren/Gellibrand aquifer investigations.
- 7. Until 12 June 2007 there was not the slightest hint that any development was about to take place at the Kawarren borefield .
- 8. I wrote a letter to Barwon Water in response to the letter Robert Maxwell received asking very specific questions.
- 9. Paul Northey of Barwon Water replied July 11 2007 and informed me that "The concerns you raise have been noted and these matters will be addressed appropriately in correspondence to all affected parties." Not one of the questions or concerns raised was answered. Paul suggests that "If you have any further questions please do not hesitate to call Scott Dennis on ..." Would Scott be able to provide the answers to anything when his superior Paul, the Manager Strategic Planning and Sustainability can't answer basic questions. One also becomes extremely wary of verbal discussions that are not confirmed in writing.
- 10. From the Water Act of 1989 it would appear that the responsibility of ascertaining local residents who could be "affected parties," is Barwon Water's, not that of local landholders as suggested by Northey. It is also Barwon Water's responsibility to keep local residents informed of developments that may affect them.
- 11. On July 23 a letter arrived from Paul Northey, dated July 12, on the subject of the Newlingrook groundwater investigations. This letter was addressed to my deceased mother. The letter states that a test pump at Kawarren forms part of this investigation.
- 12. I have been a landholder in the Kawarren valley since the 1960s and up to the end of July 2007 I have not received any unsolicited correspondence. It is most puzzling how it was determined to whom correspondence was sent. I didn't receive this letter and therefore assume I was not regarded as an "affected party."
- 13. Paul Northey indicated that a preliminary inspection would be done in August. This was done between the 17 July and 20n July 2007. Why the haste? Why wasn't the landholder informed of this event and what happened to the "Community consultation is planned to commence in July following identification of affected parties."

The Otway Water books are littered with similar examples of this type of experience.

Barwon Water have an extremely poor track record at engaging meaningful and worthwhile dialogue with residents of the Kawarren/Gellibrand communities. This situation is on record dating back as far as the late 1980s.

However, Barwon Water is not alone in this regard. Other Government authorities have a similar record.⁽⁵⁹⁾

Another classic example of not providing a clear, direct and meaningful answers to direct and specific requests can be read in Appendix 8, pages 159-162.

CHAPTER FIFTEEN

Stygofauna & Groundwater Dependent Ecosystems

Subterranean ecosystems in Australia have undergone very limited study. An extensive search of published literature was unable to find any such study carried out on stygofauna in Victoria. If worldwide research is to be believed it would appear that subterranean ecosystems are comparable to those found on the earth's surface. The following pages in this chapter have been adapted from a chapter in Otway Water Book Ten.

Combined, the Boundary and Loves Creek catchments contain sedimentary, limestone karst and volcanic karst aquifers. There is every chance that there are also perched aquifers present. The depths of these aquifers range from shallow to hundreds of metres below the surface. Mentioning the range of aquifer types found in the area has been done to emphasise the complexity of the geology in the region and to highlight the diversity of species that could be associated with these aquifers .



Virtually all permanent residents in surface streams are dependent on groundwater, especially during drought when thermal and hydrological refuges typically are entirely sustained by groundwater.

Humphreys⁽¹⁴⁸⁾ also maintains that surface waters are the ultimate groundwater dependent ecosystems. These are extremely important statements as they clearly demonstrates the notions that without groundwater flow, especially over summer in the Otways, surface water ecosystems will be dramatically compromised and most likely disappear. Boundary Creek⁽¹⁴⁵⁾⁽⁵⁷⁾ being a classic example of this already happening.

It is very apparent that little to no consideration has ever been given to the subterranean ecosystems when developing and managing the Barwon Downs borefield. The same situation appeared to be taking place with the investigations planned to be conducted at the Kawarren borefield. In this day and age and considering the enormous leaps of knowledge made in regard to groundwater species, the fact that no provision has been made to determine the state of ecological systems in these aquifers is quite alarming.

Under the Statement of Obligations⁽¹⁵¹⁾ as set down by the Victorian Government under the Water Act for Barwon Region Water Authority, this level of management and concern is no longer acceptable.

Implementing sustainable management practices as defined in this Statement of Obligations indicates that a great deal more care of the groundwater dependent ecosystems must be taken into consideration.

For example:

- 1. Comprehensive studies researching the species found in the groundwater most definitely should be done before groundwater is extracted.
- 2. Sensitive and practical triggers must be established. If such a trigger point is reached during pumping the operation must undergo specific changes.
- 3. Environmental flows must be established and legislated giving them legal standing to protect the surface and groundwater species.
- 4. Terrestrial indicator species that rely on groundwater flow into wetlands, springs or creeks should be identified e.g. platypus, fish, water invertebrates, flora and benthic algae.
- 5. Identify fauna indicator species found underground in the aquifer.
- 6. The status, occurrence, abundance and biological needs of these species to be identified.
- 7. A comprehensive analysis of the connectedness and dependence of these species to groundwater.
- 8. The importance of permanently saturated springs, soaks and wetlands to the survival of these species.
- 9. Trigger points of stress that would be exhibited by these species, trigger points that should not be exceeded.

Maintaining the integrity of the groundwater dependent ecosystems must be a major priority when determining if groundwater extraction is sustainable. Until it is accepted that aquifers are in fact ecosystems there will be little change to the recognition of their ecological importance.

Life forms may occur several kilometres below the earth's surface. Specialised invertebrates, and the occasional vertebrate, aquatic species occur to depths of at least 1000 m. In 2008 Humphreys⁽¹⁴⁹⁾ talks about the Australian subterranean aquatic life that continues to surprise through its diversity, composition, age and types of habitats and water quality in which it occurs. Australian stygofauna (groundwater animals) comprise amphipods, isopods, copepods, ostracods, bathynellaceans, gastropods, water mites, insects, fish and diverse microbial communities. Boulton et al.⁽¹²⁾ states that by analogy with surface ecosystems this fauna has numerous potential functional roles in groundwater systems. Recently these groundwater ecosystems. However, in most cases the stygofauna typically lack resting stages, are slow moving, have few young, are long lived when compared to surface water relatives, often have sparse populations; require low levels of energy, dissolved oxygen and organic matter; are venerable to change and are a significant issue for biodiversity conservation.

Following are quotes that water managers need to seriously consider when planning exploitation of water resources.

"... the species inhabiting subterranean ecosystems are often considered intrinsically vulnerable to anthropogenic (human) effects..." (Humphreys⁽¹⁴⁹⁾).

"Knowledge of stygofauna of Australia is increasing at such a rate that any estimate of the biodiversity it contains is premature." (Humphreys⁽¹⁴⁹⁾).

"However, it is already apparent that Australia contains a stygofauna of global significance." (Humphreys⁽¹⁴⁹⁾).

"At a very conservative estimate at least 750 species have been recorded from Australia, mostly in the last 10 years." (Humphreys⁽¹⁴⁹⁾).

What is surprising is that very few regional areas in Australia have been surveyed for stygofauna and most definitely no work has been conducted in the region of the Gellibrand Groundwater Management Area of the Otway Ranges. Humphreys argues that there needs to be research into the wealth of biodiversity, the ecological processes involved and the benefits these processes provide. When acid water, heavy metals and metalloids are produced in drying peat swamps this toxic mix can then soaks into a depleted aquifer. If this is in fact actually happening then the possibility of impact on stygofauna from this source should also be incorporated in any studies.

In 2008 Boulton et al.⁽¹⁴⁷⁾ discusses the human appropriation of Earth's natural resources and the detrimental impacts this can have on biodiversity. Boulton et al.⁽¹⁴⁷⁾ also emphasises that...

- Humans cannot afford to lose this biodiversity that forms part of essential resources providing the stability of our life-support system: organic matter decomposition, water purification, providing food, toxin and waste material breakdown, oxygen, medical products and other fundamental human requirements.
- The role groundwater ecosystems play in this process is poorly understood and still has relatively little research being conducted.

- Our understanding of how groundwater invertebrates influence ecosystem services is almost non-existent.
- Previously regarded as lifeless, aquifer water is now being recognised to support diverse assemblages of stygofauna.
- Any change to an aquifer system has the potential to bring about complex changes in the interaction and functional characteristics of the aquifer in relation to the stygofauna.

Humphreys⁽¹⁵⁰⁾ draws an analogy with surface ecosystems whereby invertebrates also have numerous potential functional roles in the groundwater systems.

Some of these roles include:

- the maintenance of voids
- enhancing the release of organic carbon
- the cycling of nutrients
- promotion of biofilm activity
- improved hydraulic flow paths
- the provision of favourable sites for microbial activity, and
- movement and mass transfer of energy and materials through the sediments.

The most obvious effect of groundwater extraction is the lowering of the groundwater table levels. The implications from lowering the water table may seem obvious but Boulton et al.⁽¹²⁾ state that this is not as simple as saying the groundwater species die out. In the Barwon Downs borefield scenario the drawdown of the groundwater is further complicated by the production of acid and toxic levels of heavy metals and metalloids as the wetlands dry out and re-wet. This mix is then soaks into the depleted aquifer with the potential to cause untold damage.

In an article written up in the same Hydrogeological Journal, Humphreys⁽¹⁴⁸⁾ makes these very interesting comments...

- The relationship between ecology and hydrology is well recognised and much explored, and has even been defined as "ecohydrology."
- Even with this recognition and the realisation that groundwater ecosystems may provide significant environmental benefits there has been sparse consideration of the effect of groundwater extraction on groundwater ecosystems.
- This is partly because those people utilising the groundwater are largely unaware of the ecological complexity, biodiversity and local endemism of the groundwater ecosystems.
- Little recognition is given to the relationship between environmental flows and groundwater ecosystems.
- Groundwater species are increasingly recognised as being under threat of extinction.
- In the Kolbental Valley, Germany, changes in groundwater fauna were found to be the best indicators of the effects of groundwater pumping on the surface groundwater dependent ecosystems.
- Groundwater fauna is commonly white, lack eyes, and are often worm shaped.
- Groundwater fauna have three fundamental requirements a place to live, energy and oxygen or other electron acceptor.

- Hydrogeologists often have control over these fundamentals and therefore their management practices have implications for groundwater ecosystems.
- Groundwater fauna are mostly restricted to the upper parts of subterranean ecosystems.
- There has been almost no study of the impacts of water extraction on aquifer ecosystems.
- There are indications from surface studies that suggest that pumping effects are likely to be profound and complex.
- "It is hoped that this article will help overcome the general lack of knowledge amongst Hydrogeologists of the presence, ubiquity and nature of groundwater ecosystems in a broader context."

There has been little explicit recognition of the way groundwater influences riverine biota or processes; how ecological dependency varies and as a result, how management practices can be inappropriate, Boulton et al.⁽¹²⁾ A sound understanding of the flora and fauna present, the ecological processes taking place, what the triggers and requirements of these processes are, is essential for effective management of sustainable use of any water resource. On a catchment scale the hydrological, physical, chemical and biological attributes of the groundwater can influence the biota and ecosystem processes in diverse and complex ways. Sensitive high quality planning, design and management of groundwater extraction must involve a holistic multi discipline approach. Such an approach would include a total water balance plan, a sociologist, zoologist, botanist, microbiologist, geomorphologist, chemist, anthropologist, economist, hydrologist, hydrogeologist, landholders and as this chapter amply points out a specialist in stygofauna. The only government document that comes anywhere close to achieving sensitive high quality planning, design duality planning, designed and management guidelines is the EPA document No. 668 titled "Hydrogeological Assessment."Unfortunately this comprehensive document is seldom used, if ever.

The study of stygofauna in Victoria is years behind other states of Australia and sadly it would appear that the first step making a start is still some considerable time off.

CHAPTER SIXTEEN

Maggio's Wetland & Forestry.

Maggio's Wetland is found in the headwaters of the western branch of Ten Mile Creek. Groundwater has discharged from this wetland throughout the most recent drought and if statutory declarations from long term landholders are to be believed this wetland has never been dry. It lies in the Barongarook High region.



Perhaps the most convincing argument that this wetland has never run dry would be the size and age of the wetland dwelling vegetation that exists in this area. Forestry operations surrounding this wetland have taken place for decades and have never been able to access the boggy wetlands, and besides, the wetlandy saturated conditions have never been conducive to timber plantation production. This wetland named Maggio's Wetland has maintained its healthy groundwater dependent status despite severe drought and extensive long term forestry operations within very close proximity.









Maggio's Wetland towards the end of the 2000s drought.

Looking down into the wetland This wetland vegetation is at least 25 metres high.





OTWAY WATER BOOK 23. Gellibrand GMA, Surface & Ground Waters.





In 1973 the entire Hitchings Coupe was planted in pines except for Maggios Wetland.

When these pines were harvested in 1996 this blue section was then planted down with blue gums. These trees were then harvested in 2009 and have been allowed to coppice as regrowth. This blue section is now 4 years into its third rotation of forestry for timber production and the wetlands continued to thrive.

This green section was replanted with pines in 1996 as a second rotation and will be harvested in the future.

The Hitchings Coupe has been in operation as a timber harvesting enterprise for 40 years. Maggio's Wetland has maintained its high value wetlands throughout this time and includes a period of extreme drought conditions lasting for at least 12 years from the late 1990s to 2010.

Map SOURCE: Midway.

The reason this magical little wetland has maintained its integrity even though the Boundary Creek catchment just north of here has been decimated, is the aquifer divide that exists between the two sub-regions.

Hydro Technology reports⁽⁷⁶⁾⁽⁷⁷⁾ in 1994, include the following statements:

"The results from drilling undertaken in this program has provided sufficient data to accurately delineate the areas providing recharge to each sub-region."⁽⁷⁶⁾

"The southern and more prominent hydrogeological divide separates groundwater flow towards the Barwon Downs sub-basin from that moving into the Kawarren sub-basin." ⁽⁷⁶⁾

And:

"The hydrogeological setting in the Kawarren region has been well established following recent investigations." ⁽⁷⁷⁾

Up until the end of the latest drought in 2010, there has been no discernible impact on Maggios Wetland.



SOURCE: Hydro Technology⁽⁷⁶⁾

This southern and prominent hydrogeological divide, in the most part, separates the Ten Mile Catchment from major influences from groundwater extraction that takes place at the Barwon Downs Borefield.



Despite one of the worst droughts on record and localised extensive forestry activities, Maggio's Wetland has maintained its viability as a healthy groundwater dependent ecosystem. However, as the Eastern View Formation aquifers in the Barwon Downs Borefield region replenish themselves, the area of impact will draw water from further and further out. This replenishing process could take decades despite groundwater extraction having been halted in 2010. It is anticipated that Maggios Wetland will be one of the first regions to experience any such influence. However, if discussion found in Chapter 13 has any merit, it would appear that groundwater flows into Ten Mile, Porcupine, Yahoo and Loves Creeks are already being impacted.



Looking down into the Maggios Wetland across the harvested blue gum plot, 2009.







OTWAY WATER BOOK 23. Gellibrand GMA, Surface & Ground Waters.

CHAPTER SEVENTEEN Acid Sulfate Soils

LAWROC Landcare Group became concerned when it was found that Boundary Creek had changed from a ph neutral stream to an extremely acidic and heavy metal laden creek. Gaining no interest or support from Government authorities to investigate this occurrence, LAWROC commissioned a \$20,000 study looking at the Big Swamp wetland on Boundary Creek and other possible Acid Sulfate Soil sites. Several of these were in the Gellibrand Groundwater Management Area and were found to be Potential Acid Sulfate Soil wetlands.

Considering there is an estimated 1500 hectares of swampy wetlands in the Gellibrand River Catchment, the chances of other Highland Freshwater Potential Acid Sulfate Soils is extremely high. Lowering of the watertable in any of these areas will see similar disastrous outcomes as experienced in the Acid Sulfate Soil site of the Big Swamp.⁽⁵⁶⁾

Alarmingly a joint Corangamite Catchment Management Authority and State Government Authority report⁽¹²⁷⁾ on Victorian coastal Acid Sulfate Soils, found the estuary of the Gellibrand River to have the potential to be one of the worst coastal Actual Acid Sulfate Soil sites in Australia. Reducing the flows of the already over allocated water resources of the Gellibrand River does not bear thinking about.



CHAPTER EIGHTEEN Fire

The threat from fire happening in the Otway Ranges will always be a possibility, but what should not be allowed is the continuing of unsustainable groundwater extraction causing wetlands, creeks and rivers to dry out. Since European settlement moist river flats, wetlands and reliable sources of water have played a strategic role in fire prevention plans. Without these areas the risk, occurrence and intensity from fire is magnified.

In September 2010 the Liberal and National Coalition had no confidence in the way groundwater was being managed by the State Government of the time, and... "*Put simply the Government does not have the skills to manage groundwater in the state effectively.*"⁽⁸⁵⁾

As part of its election platform the following promise was made by the Victorian Liberal and National Coalition..."*Sustainable management of the State's groundwater resources is critically important and will be given a high priority by a Liberal Nationals Coalition Government.*"

A promise that should have been honoured in the years the Liberal National Coalition was in power (2010-2014). However, it turned out to be an empty promise.

Successive State Governments have a dismal record of dealing with the over allocation of water resources in the Otway Ranges (see Chapter 19).

If the unsustainable allocation of water resources in the Gellibrand Groundwater Management Area continues the scenario of a major disaster as depicted in Otway Water Book 15,⁽⁶⁰⁾ is a horrifying possibility.

At a Black Saturday debriefing held in Colac in November 2010 this comment was made regarding the dried out wetland of the Big Swamp... "...it is the biggest time bomb ever facing the Western District."⁽⁶⁰⁾

If unsustainable use of the water resources continues other peat rich wetlands will dry out and further increase the possibility of a catastrophic fire event happening in the Otway Ranges.

(Otway Water Book 15 "FIRE" can be viewed at www.otwaywater.com.au.)

CHAPTER NINETEEN Misinformation, Ignorance & Generalities

In the context of this chapter misinformation is defined as "information forming the wrong impression." Ignorance in this context is defined as "uninformed." With generalities, the definition being "vagueness."

I was told on many occasions by Australian Federal officers that water issues in Victoria are the province of the Victorian State Government officers. Consequently it probably should not be a surprise that I had overlooked the National Water Initiative.⁽¹⁵⁷⁾ Late in 2014 it was bought to my attention that the Victorian State Government was a co-signatory to the National Water Initiative back in 2004 and that a final report, before the Initiative was wound up, had been written in 2014.⁽¹⁶⁶⁾ Asking for a copy and reading of this document set in motion research attempting to determine exactly what has been accomplished under this initiative for the Gellibrand Groundwater Management Area and the Gellibrand River Catchment. Not surprisingly, generalities, a display of ignorance and misinformation were all that could be found after labouring through 1033 pages of Victorian State Government documents.

However, reading this plethora of misinformation, ignorance and generalities it is easy to understand why the general public could gain the impression and conclude that all is correct in the world of water resource management in the Otway Ranges.

But, when searching for specific foundation documents on which such statements were based, a totally different picture emerged.

In agreement with the 2004 National Water Initiative (NWI) the Victorian State Government (VSG) made a commitment to:

prepare water provisions for the environment,

deal with over allocation or stressed water systems,

register water rights,

provide standards of accountability, and

meet and manage urban water demands.

The following aims of the National Water Initiative were also agreed upon :

to improve public access to information,

to manage surface and groundwater in an integrated manner

to return over allocated groundwater to a sustainable level, and to develop effective water accounting. In the final National Water Initiative report,⁽¹⁵⁷⁾ the Victorian State Government asserts⁽¹⁵⁸⁾ that attaining these goals have been achieved to the degree that the following strategies and plans have been developed. Sustainable Water Strategies. Groundwater Management Plans. Surface Water Management Plans.

Regional Water Strategies.

Victorian Water Accounts.

Access to these VSG documents was not easily obtained. And, their applicability to the Gellibrand River Catchment including the Gellibrand Groundwater Management Area, was confusing, difficult to find, cursory, full of misinformation, ignorance and generalities.

SUSTAINABLE WATER STRATEGY.

Apparently a Sustainable Water Strategy is the same as a Regional Water Strategy.Two strategies were referred to by the Department of Environment and Industry, the "Sustainable Water Strategy - Central Region, Action to 2055" and the "Western Region Sustainable Water Strategy."

A. The Sustainable Water Strategy Central Region.⁽¹⁶⁰⁾ "The Strategy provides a comprehensive plan for the sustainable use of water resources." "A blueprint for our future water."

"The Victorian Government is committed to improving the health of Victoria's rivers, floodplains and estuaries."

"The Strategy contains actions to improve river health and address water shortfalls."

"It is important to keep our rivers and aquifers healthy so that they can continue to provide important environmental, economic and social benefits to the community."

"The Government will use a variety of approaches to secure our water future."

Such approaches "... will help to ensure sustainable use of our groundwater resources." And so these sweeping statements continue.

On page 32 the Gellibrand Groundwater Management Area is recognised as a groundwater management area in the Central Region, and considering the following quotes it is baffling why page 33 dealing with Groundwater Management Areas, does not include the Gellibrand Groundwater Management Area in the table for the Permissible Consumptive Volumes (PVCs).More unsubstantiated sweeping statements.

"This (PCV) approach is designed to prevent over allocation of groundwater that would cause long –term decline in groundwater levels and potentially salt water intrusion."

"Some groundwater management areas are already over-allocated. In these cases water supply protection areas are declared."

"Groundwater management plans will be developed to protect against the depletion of groundwater resources in the event that low flow conditions...." occur.

"It is important to ensure groundwater use does not exceed the long-term recharge rates."

Much more will be discussed about groundwater management under the heading Groundwater Management Plans, see page 139.

The only other reference to the Gellibrand that could be found in this document dealt with environmental flows and was found on page 7. While the Yarra and Barwon Rivers were promised an environmental flow nothing was proposed for the Gellibrand River. **"No proposed addition as current environmental flow regime is sufficient."** A classic piece of misinformation and display of ignorance. (See pages 137-138.)

"Environmental Water Reserves help to ensure the long-term health of our rivers which are vital community assets." The Gellibrand River

does have a generous Environmental Water Reserve but unfortunately there is nowhere to keep it in reserve to be released in the stressful summer low flow periods when it is so necessary(also see page 40). Numerous environmental flow recommendations have been made over four decades but have never been implemented.

These subtle pieces of misinformation highlight the importance of our water resources, giving the impression that they must and will be looked after, but in fact are misleading and give false hope. "Rivers provide vital water for homes, towns farms and business and are a major drawcard for recreation and regional tourism." "...rivers are highly significant ecosystems in their own right." And so, everything is and will be done to preserve the resource for the benefit of all. This leads one to the question of community engagement. The Strategy... *"Is the result of a comprehensive 18 month consultation process with the community including industry, local government as well as water and catchment management authorities."*

Despite the "public meetings" and "...scrutiny by an independent panel of experts," there is very little in this Central Water Strategy that reflects the input given from the Gellibrand River community and the LAWROC Landcare Group.

B. Western Region Water Strategy.⁽¹⁵⁹⁾

The Western Strategy states a lot but is also short on specifics. By grouping so many aquifers, wetlands, rivers, creeks, streams and catchments under the one heading of the Otway Coast, generalities smooth out the specifics and gives the impression that all is possible. Unfortunately the Gellibrand Catchment has been bundled into this Otway Coast package and much of its character and peculiarities are lost in the process. So much so that in the complete 291 pages of the strategy Gellibrand is mention just over 20 times. The majority of these references are generalisations and are found scattered in the 19 pages of the Otway Coast chapter.

Map Source page 164 Western Water Strategy showing the Otway Coast Region of the Strategy.



Chapter sever

Pages 14 and 15 of the strategy outline the "Strategy at a glance." The key elements outlined include:

- Providing increased certainty to water users and the environment Promoting sustainable water use.
- Protecting and improving the health of waterways, aquifers, wetlands and estuaries.

The only mention given to the Gellibrand River on these pages, states, "Gellibrand River – improving environmental flows." Considering an environmental flow has never been allocated to the river, despite decades of recommendations, this could only be an improvement. And, the following quotes should also be encouraging, but aren't.



"Providing adequate environmental flow and protecting or restoring riparian habitat and water quality will sustain healthier waterways." The Otways "...has relatively plentiful and reliable surface water and groundwater resources..." "The water resources of the Otways provide reliable supplies to the surrounding area."

"The Gellibrand River Catchment is also the major source of water for Warrnambool, Camperdown, Colac and numerous smaller towns outside the Otways." (Sustaining approximately 26 000 people.)

But, "Because there are no regulated systems in the systems (Otway Coast), no environmental entitlements are held in storage." However, "If there is not enough (water) for all needs water use is restricted to share the available water between existing users and the protection of the environment..." "Local management plans will clearly define rules for how water is managed on unregulated systems to meet the needs of licensed water users and the environment."

Extensive comment is made regarding the uniqueness, importance and value of the river systems in the Otway Coast region.

"...contain significant environmental values..." "...some of the most diverse in Australia..." "...popular recreational areas..." "..rely on the flow regimes..." "...wetlands that are of national significance..."

This is all very well but let's take a moment to look at a specific, the Gellibrand River Stream Flow Management Plan⁽¹⁶¹⁾ prepared by Southern Rural Water, and see how it matches up with the statements made above and below.

"The plan sets out a system of rosters and bans on licensed diversion when river flows drop to 22 ML per day in the lower

Gellibrand River." This is to be commended. However, later in the strategy it states that the Wannon Water's Bulk Entitlement

"...allows all available flows below 12 ML per day to be taken from the Gellibrand River at Carlisle River." This is bad enough but what the strategy does not state is that in the Gellibrand River Stream Flow Management Plan, Wannon Water can also take all available flows below 12 ML per day at its southern Gellibrand River extraction off-take (see map page 135). In effect Wannon Water can suck the Gellibrand River dry at two points leaving no environmental flow what so ever..

Some argue that the Gellibrand River Stream Flow Management Plan is not worth the paper it is written on. However, the Western Region Water Strategy states "*The Gellibrand River will be managed based on a local management plan. A statutory streamflow management plan will not be prepared.*"

How reliable is the introduction to the Otway Coast chapter when it states? "...The actions presented in this chapter aim to meet the specific water needs of the Otways... protecting the reliability of supply for existing and future consumptive water users and enhancing environmental values... protecting waterways, aquifers, wetlands and estuaries... environmental flows for the Gellibrand River."

There are no statutory environmental flows for the Gellibrand River and if the human need arises the present management plans allow the river to be sucked dry at two extraction points.

Things look no better when matching the generalities and half truths with the groundwater management of the Gellibrand Groundwater Management Area (GGMA). The same amount of ignorance is found.

SURFACE WATER MANAGEMENT PLAN.

I was informed by email in December 2014, from a Department of Environment and Primary Industry officer, that a Surface Water Management Plan for the Gellibrand River does not exist. As discussed above one in fact does exist.

VICTORAIN ENVIRONMENTAL WATER HOLDER.

There does not appear to be any water held in the Gellibrand River Catchment for environmental water as per the Water Holder records.



Map Source: Victorian Environmental Water Holder Seasonal Plan 2014-2015

GROUNDWATER MANGEMENT PLAN. (found in 164)

The Western Region Water Strategy states that by mid 2012 a groundwater management plan should be completed for the Gellibrand Groundwater Management Area. A request for such a plan and follow up research can be summarised as follows.

- 1. The amount of stock and domestic use for both surface and groundwaters is not known.⁽¹⁵⁹⁾⁽¹⁶⁰⁾
- Parts of the aquifer in the Gellibrand Groundwater Management Area is *"...highly connected to the surface water in the Gellibrand catchment."*⁽¹⁵⁹⁾
- 3. The cost of extracting groundwater in the Otway Coast area, was given as a reason little was being extracted.⁽¹⁵⁹⁾
- 4. The Western Strategy recognises that the Gellibrand Groundwater Management Area has a Permissible Consumptive Volume of zero.
- 5. This is the extent of information to be gained from either the Central or Western Water Strategies.
- 6. The 2014 Southern Rural Water's Hopkins-Corangamite Groundwater Catchment Statement⁽¹⁶⁴⁾ states a Local Plan has been drawn up for groundwater. It may be stated as a local plan but it most definitely has had no upper or middle Gellibrand River Catchment local community input into its development.
- 7. The "Plan" states there is no Permissible Consumptive Volume allocated to the Gellibrand Groundwater Management Area. "The PCV was previously set at zero pending resource assessments of this GMA." (164) What this means is anyone's guess. The Khouri and Duncan (see page 39) and SKM's reports (see page 79) certainly justified the PCV being set at zero. How the PCV of zero for the Gellibrand Groundwater Management Area has dropped from the scene is most baffling.
- 8. Water Minister Peter Walsh displayed the same amount of ignorance in 2011 when he Gazetted the Permissible Consumptive Volume Groundwater Order for all previous groundwater management areas in Victoria and omitted to include the Gellibrand Groundwater Management Area.⁽¹⁶²⁾ Previously on 2 November 2006 the Victorian Government published the Victorian Government Gazette G44 in which the order stated that the Gellibrand Groundwater Management Area Permissible Consumptive Volume be set at zero. Woodward-Clyde¹⁴²⁾ had made this recommendation back in March 1999 based on extensive research (also see page 40).
- 9. Southern Rural Water's Otway Coast Basin Local Water Report November 2012 states that most of the observation bores in the

Gellibrand Groundwater Management Area "...are at, or very near, their lowest historical level." However, the Victorian Water Accounts document for 2012-2013⁽¹⁶²⁾ states that the groundwater levels in the Gellibrand GMA are stable. Does this mean they are stable at a lower level? After three wet winters these statements are confusing.

- 10. The Vic. Water Accounts 2012-2013 report⁽¹⁶²⁾ makes scant mention of the Gellibrand Catchment groundwater resources. It is recognised that there is a Gellibrand Groundwater Management Area (Gellibrand GMA) and that there are 2 stock and domestic bores that extract approximately 3 ML/year. And, on page 306 it actually states that there is a zero allocation limit placed on the Gellibrand GMA. This report was signed off by the then Minister for Water, Peter Walsh, and stated that this report is a key planning document that facilitates sustainable management of Victoria's water resources. But strangely, Minister Walsh missed Gazetting the zero Gellibrand GMA just before leaving office.
- 11. The only reference to a Gellibrand Management Plan that can be found⁽¹⁶⁴⁾ has been prepared using a pro-forum that contains little to nothing that is pertinent to the Gellibrand River.

The Gellibrand Groundwater Management Area features, if so ever poorly, in the Central Water Strategy, the Western Water Strategy, the Hopkins-Corangamite Groundwater Catchment Statement and the Otway Coast Victorian Water Accounts. In the confusion as to where the Gellibrand Groundwater Management Area should be placed it would appear that it has passed any comprehensive scrutiny and or recognition.

CONFUSED?

This chapter came about as a result of trying to assess the validity of the Victorian State Government's 2014 assertions that it had successfully achieved many of the objectives agreed to in the 2004 Australian Water Initiative. In relation to the upper Gellibrand River Catchment none of these assertions could be confirmed.

There is no such thing as a Groundwater Management Unit. The Gellibrand Groundwater Management Area seems to have slipped into obscurity and there is no Water Supply Protection Area; no Seasonal Watering Plan; no mention on the Victorian Environmental Water Holder's plan; no environmental flows allocated; an Environmental Water Reserve that has no storage to allow releases during summer stress periods; an Environmental Water Reserve that flows to Bass Strait during winter high flows, and scant reference on the Victorian Water Register.

The Hopkins-Corangamite Groundwater Plan for the Gellibrand Groundwater Management Area called the Gellibrand Local Management Plan⁽¹⁶⁴⁾ states there is no Permissible Consumptive Volume that currently applies but does acknowledge that it was previously set at zero. The rest of the "Plan" follows the pro-forma of other plans and states there can be trading of water, new licences issued and gives the impression that the Gellibrand Groundwater Management Area is once again open for "business." Nowhere can it be found why Water Minister Walsh and Southern Rural Water have taken this stance of omitting the zero Permissible Consumptive Volume for the Gellibrand Groundwater Management Area.

The Victorian Water Register does not register the multitude of landholders' free rights to Stock and Domestic water, making it extremely hard for any form of accurate total water balance auditing.

There is more than a little confusion regarding a Stream Flow Management Plan for the Gellibrand River. Some department sources state none exists and will never be done unless by the local community, while another report tells of a "local" plan but only portrays a fraction of the plan. The truth of the matter is that Southern Rural Water's Gellibrand River Stream Flow Management Plan permits Wannon Water to take all of the water that flows in the river, if needed, for urban use.

The Sustainable Water Strategy, Central Region acknowledges the Gellibrand Groundwater Management Area as part of its area of influence but the authors chose to drop all local input and comment from the strategy.

The Western Region Sustainable Water Strategy also included the Gellibrand Groundwater Management Area as part of its brief but decided to allocate the Gellibrand Groundwater Management Area into obscurity by lumping it into the Otway Coast Region making little reference to it.

Volumes of literature have been written containing platitudes, motherhood statements and other soothing writings outlining the huge gains made in efforts to achieve sustainable use of our water resources that are stated to be conducted in an environmentally conscious fashion. However, scratch the surface and very few of these statements stand up to scrutiny.

Public access to information remains extremely difficult to obtain. The material provided is often confusing and contradictory or doesn't even exist. Plans and

strategies are often duplicated under various names and too often cover the same area providing conflicting information. An accurate Total Water Balance Audit has never been done, making appropriate management decisions amost impossible.

The best way to sum up this chapter is with a quote from the Victorian Auditor General on its investigations into groundwater management. *"The Department of Sustainability and Environment (DSE) and water corporations do not know whether groundwater use is sustainable."*⁽⁸⁴⁾ Considering perennial streams are groundwater sourced this statement could be as appropriately applied to the surface water resource.

CONCLUSION

In the Otway Ranges we may not be able to pass onto our descendents grand palaces, magnificent century old churches, exotic mosques and historically mind blowing monuments, but hopefully we can leave a mountain range environment that people will gasp and wonder about how such a gem has remained unspoilt from human influence.

As things stand unless there is a monumental change in the way the Otway Ranges water resources are managed, such an aim seems most unlikely.



APPENDIX ONE

1989 NREC Findings⁽⁹⁷⁾

In the late 1970s it became increasingly obvious that the demand being placed on the limited water resources in the south western region of Victoria was reaching a critical stage. The scope and complexity of these demands and limitations prompted a series of enquiries.

- In 1979 the Parliamentary Public Works Committee (PPWC) opened the Gellibrand River Enquiry.
- 1982 saw a change of Government and the PPWC was superseded by the Natural Resources and Environment Committee (NREC). Provision for continuity between the PPWC and NREC was taken into account.
- □ In 1983 the State of the Rivers report was tabled.

Throughout these enquiries the NREC included members from all major parties of the Parliament.

- In February 1984 the Victorian Parliament gave the Natural Environment and Resources Committee its Terms of Reference which in effect required it to continue with the PPWC inquiry.
- On the 31 July 1984 the Committee's Terms of Reference were considerably widened to examine all aspects of water management in the south western region of Victoria covered by the Moorabool River, Barwon River, Lake Corangamite, Otway Coast (including the Gellibrand River) and the Hopkins River basins.
- □ In November 1984 the NREC's first report to Parliament highlighted the need for further investigations.
- In March 1985 the Minister for Water Resources established the South Western Regional (SWR) Task Force to co-ordinate the investigations recommended in the first NREC's report.
- On June 10 1988 the SWR Task Force submitted its findings back to the NREC. Consequently the enquiry was re-opened. The NREC was to report back to Parliament by November 1988 but the State election interrupted this and the final reporting back to Parliament was delayed to November 1989.
- The NREC reviewed the 1988 SWR Task Force's Draft Strategy for Managing the Water Resources of South-Western Victoria. It also considered the evidence and submissions received in July 1988 and again in May/June 1989. Extensive public consultation was sought, heard and considered. The NREC went to extreme efforts to table a relevant and appropriate Strategy.

The NREC reported back to Parliament in 1989 with a strategy⁽⁹⁷⁾ for the future management of the water resources in the south western region of Victoria.

Throughout these enquiries there had been many changes and the scope of the final report is considerable. The focus of this appendix is based on those recommendations and parts of the recommendations that have particular reference to and influence on the water supply to the Otway Ranges. **NOTE:** It is important to note that the following commentary under each recommendation is a summary of that recommendation. There are 52 recommendations in total and the 253 page NREC document demonstrates the thoroughness of the NREC's enquiries and its forward thinking.

Recommendation 2

To provide a framework for the integrated management of all elements of the terrestrial phase of the water cycle to best serve the present and future needs of the community minimising the economic, social and environment costs.

Recommendation 3

- To develop a more detailed understanding of the water cycle and its interaction with the land and the environment.
- To conserve and protect the region's water resources and associated environmental values.
- To regularly review predictions of future community and environmental needs for water.
- To regularly review the full range of options available to balance predicted future community needs for additional water supplies against the available resources and effects of the use of these resources.
- To provide for future community need for water supplies of an adequate quality and level of security.
- □ To increase the level of local and regional coordination and responsibility for the management of all aspects of the water cycle.
- To integrate the development of local and regional responsibilities within a statewide context.

Recommendation 4

- □ The development and adoption of techniques for conserving water
- Detail of the existing rights of rural landholders
- Establishment of environmental flows
- Detailed investigation of groundwater systems
 - Iocation of recharge areas
 - interconnection between ground and surface water systems
 - quality of the groundwater
 - magnitude of the groundwater
 - effects of using groundwater on surface and groundwater systems
 - develop economically viable groundwater resources before development of further surface water resources
 - **base water quality on World Health Organization guidelines**
 - develop management plans for all wetlands, water bodies and river frontages
 - investigate water quality trends
 - restore degraded rivers, streams and catchments to a stable condition
 - develop and implement appropriate land use controls
 - develop community awareness
- develop whole of catchment management mechanism
- develop regional organizations responsible for managing all aspects of the water cycle. These organizations should be financially self-reliant, accountable for their actions and representative of all interests affected by their activities.

Recommendation 5

For more efficient and environmentally responsible management the Government should facilitate voluntary restructuring of existing authorities.

Recommendation 8

 Groundwater investigations strongly recommended to be completed as a matter of high priority.

Recommendation 9

The NREC could not entertain any option which would further stress the Gellibrand River until all groundwater investigations and findings are complete. Investigations should therefore continue to test the full feasibility of all groundwater resources before any final decision is made.

Recommendation 13

 Ongoing research is needed into the range of available water supply options, especially groundwater. The committee emphasises the need for flexibility and ongoing review based on updated comprehensive information.

Recommendation 14

 Development of surface water resources should be delayed until groundwater resources at Barwon Downs, Bambra, Kawarren, Gellibrand, Curdie Vale and Moorbanool (now called Newlingrook) have been fully evaluated and, where appropriate, developed to a maximum. The Committee especially recommends that there should be no additional extraction of water from the Gellibrand River.

Recommendation 15

Development of the Upper Barwon storages is the next most desirable alternative to groundwater for Geelong. When available the Geelong and District Water Board should purchase the relevant land for the Roadknight, Callahan and Dewing Creeks' dam sites.

Recommendation 16

The Geelong and District Water Board should be free to pursue investigations but at its own cost and with no prior assurances that any commitment to additional water resources will be given. The Board would need to have collected sufficient information to fully justify its proposal in an Environment Effects Statement.

Recommendation 18 and 19

 Water Supplies authorities to develop and implement comprehensive programs designed to encourage more efficient use of water.

Recommendation 20

Geelong and District Water Board should investigate the recycling of waste water.

Recommendation 22

Incentives should be offered to home owners to install water tanks.

Recommendation 24

 Water authorities should keep landowners and others likely to be affected by works, proposals or the planning process, regularly informed.

Recommendation 25

 During planning periods landholders should be offered counselling and advice on their rights.

Recommendation 26

If the present flow patterns of a river have to be modified and this would affect existing water allocations then the Government should ensure that the affected diverters are able to gain access to adequate alternative sources of water, or receive appropriate compensation.

Recommendation 43

A much higher level of local involvement should be encouraged in the management of the region's rivers, lakes and streams.

Recommendation 47

Description Minimum environmental flows requirements be allocated.

Recommendation 48

- A condition of approval of any new water diversion or storage should be that it is designed and operated so that present levels of fish populations are maintained and where necessary improved.
- Measures may also need to be incorporated in new works to maintain the temperature range of the water for aquatic ecosystems.

Recommendation 50

- Undertake comprehensive studies to determine the water quality requirements of platypus, and riparian and other aquatic vegetation.
- Ensure that any proposed increases in environmental flows take all possible aspects of the river ecosystem into consideration.
- □ Investigate the impact of reduced water levels on the biological values of wetlands.
- Initiate further detailed investigations of various aspects of the groundwater systems.
 - o Identification of groundwater recharge areas
 - o Resolution of localised groundwater problems
 - o Assessment of groundwater pumping impact on soaks, creeks and springs
 - Undertake salinity investigations on the rivers, lakes and streams.

Recommendation 52

The Department of Water Resources should continue to convene the SWR Task Force initially to prepare an Action Program for implementing the adopted Strategy and, at least on an annual basis, to monitor and report to the Minister for Water Resources on progress in the implementations of the adopted Strategy. Steps should be taken to ensure that adequate consultation occurs with interested parties during the preparation of the Action Program either by widening the representation on the Task Force or by other suitable means.

APPENDIX TWO

- October 2006⁽¹³⁵⁾ the Victorian Government tabled its Sustainable Water Strategy, Central Region Action to 2055.
- 11 May 2007⁽⁴⁾ Barwon Water signs off on Technical Services Panel Contract Service Contract No. 10643. This is given to Sinclair Knight Merz to investigate the feasibility of extracting 16 000 million litres from the Kawarren borefield for urban use in the Geelong Region. The contract included the assessment of the development of infrastructure such as, another extraction borefield closer to Geelong, a water treatment plant, easement requirements, land acquisition, pumping station, delivery pipe routes, electricity supply etc.
- June 2007 Barwon Water indicates to a Kawarren farmer that it intends to conduct a small 48 hour pump in August to test the condition of the extraction bore at Kawarren. This test would also look at the properties of the deep water. It was indicated that a 90 day test pump would be commenced in December 2007 and the extracted water would be flushed into the Loves Creek water system.
- July 2007 a 48 hour short term test pump was conducted and 6 million litres of water was dumped into the Loves Creek system. Southern Rural Water did not sanction this pump and it was regarded as inconsequential. In essence it was an illegal extraction. Martin Kent of Southern Rural Water, *"I am advised that SRW did not issue an approval for the pump test. However, given the small volume of groundwater extracted, our attention is focussed on the proposed, and far more significant, three month test." An illegal extraction such as this by anyone else, other than a water authority, would most likely have resulted in a prosecution.*
- October/November 2007 a rather clumsy effort was made to indicate that permission was given by the Department of Sustainability and Environment to proceed with the work as outlined in Service Contract No. 10643.
- 1 Feb 2008 advertisement asking for submissions re: Barwon Water extraction at Kawarren.
- 22 Feb 2008 submissions closed (SRW allowed an extra few days by request).
- 63 submissions sent to Southern Rural Water including the Victorian Farmers Federation opposing the proposed pump.
- 10 April 2008 verbal submissions heard at hearings in Colac by Mick Fennessy of Southern Rural Water.
- 16 April 2008 Warrnambool Standard article. In this article Joe Adamski of Barwon Water was reported to say that Barwon Water would be pumping from Kawarren by July 2008. Mick *Fennessy's decision still not handed down due process still in motion as per the Water Act.*
- 21 April 2008, the Water Minister, Tim Holding, states that the PCV will be amended to support the Barwon Water investigation program.
- 22 April 2008, Tim Holding replies to Terry Mulder MP regarding a 843 signature petition.
- 24 April 2008. Tim holding states that Barwon Water <u>will be given</u> a licence to pump and that it will be <u>for 13 months</u>. *Fennessy's decision still not handed down due process still in motion as per the Water Act. This letter made a mockery of DUE PROCESS and the WATER ACT.*
- 28 April 2008. The 16 April Warrnambool Standard article prompted a terse letter to the EPA and Southern Rural Water asking how this can be so when Mick Fennessy had not brought down a determination will the licence to extract water at Kawarren be given as a matter of course irrespective of the process still in motion at the time.
- 29 April 2008 Mick Fennessy replies to the terse 28 April letter saying that he still **has not reached a decision**. Both Mick and Malcolm were not aware of Tim Holding's 24 April letter at this stage. This letter arrived in early May. Mick Fennesy was informed and was surprised at this revelation considering he was still deliberating on the issues at hand. Tim Holding's 21 April letter was another shock, especially to Mick Fennessy when its existence became known on the 10 June 2008.

- The last sentence of Mick's letter, when compared to Tim Holding's statement that the licence will be issued, was absolutely dumbfounding. *Fennessy's decision still not handed down due process still in motion.*
- 22 May 2008. Mick Fennessy states that his decision will come after Barwon Water's reply to issues raised from the 10 April submissions and hearings. *Fennessy's decision still not handed down due process still in motion*.
- 11 June Mick Fennessy wrote to Charles Kohout (local resident) still talking of due process .
- 27 October Mick Fennessy finally handed down his decision, granting Barwon Water permission to proceed with the 90 day test pump at Kawarren, 6 months after Tim Holding had already made the decision.
- Mick Fennessy's notification allowed 28 days for appeal.
- Friday 13 November 2008 Val Warner, an objector to the 1 February notice, received her notification of SRW's decision. Appeals had to be in by the following Monday.
- However, in the meantime 8 individual groups appealed the Southern Rural Water's decision to allow a 90 day test pump at Kawarren.
- 13 February 2009 and the first Victorian Civil & Administrative Tribunal (VCAT) hearing was delayed a week to the 20th because of a total fire ban day, the Friday following Black Saturday.
- 20 February 2009 VCAT hearing. More time needed by parties.
- 25 June 2009 notification was given by Harwood Andrews Lawyers that Barwon Water had withdrawn its application to conduct a 90 day test pump at Kawarren. This was done at the eleventh hour, the VCAT directions hearing was due to be conducted the next day.
- 26 June 2009 VCAT Hearing went ahead and it was determined that Barwon Water's application made to Southern Rural Water to extract groundwater at Kawarren be set aside.

A 200 million dollar project dumped.

• A 200 million dollar project was stopped in its tracks. This was, "*The preliminary cost* estimate for connection of the aquifer (Newlingrook)," (Page 12 of the Barwon Water's Water Supply Demand Strategy, 2007.)

APPENDIX THREE



The one and only notice of this highly controversial issue. Note that the post code is incorrect.

Barwon Water

APPENDIX FOUR

Our Ref: Your Ref: Enquiries To: 15/260/0007A(7)

Mr M Watson 05 5226 2543

14 April 2009

Mr M Gardiner 1805 Colac-Beech Forest Road KAWARREN VIC 3249

Dear Sir,

RE: REQUEST FOR ACCESS TO DOCUMENTS UNDER THE FOI ACT

In response to your correspondence received 27 February 2009 in respect to the information requested below, I hereby provide the following details:

- Newlingrook Groundwater Investigation stream trigger levels 90 day pumping test draft 4 (9 September 2008) Copy attached.
- Copy of reasons why the Kawarren test pump (90 days) has been reduced from 3000ML to 470ML

No document related directly to this request has been located.

- Copy of the documentation and rationale of how 470 or 625 or 650ML extraction over 90 days can be used to calculate the sustainability of the Kawarren aquifer No document related directly to this request has been located.
- Copy of the environmental and social considerations being undertaken re this 90 day pump

No document related directly to this request has been located.

Copy of or permission to access a copy from Ecology Australia "Inventory and Assessment of Flora and Fauna Values of Barwon Downs Aquifer Outcrop Areas and Associated Streams, Otway Ranges, Victoria", Ecology Australia Pty Ltd, Clifton Hill, Vic., Carr, GW, Muir, AM (1994)

Previously provided to yourself – 4 March 2009.

Barwon Region Water Corporation, Environmental Audit, Checklist, Construction project Olangolah Reservoir Upgrade, Contract No.10467, File 40-100-0048G – Contractor Entracon 09/01/2008:

- The contingency plan for high rainfall events
 No specific contingency plan for high rainfall events was developed and therefore there is no document available.
- The flora and fauna survey that was completed Copy attached.
- The vegetation clearance and revegetation plan.
 No vegetation clearance and revegetation plan was developed and therefore there is no document available.

Barwon Region Water Corporation ABN 86 348 316 514 61-67 Ryrie Street, Geelong, Victoria P.O. Box 659, Geelong, Victoria, 3220 DX 22061 (Geelong) www.barwonwater vic.gov.au

APPENDIX FIVE

	State of Victoria – Evidence Act 1958
	STATUTORY DECLARATION
lot T	nn Newton Mitchell.
I,	[full name]
of	14 Aidrie Street COLAC Victoria 3250
D.	[address]
R	foccupation , do solemnly and sincerely declare that:-
I was borr occupied the west s	n in 1927 and lived at Kawarren from this period until 1955 or 1956. Our family owned the land now by Shane Flanagan, on the east side of the Colac to Gellibrand Road, and Jane and John Mollard, on side of the road.
The sectic This tribut Creek som	n of land on the east side of the Colac to Gellibrand Road has Pompa Bill Creek running through it. tary of Loves creek was originally named Yahoo Creek but for some reason a tributary of Loves ne kilometres to the north, eventually became known as the Yahoo Creek, as it still is today.
From my e in the 193 domestic	earliest memories, Pompa Bill Creek, as it is now known, never dried up during this period and even 9 drought its flow did not appear to be diminished in the least. Our family relied on this creek for a water supply as far back as I can remember.
I can reme through th house occu be loaded a mill way was in plei	mber before tractors came to the area and there was a tram line running down from the bush he area of land now owned by the Gardiner family, to a timber siding directly behind our house, the upied by Shane. As kids, we used to watch the horse drawn tram bring the timber to the siding to onto the Beechy train on a Saturday. This siding was on the east side of the railway line. There was up in the bush along Pompa Bill Creek and stables used to house the horses. Water from the creek ntiful supply.
The creek we threw i Pompa Bill indeed.	had lots of little fish that we called minnows, that we often tried to catch using small bits of food nto the water. We often did this just below the creek tunnel that passes under the railway line. Creek way back into the bush, used to be part of our play ground and I knew the area very well
When I ma the Mollard 1956. As I h through thi	rried in 1951 my wife and I moved over the road on our property into a small cottage near where ds have built their home. Having outgrown this little cottage we moved out of the area in 1955 or nave stated from my early recollections in the early 1930s, Pompa Bill Creek never stopped flowing is period.
l acknov and belie	vledge that this declaration is true and correct, and I make it with the understanding of that a person who makes a false declaration is liable to the penalties of perjury.
Declared	at _ Cdar Marman
in the Sta	ate of Victoria, this <u>8</u> day of
A	uguit 2013 sight of a view of Wichell
	[to be signed in front of an authorised witness]
Before m	e, Colac Pharmacy
	Signature of euthorised witness // Colac, Vic, 3250
	"Ph: (03) 5232 2399 Fax: (03) 5231 2294 ABN: 15 993 679 840 App. No. 23384F
	norised witness must print or stamp his or bet name address and title under section 1074 of the Edition and the section 1074 of the Edition
The auti	eg. Justice of the Peace, Pharmacist, Police Officer, Court Registrar, Bank Manager, Medical Practitioner, Dentist)

APPENDIX SIX



GHD	
11. Conclusions of the Audit	
 The results of the audit indicate that: It is possible that the management of the construction activities at the site by BRWC caused a risk of possible harm or detriment to the identified beneficial uses of the receiving waters; and It is possible that the construction activities at the site by the Contractor caused a risk of possible harm or detriment to the identified beneficial uses of the receiving waters. Key recommendations from the audit are that: BRWC Capital Delivery Department to implement the recommended changes to their Environment and Contractor Management System to ensure that the system does not pose a future risk of harm or detriment to a segment of the environment; and The Contractor to implement the recommended changes to their Management System to ensure that the system does not pose a future risk of harm or detriment to a segment of the environment; and BRWC to ensure that all contactor recommendations are implemented prior to them being engaged for any future contracts. 	
DATED: 12 August 2009 SIGNED: ANDREW ROY ENVIRONMENTAL AUDITOR (Appointed pursuant to the Environment Protection Act 1970)	
31/23907/161861 Olangolah Reservoir Upgrade Works 47 Environmental Audit	





11. Conclusions of the Audit

The results of the audit indicate that:

- While BRWC had high-level policy and management systems in place to manage significant environmental aspects of projects, these had not been adequately applied for the Olangolah Reservoir project;
- Documentation related to the Contractor's Management System were adequate but was limited to the immediate construction site and did consider the use of the access track and risks to adjacent areas of environmental sensitivity i.e. The Olangolah Creek;
- On-ground implementation of the Contractor's Management Systems raised issues in terms of adequacy of training, implementation of environmental controls, incident reporting and inspections and monitoring;
- BRWC had not adequately monitored the Contractor to ensure that environmental controls and contingency plans have been developed and implemented and that they met the requirements stipulated in the work contract and CEMP;
- As identified by BRWC and the contractor, rainfall played a major role in creating an unstable environment around the work site; and
- Due to a lack of sufficient monitoring data, it was not possible to determine that the management of the construction activities at the site by BRWC and the contractor caused a risk of possible harm or detriment to the identified beneficial uses of the receiving waters.

Key recommendations from the audit are that:

- BRWC Capital Delivery Department to implement the recommended changes to their Environment and Contractor Management System to ensure that the system does not pose a future risk of harm or detriment to a segment of the environment; and
- The Contractor to implement the recommended changes to their Management System to ensure that the system does not pose a future risk of harm or detriment to a segment of the environment.
- BRWC to ensure that all contactor recommendations are implemented prior to them being engaged for any future contracts.

DATED:	23 December 2009	
SIGNED:	ANDREWROY	
	ENVIRONMENTAL AUDITOR (Appointed pursuant to the Environment Protection Act 1970)	
31/23907/161861	Olangolah Reservoir Upgrade Works 53V Environmental Audit	

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APPENDIX SEVEN

SKM

Climate Change Modelling for the Barwon Downs Aquifers

FINAL REPORT

Draft 2 July 2011

> Sinclair Knight Merz ABN 37 001 024 095 590 Orrong Road, Armadale 3143 PO Box 2500 Malvern VIC 3144 Australia Tel: +61 3 9248 3100 Fax: +61 3 9248 3364 Web: www.skmconsulting.com

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OTWAY WATER BOOK 23. Gellibrand GMA, Surface & Ground Waters.

Interim Report

8.

The unacceptable impacts { mentionce} hove and (at about 200 m below the surface

do is surface water have nothing to Sustainability of Borefield Use

A key objective of the investigation is to assess whether the planned long term use of the Barwon Downs borefield is sustainable. In/order to address this issue it is necessary to define a set of criteria that can be used to assess the sustainability of any proposed borefield use. These criteria must provide effective safeguards against unacceptable impacts that might accompany future groundwater extraction. Sustainability criteria used in the current investigation are as follows:

- 1. Pumping from the borefield must not exceed the available pumping capacity of the borefield. In other words the proposed use of the borefield must not exceed the pumping capacity associated with the current production wells. This criteria can be assessed by the numerical modelling results through the comparison between calculated water levels in individual pumping wells and the pump setting depths in these wells. It is assumed that if the calculated water level remains at least 10m above the pump setting depth then the required pumping rate can be maintained in the production well.
- 2. Groundwater levels must stabilise within 50 years when the borefield is pumping at a "constant rate". This criterion can only be assessed if the model assumes wells pumping at a constant rate. In Scenarios 2 and 4 this assumption is not valid as the borefield is only used sporadically. However in Scenario 5 the modelled pumping includes an annually repeating cycle that approximates a constant pumping rate when assessed for the full 60 years of the scenario.
- Groundwater levels in the confined parts of the principal aquifer (Dilwyn Formation 3. Aquifer) must remain above the base of the overlying confining layer (ie the Narrawaturk Marl). This criterion is aimed at ensuring that the aquifer is not dewatered.

These three criteria can be used to assess whether the proposed borefield operation is sustainable.

8.1. **Criterion 1 Borefield Capacity**

Results for the pumping scenarios (Scenarios 2, 4 and 5) as shown in Figure 30, Figure 41 and Figure 42 illustrate the estimated water levels in all production wells. These levels have been obtained from the predicted groundwater levels in the appropriate cells in the model with corrections made to account for well losses and scaling issues associated with the level of discretisation included in the model. The results illustrate that in all cases the estimated water levels in all production wells remain well above the individual pump setting levels and hence the pumping is considered to be sustainable.

8.2. Criterion 2 Stabilisation of Groundwater Levels

Because Scenarios 2 and 4 include sporadic pumping from the borefield they do not provide useful outputs to assess this sustainability criterion. The pumping records assigned in these two scenarios have been derived from REALM modelling that provides an optimum use of the borefield to meet the expected water demand given the climatic conditions included in the scenario. The differences SINCLAIR KNIGHT MERZ

29 June 2014

APPENDIX EIGHT

From: wateris.life@yahoo.com.au Subject: Wrong email, Danny? Date: 21 August 2014 10:13 To: danny.suster@dsdbi.vic.gov.au

Hello again Danny,

After you could not answer the questions below following our discussions in Colac at the unconventional gas forum, you suggested I ask the questions of your department's info line. Unfortunately the email address you gave me appears to be dis functional as there has been no reply after several inquiries. Could you suggest another email address that I could try. Regards,

Malcolm.

Malcolm Gardiner Email <u>otwaywater@yahoo.com.au</u> <u>www.otwaywater.com.au</u> Phone +61 3 52358325

Begin forwarded message:

From: Malcolm Gardiner <<u>wateris.life@yahoo.com.au</u>> Date: 20 August 2014 14:58:13 AEST To: "<u>naturalgasinfo@dsdbi.vic.gov.au</u>" <<u>naturalgasinfo@dsdbi.vic.gov.au</u>> Subject: Is thias a functional department???? Reply-To: Malcolm Gardiner <<u>wateris.life@yahoo.com.au</u>>

Hello Anyone,

Does this department have a PR function that at le3ast can show the good manners of replying in some format?

This set of questions has been sent to your department on numerous occasions without the slightest whisper of a reply.

This is especially concerning when Danny S of your department (DSDBI) would not answer the questions and said I could get the answers by emailing your address.

What is the hold up?

Malcolm.

by 15/01/2015 still no reply.

From: Malcolm Gardiner <otwaywater@yahoo.com.au></otwaywater@yahoo.com.au>
To: "linda.bibby@dsdbi.vic.gov.au" <linda.bibby@dsdbi.vic.gov.au>,</linda.bibby@dsdbi.vic.gov.au>
Cc: 'naturalgasinfo@dsdbi.vic.gov.au' <naturalgasinfo@dsdbi.vic.gov.au></naturalgasinfo@dsdbi.vic.gov.au>
Date: 16/01/2015 01:18 PM
Subject: Fwd: Questions not answered
L'il z
1 mil 2013
Tel.
Units Linds
Hello Linda, Dappy being away sent me your email address to refer matters on to. Could you process the email below, please?
Bonarde
Malcolm.
Malcolm Gardiner
Walcom Galdner
From: Linda.Bibby@dsdbi.vic.gov.au Subject: Re: Fwd: Questions not answered Date: 16 January 2015 16:08 To: Malcolm Gardiner otwaywater@yahoo.com.au Cc: danny.suster@dsdbi.vic.gov.au Danny.Suster@dsdbi.vic.gov.au
Dear Malcolm,
rappiogise for the delay in responding to your questions. Departmental representatives have done their best to answer the
questions you have asked in the attached document.
Given the generic nature of the questions, we are unable to provide specific answers in some cases. Should you have questions about a specific well or operation, the Department is able to provide more specific information than what is included in the attached response, however you would need to provide us some more information, for example the name of the company or the location of the well. The answer to the first question includes instructions for our online mapping
application, GeoVic, which you can use to look at data for specific areas.
regards,
Linda
Linda Bibby Manager Policy Reform & Government Coordination Earth Resources Development Department of Economic Development, Jobs, Transport and Resources Level 10/ 121 Exhibition Street, Melbourne, Victoria 3000
P: (03) 9027 4403 M: 0417 161 104 E: linda.bibby@dsdbi.vic.gov.au W: www.energyandresources.vic.gov.au

1. The sites of the tight gas well that have been drilled across Victoria.

The sites of wells that have been drilled across Victoria are accessible via the *Geovic - Explore Victoria Online tool* (http://www.energyandresources.vic.gov.au/earth-resources/maps-reports-and-data/geovic) which allows you to search our geospacial databases and display the information in a mapping format.

If you click the green addition sign on the upper left-hand side of the page you can add data layers to the map displayed. If you select "Wells and Boreholes" and then "Wells - Petroleum" and click on "apply" this will give you all the petroleum wells drilled in Victoria.

Then if you zoom in to the area you are interested in and select the "Legend" tab in the upper left side you will find a legend which identifies what was discovered (oil or gas) or if nothing was found then it is listed as a dry well.

All wells drilled in Victoria are identified in Geovic and there is a legend that identified what was discovered at each respective well (oil, gas or if nothing was found the well is listed as dry)

Please note that there is no differentiation for licenses for tight gas versus natural gas or oil under the Petroleum Act.

2. How many fraccs have been done per well?

23 fracture stimulations have been conducted under the Petroleum Act and the MRSDA however some of these operations were on the same well so the total number of wells fracture stimulations is less than 23.

3. How much water has been used per fracc?

The water used and where it comes from varies from operation to operation.

As a guide, a standard drilling operation requires between 2 and 5 megalitres.

This number is a guide only.

4. Where did the water come from

Water can be drawn from a number of sources, however in many cases it is obtained from an external source i.e. purchased from a groundwater licensee and trucked in.

5. What chemicals have been used

The chemicals used in each operation varies depending on the geology of the area where the work is to be carried out.

Companies wishing to do any exploration work are required to submit a list of fluids they intend to use for well control to the Regulator prior to conducting any work.

The Regulator must approve the list of chemicals before any work can be carried out.

It's worth noting that a ban on the addition of BTEX chemicals in hydraulic fracturing has been legislated in Victoria.

6. Which company did the work?

To sufficiently answer this question more information is needed about the particular operation.

7. How the waste water was processed?

Wastewater is stored on site while the work is carried out.

Once the operation is complete, the water is treated and disposed of as appropriate and in accordance with EPA standards.

If the water is tested and found to be of suitable quality for agricultural or other purposes that benefit the landholder, the landholder can request that the water remains on their property.

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