FLOOD PROOFING BRISBANE

from damaging floods to the point of extinction.
Flood mitigation in Ipswich and Gympie

Drought proofing South East Queensland

Submission to Queensland Floods Commission of Inquiry
February 2011

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In Conjunction with: Mr Trevor Herse, retired, gold Coast and Mr Ron McMah, Grazier, Imbil

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Submission to the Queensland Floods Commission of Inquiry *A*

Objections to the Borumba Dam proposal 25th July 2008 when being considered as an alternative to the Traveston Dam *B*
The fundamental flaw in calculation of water to the ecology *C*
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Chartered Accountant

[redacted]

Correspondence to:
[redacted]

28th February 2011

FLOOD PROOFING BRISBANE.
Reducing damaging floods to the point of extinction. ***A1***

Incorporating Flood mitigation in Ipswich and Gympie.

DROUGHT PROOFING SEQ

Associated topics that form part of the structure and are an essential part of the submission

Objections to the Borumba Dam proposal 25th July 2008 when being considered ***B***
The fundamental flaw in calculation of water to the ecology ***C***
Proof that the "Millennium" drought did not exist in the catchments and ***D***
Proof that our low dam levels were not caused by any drought ***D***

Letters to members of DERM form the base of "C" and "D". They were written to these members at the express request of Minister Robertson and Ms Mary Boydell F.C.A. the Water Commissioner that I communicate direct with them should I require any further information. Both the Minister and the Commissioner have received copies.

The letters fully state my position in relation to the fundamental flaw in the calculation of water to the Ecology. They also state my position that there was no drought in the catchments and include proof that the low levels of our dams were not caused by drought but the normal operation of our main water supply "uncommon events'. They are accompanied with backup evidence derived from official sources to support my conclusions.

Where "I" appears, it also represents the plural being Mr Trevor Herse, retired of the Gold Coast, Mr Ron McMah, grazier, of Imbil and myself. We worked together to have the Traveston Dam replaced by the Borumba Dam expanded. We had no interest other than as Citizens of SEQ. The Traveston did not proceed. However we recognized that the Borumba dam expanded was an ideal low cost backup for long periods without water replacing the proposed three desalination plants. The Water Commission showed no interest.

Containment of floods is presently on the minds of our leaders. The partial use of an expanded Borumba Dam for reserve supply would provide an important cog in containment of floods to the point of having damage extinguished.

Synopsis

The firm foundation of assessing flood inflow information has been established by the Water Resource (Moreton Plan) 2007 Act. The daily time-step computer program is written into the Act for the calculation of the ecology requirements. This in turn gives us an accurate inflow assessment particularly when dams and people were not present.

If our available capacities are inadequate to control the flood, then arguments over alternatives methods always present themselves. This is particularly so where "flash" floods are involved that come at the dam managers at speed. Without sufficient capacities, the managers have little influence on the outcome. Their prime concern then is not to allow the dam to fail.

With the pre-development flows prepared by the IQQM computer model, we are able to determine the volume of all floods from 1890 to 2000.

We will see that all floods were preceded by saturation rain that would have all dams at FSL. We will also see that the 1893(1), 1893(2) and 1974 major floods had similar heights using the constant measure of the Port Office gauge. The heights were 7.25m, 6.97m and 6.6m respectively. The 1974 flood was restricted by the 524,000ML flood compartment of the Somerset Dam

We will observe the competing influence of maintaining our dams at FSL. These "events" can vary from a fill of 20% to 300% as we have just witnessed. They do not come every year and have a historical average of 3.7 years. They are our main water supply far exceeding normal summer rainfall. They can appear at any time of the year.

To eliminate the impact of the 58.2% of the flood by delaying the contribution of the Wivenhoe/Somerset it is necessary to examine a reserve supply.

Having researched the expansion of the Borumba Dam for two submissions I believe we have a low cost holding structure capable of containing sufficient reserve supply to allow the release, if prudent, of all F S Levels of both the Wivenhoe and Somerset dams before those releases would impact upon flooding associated with the Bremer River and Lockyer Creek. It has capacity to serve us well into the future for both flood and drought.

We will observe that the largest flood in volume that we have ever experienced can be contained. It will reduce damaging flooding in Brisbane to the point of extinction and, in turn, reduce flooding in Ipswich and Gympie. Unfortunately it will not avoid the events in the Lockyer Creek area.

Introduction

By way of introduction, I have in the past lodged submissions on the proposed Traveston Dam and more recently a submission and addendum to the SEQWater Strategy. Contributions to that Strategy were opened to the public by the Queensland Water Commission after the demise of the Traveston proposal. All failed to gain acceptance.

What is different this time is that I have the pre-development flows calculated by the IQQM computer model for the Wivenhoe/Somerset dams.***A2.*** That computer program is recognized in the Water Resource (Moreton) Plan 2007 No 31 2007 and enacted on the 19th March 2007. It can be found on page 91 of that Act.

The pre-development flows, despite several requests, were only obtained after a meeting with senior DERM officers held on the 2nd February 2010, which was arranged by Mr Daniel Spiller, CEO of the QWC at that time. I was aware of a possible problem in the mathematics before the meeting. Attendees attached ***A3***

The pre-development flows (ex dams and people) reduces our core problems of drought and floods to one of mathematics. Rainfall statistics are taken out of the equation. They also give the Commission the ability to test the veracity of statements and information that may come before it.

The pre-development flows provide us with the ability to assess two important inputs to both flood and drought proofing. They are:

- The ability to assess the critical "mean annual flow" on which the 66% allocation to the ecology was based. It will determine the extent of the impact of the "skew" which occurred with the inclusion of large floods in that calculation and as a consequence of this permanent base calculation, the additional annual volume redirected to the ecology than was intended.

  The supporting notes of the Technical Advisory Panel (TAP) warn of the possibility of the "skew". It was the critical factor in rejecting consideration of the expansion of the Borumba dam as an alternative to the Traveston. It was claimed that no water was available for transfer and later return.

  We will examine this flaw. Rectification of this fundamental flaw is paramount to allowing the creation of an adequate reserve water supply for floods and drought. **In the case of floods it gives the Dam Managers the option of early major release to increase the withholding capacity.**

- The ability to determine the volume of all floods from and including 1893 to date. We will find that with a reserve supply of up to 1,500,000ML in the Borumba Dam, capable of being expanded to 2,000,000ML on engineering advice, will unlock the full supply levels decisions. This will provide in the region of 3,500,000ML withholding capacity.

  That is sufficient to withhold the largest volume being a surprising 1974 flood volume of 3,700,000ML. This volume surpasses either of the two major floods of February 1893.

  A reserve supply capacity of 1,500,000ML is the initial and once only creation necessary to maximize the Borumba Dam to its full potential. It is fully operational at 700,000ML

  In the case of early release, all of the water from the Wivenhoe/Somerset system is withheld until all other tributaries have cleared. The retrieval of most, if not all, of the early release water is

certain if the anticipated flooding rains are received.

Where early release is made in view of projected weather and it fails to eventuate, it is likely that no more than 50% of the Wivenhoe capacity, or one third of the Borumba reserve supply, will be needed to be drawn down.

In the case of drought, based on the last 120 years of Bureau records, a maximum of 500,000ML retrieval would have been required to maintain dam levels at 40%. This was for a period of three years and only happened twice in those 120 years. It was based on an annual yield calculation of 373,000ML ***A19*** and was made by the previous Water Strategy. That yield is well above the 286,000ML allocations made to date.

It also brings into play partial flood mitigation in Gympie

A practical application, and a subject of this inquiry, can be seen when applied to the 2011 flood if the early release option was available.

The total volume through the Wivenhoe/Somerset was 2,674,100ML or 229.5% of the Wivenhoe capacity. It is calculated by the well published releases plus the water in the dams over the FSL of 100% at a point at the back of the flood. The starting point was full dams. Mr Burrows of Seqwater has since confirmed the volume at 2,600,000ML. This volume is well below the 3,700,000ML of the 1974 flood.

This volume is well above the ability of the flood compartments when coming at speed. The dam managers said the inflow speed was double that of the 1974 flood and the evidence of Peachester seems to support this. Over a longer period, they may well have contained the flows in the Wivenhoe Somerset.

The non Wivenhoe/Somerset contribution to the flood is calculated by the IQQM computer at 41.8% (100%-58.2%). This represents a volume measured by the Wivenhoe capacity of 160.4%.

With capacities of up to 2,000,000ML available from the flood compartments of the Wivenhoe/Somerset Dam and up to 1,500,000ML released from the FSL of both dams, the total flow of the Wivenhoe/Somerset could have been held to the back of the flood with ease. The retrieval of the early releases would thus occur.

The early release would have allowed the Bremer River and Lockyer Creek to run free, thus mitigating the flood in those tributaries and the Brisbane River to a measure that I cannot say with certainty. However what can be said with certainty is that the Wivenhoe/Somerset volume is taken out altogether and released with no impact on Brisbane.

By way of comparison, the 1999 "event" was 2,000,000ML as shown on the pre-development chart or 171% of the Wivenhoe capacity. The dams were at 74.1% in the Wivenhoe and 43.6% in the Somerset. As it was a cyclone hovering off the coast, and with supporting rainfall figures in the catchments, it is reasonable to assume that the non-Wivenhoe/Somerset contribution was a stable 42%.

With the remainder of the FSL and the flood compartments, there was no discomfort or damage in Brisbane.

The other two main inputs to this proposal are:

- An essential ingredient to drought and flood proofing is the Borumba Dam. It is a hard rock natural amphitheatre the engineers say can be expanded to 2,000,000ML. We own all the land and a Dam already exists. It is 60klm "over the hill" in the Mary Valley. It is the only remaining natural resource that is not a National Park.

- The recognition and confirmation by Mr Rob Drury, operations manager of SEQWater, of the part that low pressure systems play in our water supply. They are our main water supply. There is clear evidence that this is not understood. This factor can have a major adverse influence on the preparation for drought and floods.

All of these ingredients combine to give us the opportunity to control all major floods, including those of the size of the two 1893 major floods, almost to the point of extinction. They also provide worthwhile SEQ drought backup over an extended period.

Flood proofing

With the use of the pre-development flows it now becomes mathematical as to what volumes we are dealing with and what we have available to control them. Mathematically the flood height must have some relation to the speed of flow. This is borne out by the following evidence. The flood height can be deceptive in control analysis that I have in mind.

Major floods covered by the pre-development flows

1893 (1), 1893 (2) and 1974

Because the pre-development flows are expressed in years, it is necessary to make estimates of minor floods that occurred in the same year based on rainfall. These flows were calculated by the IQQM computer model on a daily time-step and individual floods can be determined where one or more floods occur in a year. These estimates can be checked with Ms Alma Mahmutovic, principal Hydrologist, Water Planning Sciences Environment and Resource Sciences DERM. They do not interfere with the overall assessment of this submission.

This graph measures volumes from the base to the top red mark. *A2*

1890 was also included. The Bureau information seems to indicate multiple floods and a flood volume the same as 1974. Apart from rainfall of 385mm recorded in March by station number 40075 in the Upper Brisbane River catchment, I have no further information. I have not included it in my observations.

1974 The volume recorded in the predevelopment flows is 4,300 giga-litres. There is also high rainfall activity in the month of March 1974 and I have made an estimate of 600 giga-litres leaving 3,700 gigalitres of inflow for that flood. This, of course, can be checked as listed above. The height of that flood measured at the Port Office was 6.6 metres and 5.4 metres at the City gauge. The Port Office gauge is a constant in these measurements.

The 1974 flood was restricted by the 524,000ML flood compartment of the Somerset Dam

1893 There were 4 floods in the volume of 7,500 gigalitres in the pre-development flows. Again there were two floods of minor flood heights at the Port Office gauge of 3.0 metres and 4.0 metres. Deducting these two floods we are left with 6,000 gigalitres for the two major floods. I record these floods for distinction as floods 1893 (1) and 1893 (2). ***A5***

The height of these two floods at the Port Office were 1893(1) 23 feet 9 inches or 7.25 metres and 1893 (2) was 22 feet 10 inches or 6.97 metres. These measurements were supported by local reporting backed by Bureau flood information. You will note, however, the Bureau of Meteorology assessment of the 1974 flood attached ***A4*** has the heights above 9 metres. The heights above 9 metres conflict with the available flow volumes calculated by the IQQM computer model.

On a "height" basis there is an even split of 3,000 gigalitres. However 1893(2) may have come in on the back of the minor flood that occurred between them. This may increase the allocation to 1893(1) and reduce the allocation to 1893(2). However there is little possibility of the 1893(1) exceeding the volume of 1974 volume of 3,700 gigalitres.

A timeline of events drawn from Bureau and other available information is attached. ***A5***

2011 This flood is not included in the pre-development flows. However we have accurate reporting on releases from the dams which were at 100% before this flood. The releases plus the levels beyond 100% at a particular point at the back of the flood, gives us a volume of 2,674 gigalitres.

The height at the Brisbane reach was 4.6 metres compared to 5.4 metres in 1974. Bureau information on 1893 and 1974 is related to Port Office heights. As we are dealing with Port Office measurement, a rough conversion is in the region of 5.2 metres at the Port Office.

Height and volume

The pre-development flows have shown us that height does not necessarily mean increase in volume. The speed of the delivery of the flow seems to increase the height as more water is squeezed through the same flow area.

The 2011 flood showed that there is some evidence of this. The local flow chart of Peachester on the Stanley River is attached. ***A6*** The dam managers' reaction to this kind of general information from all tributaries was to release 52% of the Wivenhoe dam over the Tuesday night. The reaction of the Bureau/hydrologists was to predict a Brisbane River height greater than 1974 flood.

The reduced flow at Peachester quickly invoked a revised down estimate of height and the release flow from the Wivenhoe dropped to around ¼ of the 52%. The dam managers explained, and Seqwater dam levels supported them, that releases were matched with inflow.

From general observation it appears that the other downstream tributaries of the Brisbane River displayed the same characteristics with devastating impact.

The evidence points to the fact that the 1974 flood was not the usual flood experienced by all known floods. It was longer and double headed. It should also be borne in mind that although the FSL of the Somerset was not available through saturation rain, the flood compartment of 524,000ML was available and most likely used.

The absolute evidence, that 1974 was the highest in volume but marginally lower than any of the 1893 floods in height, allows us to reach a conclusion on prior floods. The 1841 flood was of similar height and

referred to in Qld Parliament (1893) as 7 inches above 1893(1). The reported archeological find of 5.5 metres above 1974 level was up river at Indooroopilly and difficult to determine. However the Bureau reports that a Port Office measurement of 5.5 metres converts to 14 metres at Jindalee. So that sort of evidence may see the height of that event reduced to something under 1893(1).

If correct then all known floods of Brisbane are controllable to the extent of total delay of the water from the Wivenhoe/Somerset. More information is required before this statement is understood.

Saturation rain before floods

Saturation rain before all floods 1893 to 2011 is well documented. In 1893 the headwaters of the Stanley River received 2.6 metres of rain in 26 days staring on the 21st of January 1893.

This means that for the Wivenhoe/Somerset dams, if they had been in position, full dams would have been the staring point for dam managers.

Wivenhoe/Somerset Dams are for storage and flood mitigation.

The Chief Supervising Engineer in the construction of the Wivenhoe Dam assured me that the Wivenhoe Dam was both a storage and flood mitigation dam. The point of this examination is that there was then and still is little scope for the dam managers for early release of our drinking water at full supply levels of the Wivenhoe/Somerset dams.

We have seen heavy discussion on this point in the press with Minister Robertson taking advice from the dam managers. The Minister has decided to release 25% of our drinking water with very little backup.

For clarification of this point the importance of the dams being maintained at 100% level needs examination.

Our main water supply

There is confusion on this point. We see in the Water Strategy the departure from the normal HYNF assessment of the yield in the dams to a stochastic approach. Stochastic is defined in the Macquarie dictionary as "Conjectural" and in Wikipedia the cynics reduce it to "Best guess under the circumstances".

SEQWater, the previous Dam Managers, under the Chairmanship of Mr Bob Grice F.C.A. in their Annual Reports of 2001 and 2002 had the yield from the Wivenhoe/Somerset at 446,000ML annually ***A20***. The first Water Strategy had the HYNF at 373,000ML. ***A19***

The last attempt at stochastic approach firmly fixed all water allocations at the existing 286,000ML. This effectively reduced this massive infrastructure to the equivalent of 6 desalination plants of the Tugun size.

These points should leave no one in doubt that those in charge did not, but may do now, understand our main water supply.

Mr Rob Drury, the operations manager of SEQWater, on the 10th February 2007 made a clear statement that it required large "uncommon events" to fill these large dams. A copy of the article is attached. ***A7***

I have compiled an analysis of floods that register on the Bureau height scale coupled with their flood

information. This is, in turn, overlaid with the average rainfall figures from most of the operational rainfall stations in the catchments of the Wivenhoe/Somerset. ***A8***

The outcome is, as Mr Drury suggests, that they do not come every year. The schedule shows that they come on average every 3.7 years with the majority below that average. It is a mathematical certainty that those above can be quite lengthy but eventually they do reappear.

The attached dam level graph provided by Mr Drury shows that "summer rain" December to March was totally inadequate in meeting demand from as far back as 1992. It shows the continued decline at a steady level throughout the life of the Wivenhoe until the appearance of one of Mr Drury's "uncommon events" which refilled the dam. ***A9***

The period 2001 to 2007 was depicted as a "drought" on the basis of a statistical aberration. That aberration being a "decile" map as the catchments had never received less than 80% of the long term average in comparable 6 year lots. The "percentage" map for the same rainfall and period of time showed 80% of the long term average. ***A10*** ***A11***

Rainfall stations in the catchments revealed that 52% of all rainfall occurred in the "summer" months December to March. In those months the Wivenhoe catchment had received 99.1% of the long term average and the Somerset 91.4% of that average. The 20% deficiency was in the 8 non summer months that rarely produce inflow. ***A12*** ***A13***

The situation was retrieved by a series of minor low pressure systems that caught the Somerset catchment but did not come west enough to catch the Wivenhoe catchment.

Premier Peter Beattie, supported by the then Deputy Premier Anna Bligh, had extensively promoted the "decile" map to every household in SEQ as the reason for the depleted dams and that the Traveston proposal was a necessary item to our water security. Premier Beattie addressed a public meeting in Gympie on the 14th September 2006 where the Borumba Proposal was put to him by Ron McMah. An inspection of the dam site followed.

Ron McMah's comments on Premier Beattie's apparent indifference to the proposition are contained in paragraph two (2) of page three (3) of his submission to the Senate Inquiry into the Traveston Crossing Dam. Reference http://wivenhoesomersetrainfall.com/Borumba dam.htm (Note: there is an underscore between Borumba and dam)

At a further public meeting in Gympie on the 3rd November 2006 the newly appointed Minister for Infrastructure Anna Bligh gave an iron clad guarantee that it would be assessed and if viable would be the way that they would go. The implication of those reports without agreed terms of reference are throughout this submission.

Premier Bligh departed from her previous hydrological stance of a "decile" map to adopt a "social" stance on drought relating it to dam levels. She declared her drought over in September 2009 with the Bureau records showing no drought in the catchments and rainfall above average for the previous 24 months. ***A14*** ***A15***

This "millennium" drought and its intrusion into planning is more fully dealt with in the attached letter to Mt Tad Bagdon, Acting General Manager Regional Planning and Policy QWC. I was directed by Commissioner Mary Boydell F.C.A. to direct queries to Mr Bagdon. The Commissioner received a copy. ***D1***

The present "drought proofing" main artillery are the Tugun Desalination Plant and the Recycled water Plant. The Tugun desalination plant output will take 34 years to fill the Wivenhoe/Somerset from scratch if no water is taken out. On the same basis the recycled water would take 36 years based on the recent comments by Premier Bligh of 115ML a day. It is not universally supported for drinking purposes.

As we have seen "uncommon events" can fill our dams from 20% to 240% in a few days. The attached graph ***D14*** of the Wivenhoe Dams show that "summer rainfall" has been totally inadequate since 1992. The largest inflow generated from summer rain was in the so-called drought period in December 2003 to March 2004 when a 15.6% fill occurred. The rain fell evenly over both catchments, which is unusual, and permitted a general observation of the comparative efficiency of both catchments.

Therefore, after consideration of the above, the dam managers, with no water storage back-up, have no ability to confidently apply early release of sufficient volume to make a significant difference in controlling both volume and flood height.

With respect, I see that I have a way to go in convincing the Commission on these points in view of the following extract from your website:

"WRITTEN SUBMISSIONS RELATING TO ISSUES OF FLOOD PREPAREDNESS RELEVANT TO **NEXT SUMMER'S WET SEASON** (PARTICULARLY DAM OPERATIONS, EARLY WARNING SYSTEMS AND RESPONSES) ARE TO BE RECEIVED BY THE COMMISSION BY 5.00PM, 11 MARCH 2011." (*NEXT SUMMER WET SEASON IN BOLD FOR EMPHASIS BY ME*)

Our main water supply is "uncommon events" and they pay little heed to time of year. With the "wet season" December to March, examples outside of those months are April 1988 and April 1989 events which filled the dam to overflow and afforded support for the policy to cancel the Wolfdene dam. July 1992 and May 1996 which refilled the dams are further examples in the short life of the Wivehoe Dam. Two other most recent events outside those months were May 2009 and October 2010.

However the four major floods were in the months of January and February.

The Borumba Dam

It is a current small dam of 45,000ML capacity

It is the last remaining natural resource for holding of water supplies that is not a National Park.

It is hard rock granite country with deep water storage exposing a much smaller area for evaporation.

We own all the land

No infrastructure replacements.

It is 60klm from Wivenhoe "over the hill" in the Mary Valley

To maximize the Dam's capabilities we say expand the dam to 2,000,000ML. The QWC Water Strategy has a dam of 350,000ML in mind. This will allow the normal operation of the dam for expanding requirements in the Mary Valley. Therefore the storage capacity is the balance being 1,650,000ML.

This storage capacity is well above the requirements to control floods and drought. In the next few paragraphs we will see that the requirement to flood and drought proof is less than 50% of that storage

volume. In the case of drought, it allows for extremes of climate not yet experienced in our records.

While a reserve supply of 1,500,000ML is the initial creation to maximize the Borumba Dam, in the case of early full release, all of the water from the Wivenhoe/Somerset system is withheld until all other tributaries have cleared. Upon receipt of the "uncommon event" retrieval of most, if not all, is certain. Where early release is made in view of projected weather and it fails to eventuate, it is unlikely that more than 50% of the Wivenhoe, being 600,000ML or approximately one third of the reserve supply, will be needed.

In the case of drought, based on the last 120 years of Bureau records, a maximum of 700,000ML retrieval would have been required to maintain dam levels at 40%. This was for a period of three years and only happened twice in those 120 years. It was based on an annual yield calculation of 373,000ML and was made by the previous Water Strategy. That yield is well above the 286,000ML allocations made to date.

This was the subject of my "addendum" to the Borumba Dam lodged with the QWC. It can be observed at http://wivenhoesomersetrainfall.com/borumba_addendum.htm It also brings into play partial flood mitigation in Gympie. (There is an underscore between Borumba_addendum.htm)

Engineers J W P Engineering Pty Ltd costed a dam wall to 1,650,000ML including a hydro plant and two saddle dams. The costing is attached at $1.397 billion. It is calculated in three stages to coincide with the three stages of the Traveston proposal. The construction we propose would be in one stage only to 2,000,000ML, most probably costing a similar amount after deleting the additional setting up costs incurred in a three stage project. ***A21***

Pumping consideration matrices were provided to us by the chief Supervising Engineer in the construction of the Wivenhoe Dam. Pumping transfer rates up to 4,000ML a day are possible. That Engineer provided an "heroic" cost assessment of $500 million. A check on the cost of pipes at his suggestion seemed to support that cost.

As we have seen, the volume required in the Borumba Dam is 700,000ML to have the system fully operational. This can be transferred in less than 6 months. In practical terms it may take a few years depending on the activities of our main water supply, "uncommon events". Beyond that point a combination of water from the Borumba Catchment in times of "uncommon events" and surplus from the Wivenhoe/Somerset in "uncommon event" times could be used to complete full reserves for future needs.

The water resource plan for the Mary River requiring 84% to reach the River mouth must be borne in mind. We are told that the current percentage is 90% reaching that River mouth. That Water Resource Plan has not been examined for 'skewed" results.

My rough calculations show that the Yabba Creek, on which the Borumba Dam is located, provides approximately 34% of water that floods Gympie. With thoughtful dam management, that water could be withheld.

Should the rejection of the Borumba Dam over the Traveston invoke your curiosity, the objections and answers are attached. We were successful in having Mr Graham Newton, the then CEO of Water Infrastructure Pty Ltd, publicly list his objections to the Borumba over the Traveston. His public objections and my response are attached. ***B1***

The number one objection was the denial of available water from the Wivenhoe/Somerset system. His objection was supported by a fundamental flaw in the Water Resource (Moreton) Plan 2007 extensively discussed in this document and attachments.

Engineers GHD in their desk-top review of 2006 considered the raising of the Borumba Dam wall to 1,000,000ML sufficient for its own small but efficient catchment. It starts on page 532 of that report.

Our proposal is for a 2,000,000ML expansion, or higher if the engineers and planners recommend. This permits the normal operation of the Dam with the Water Strategy in mind. It provides the necessary reserve for the Wivenhoe/Somerset to permit full mitigation of the Wivenhoe/Somerset to 3,500,000ML, allowing the Dam Managers access to all compartments of the Dams.

Availability of water from the Wivenhoe/Somerset for storage and later return

The general statement by DERM officers at meetings on the 21st January 2009 and 2nd February 2010 was "you cannot take water out of the Wivenhoe/Somerset system". The Act was held up and waved at us to convince us on both occasions.

Well, we interpret the Act as saying that you can take water out of the system for later return. This is the process that we envisage. In any event the Act, after careful consideration, may be amended to accommodate that process if required.

The Act also specifies:

- That 66% of the mean annual flow must reach the Brisbane River mouth. **(WRP page 64 node E, page 72 node E column 3)**
- The once only calculation of the mean annual flows was based on the simulation period 01/07/1889 to 30/06/2000. **(WRP page 93 definition)** ***A22***
- The Act also defines the computer program that does the calculation. **(WRP definition page 91 definition)** That program also provides us with the contribution of the Wivenhoe/Somerset which is 57% of the total flow at the Brisbane River mouth.

The accompanying notes provided by the Technical Advisory Panel (TAP) advise:

- That the presence of large floods in the calculation would "skew" the result. ***A16***
- That the simulation period selected was for approximately 110 years. ***A17***

Unfortunately the TAP was not adequately diligent in this regard and, whilst warning of the potential to arrive at "skewed" results, did not specify the years of the "Simulation period". The Act was drafted with the 1890, 1893 (2 majors) and 1974 included.

The result of the practical application of that once only permanent calculation when applied to the 112 years, post 1893 floods, 1894 to 2006 and excluding 1974 is that the actual percentage became **78 percent**. An additional 160,810ML annually would have been diverted to the Brisbane River. No matter how one may attempt to rationalize the 66%, the practical application on all remaining years in the pre-development flows plus updating 2001 to 2006 is **78%**. ***A18*** *(calculation of "skew" with 1974 flood in 132,345ML)* ***A18*** *(calculation of "skew" with 1974 flood out 160,810ML)*

This further 160,600ML available for consumption means that water can be included in the transfers to the Borumba Dam for storage.

This faulty definition of the "Simulation period" must be corrected. Strangely, senior TAP members are silent on the matter despite two attempts to have two senior members explain.

Minister Robertson has suggested that I bring the matter up in 2017 when the Act is up for review. He suggests that there had been sufficient time for public review. I raised the circumstances that the Borumba Dam was under consideration and our proposal was not resolved by independent investigation specifically because of this flaw in the Act.

The **Act is fundamentally flawed** and to allow it to remain in its present form is an impost that will cost the citizens of SEQ billions of dollars. By 2017 three more expensive desalination plants will be in progress and the footings at the Borumba Dam will then not accommodate the larger dam wall.

It will block the creation of the adequate reserve supply in the Borumba Dam for effective flood mitigation purposes. If this occurs, the opportunity to block the damaging flood waters will be lost. The current costing for the 2011 flood is said to be in the Billions of dollars. The Borumba proposal would cost around the price of one Tugun sized Desalination Plant.

This fundamental flaw is more fully explained in the accompanying letters to Mr Daniel Harris and Minister Robertson.

Website

While the foregoing is straightforward, the underlying base is complex. To assist my friends and associates' understanding of this complex matter, I created an elementary website. It became more refined as information came to light. Many residents of SEQ have accessed this site and a grain of understanding of the problems that the Commission will be examining is being achieved.

The website is http://wivenhoesomersetrainfall.com

Conclusion

Where "we" appears it relates to Mr Ron McMah grazier from Imbil, Mr Trevor Herse retired of the Gold Coast and myself also retired. The Borumba Plan was the plan put to Premier Beattie at a public meeting in Gympie on the 14th September 2006. Deputy Premier Anna Bligh was queried about the plan again at a Public meeting in Gympie on the 3rd November 2006 by Ron McMah

Ms Bligh, then Infrastructure Minister, gave an iron clad public guarantee to that meeting that it would be investigated and if it stacked up it would be done.

However, the Borumba Dam expansion to a 2 million ML capacity with two way transfer piping between Wivenhoe and the expanded Borumba **has never been independently evaluated**. The Government's actions instead relied on Hydrology and Engineering reports that commenced with "advice" that no water was available under the Water Resource (Moreton) Plan 2007. They also included the very expensive Weirs in the Mary Valley for only a handful of megalitres. They not needed and are no longer part of the proposal.

We believe we have demonstrated that adequate water is in fact available for this proposal if the 66% provision required by the Act for the ecology is fairly calculated as the TAP intended.

If the TAP warning notes relating to "skewed results" had been heeded and the Act had been drafted to ensure that warning was provided for when specifying the relevant "simulation period", then today we would have different outcomes. The Traveston debacle would have been avoided. The additional expensive desalination plants would not be necessary and flood and drought proofing in SEQ would be well underway.

You would have gathered from the forgoing that my view of the control of SEQ water supply is one of complete misunderstanding by those in control since the inception of the Wivenhoe Dam. It has cost us Billions of dollars so far in infrastructure. The lack of a suitable back-up water supply has had a significant bearing on the damaging flood of 2011 in Brisbane and Ipswich. That back-up water supply would be a more cost effective answer for drought mitigation than proposed additional desalination plants.

I wish the Commission well in its enormous undertaking to be completed in such a short time.

..
John Vincent Hodgkinson F.C.A.

Attachments (refer to Index)

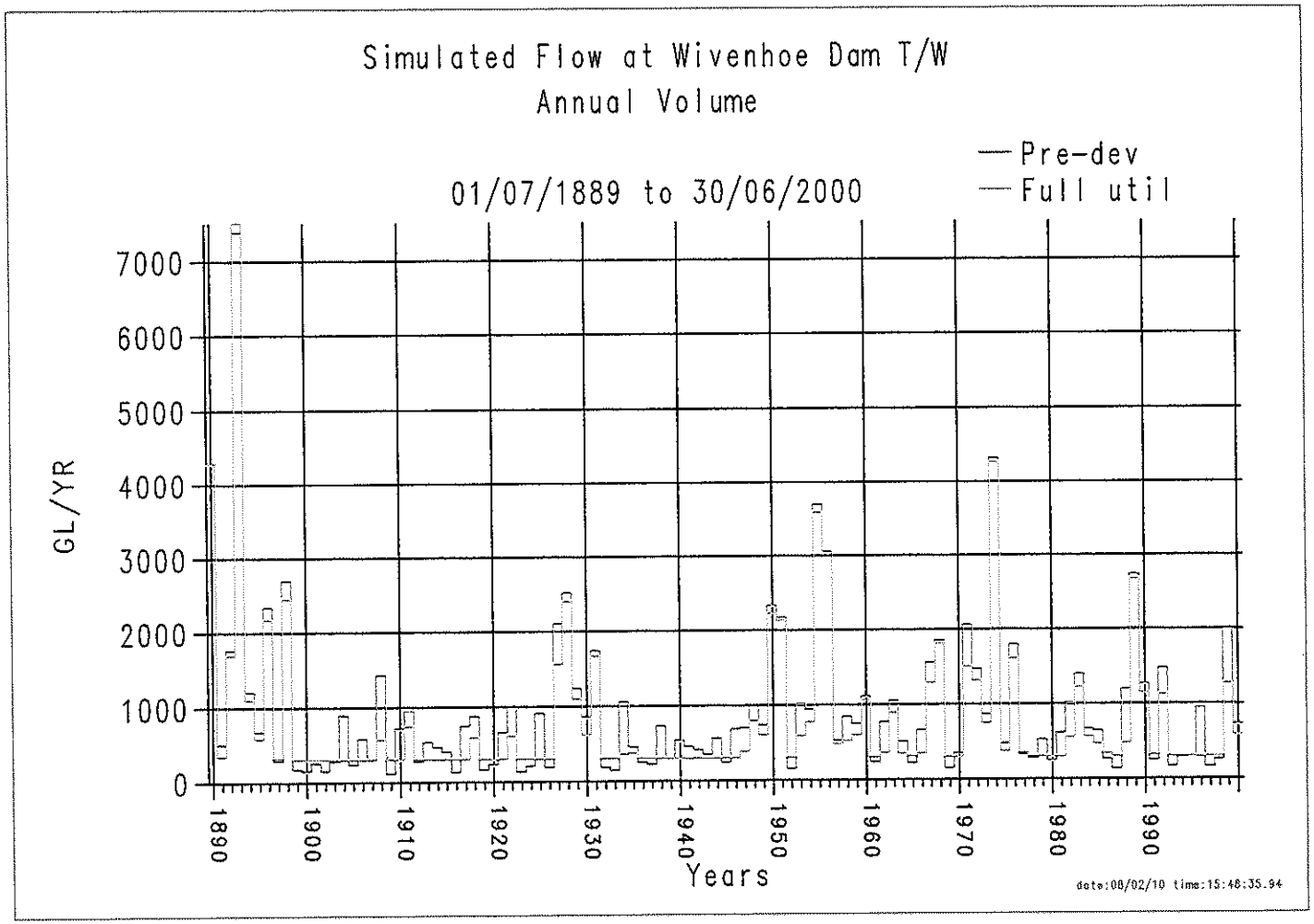


Figure 1: Annual flow volume simulated at Wivenhoe Dam TW for pre-development and full utilisation of existing entitlements scenario

A 2

John Hodgkinson

From: [redacted]
To: "John Hodgkinson" [redacted]
Cc: [redacted]

Sent: Wednesday, March 03, 2010 11:43 AM
Subject: RE: Minor refresher queries

Dear John,

Sorry I could not get back to you earlier. I hope you enjoyed your break.

I will reply to your first questions in this e-mail and I will cover other issues later on.

(1) You are right, the mean annual flow at the Brisbane River mouth for pre-development scenario is 1,641,331 ML/a. This value is based on data from 01/07/1889 to 30/06/2000.

(2) I remember us comparing flows at different sites for various scenarios, but I can not exactly reproduce this figure. I will provide a comparison of flows for a certain site for different scenarios for you and I will also provide a ratio of flows simulated at a particular site and the Brisbane River mouth for a particular scenario. Hope that will answer your question.

- Ratio of flow volume downstream of Mt Crosby Weir simulated for future development scenario and pre-development scenario expressed as is percentage is 58.0%
- Ratio of flow volume downstream of Mt Crosby Weir simulated for existing development scenario and pre-development scenario expressed as is percentage is 58.62%
- Contribution of catchment upstream of Wivenhoe Dam as a percentage of the flow at the river mouth for pre-development scenario is approximately 56.5%.
- Percentage of flow simulated downstream of Mt Crosby Weir compared to the flow simulated at the Brisbane River mouth for future development scenario is 62%.

I am not sure which graph you would like to see. I have provided graphs showing annual flow volumes at Wivenhoe Dam tailwater for different scenarios for the period 01/07/1889 to 30/06/2000 in my first e-mail. Would you like to see similar information for another site?

I will check the period of data used in assessments that Gilbert and Assoc. conducted for the Mary catchment and get back to you next week.

Let me know if you have any other questions.

Regards,

[redacted]

Principal Hydrologist, Water Planning Sciences
Environment and Resource Sciences
[redacted]

www.derm.qld.gov.au

Department of Environment and Resource Management
Location: South Wing - CSIRO, 120 Meiers Rd, Indooroopilly

A 2

Post [redacted]

From: John Hodgkinson [redacted]
Sent: Monday, 15 February 2010 2:36 PM
To: [redacted]
Subject: Minor refresher queries

Dear [redacted]

I am back from fishing and had a chance to have a good look at the information. Thanks again.

So that I am on the right page, a small refresher for me.

(1) The pre-development Mean annual flow at the Brisbane River mouth is 1,641,311ML

(2) The Wivenhoe/Somerset contribution is 58.2% or have I got that the wrong way round?

I was interested to see the graph starting at 01/07/1889 and finishing at 30/06/2000. It is in the Act as the simulation period.

The QCCCE had difficulty in producing their "Drought to 2007" due to lack of data in the Federation period. In fact they compared rainfall of the "Federation period" with the recent period of our depleted dams 2001 to 2007. They acknowledged that a hydrological assessment would be more precise. My view is that they would have had a different assessment.

A check on the rainfall stations show that 2 were operational in the 1890 flood and 3 operational in 1893 for the flood.

The Gilbert and associates Hydrology report carried out by the Govt started in 1900 and finished in 2000. This report was conducting an assessment of the expansion of the Borumba dam and the feasibility of inter-dam transfers.

So it does not appear to be a "hydrology convention" for estimates on SEQ.

All this does not have any effect on the IQQM figures. The QCCCE has not realised that they are available although they appear in their contribution to the SEQWS mark 1 and 2. The Gilbert report is no longer relevant.

It just shows that different people have a different view on things.

Best Regards

John Hodgkinson

As of 26 March 2009 the Department of Natural Resources and Water/Environmental Protection Agency integrated to form the Department of Environment and Resource Management

+----------+

A 2

Think B4U Print

1 ream of paper = 6% of a tree and 5.4kg CO2 in the atmosphere

3 sheets of A4 paper = 1 litre of water

+----------+

Queensland water Commission

Securing our water, together.

Our ref: ME/10/0037

18 JAN 2010

A 3

Mr John Hodgkinson
[redacted]

Dear Mr Hodgkinson

Thank you for your letter of 11 January 2010 concerning a meeting with representatives from the Queensland Water Commission (QWC) and the Department of Environment and Resource Management (DERM) on 2 February 2010.

The meeting will be held at 120 Meiers Road, Indooroopilly, as indicated by the red cross on the map I have enclosed. Parking is available at this location. Please enter via the reception desk and ask for [redacted] If further directions are required, please contact [redacted] and ask for [redacted]

Attendees at this meeting will include:

- [redacted] Director Water Assessment, DERM;
- [redacted] Director Water Planning (South East), DERM, currently on secondment to QWC in the role of Director Water Strategy;
- [redacted] Principal Project Officer, Water Planning (South East), DERM; and
- [redacted] Principal Policy Officer, Infrastructure Implementation, QWC.

[redacted] Acting Executive Director, QWC, will be unable to attend the meeting due to another commitment and sends his apologies.

You may wish to forward an outline of any specific questions or matters that you would like to raise at the meeting so that the hydrologists may have material at hand to assist in their response.

If you require any further information, please contact me on [redacted].

Yours sincerely

[redacted]

pp [redacted]

Executive Assistant to the Senior Director
Regional Planning and Policy

Also Present

[redacted]

Principal Hydrologist, Water Planning Sciences
Enviroment and resource Sciences

Enc (1)

Queensland Water Commission
PO Box 15087 City East Qld 4002
Ph: +61 7 3227 8207 Fax: +61 7 3227 8227
ABN: 65 242 908 036 **web: www.qwc.qld.gov.au**

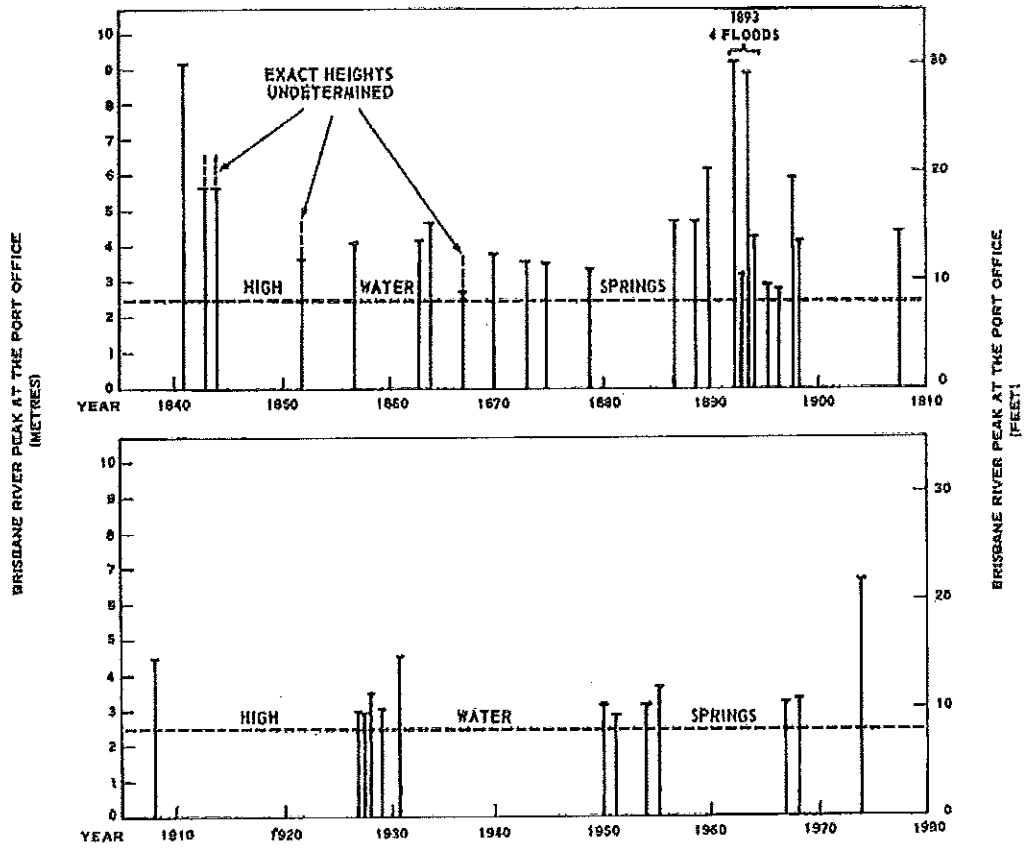


Figure 2: Floods at the Brisbane Port Office from 1841 to 1974.
(Heights referenced to Brisbane Port Office datum.)

Table 1: Occurrence of floods exceeding 2.74 m at the Brisbane Port Office between 1841 and 1974*.

Month	Number	Month	Number	Month	Number
Jan	10	May	1	Sep	0
Feb	9	Jun	3	Oct	1
Mar	7	Jul	1	Nov	0
Apr	4	Aug	1	Dec	0

Because of changes in the physical characteristics of the river and its catchment, it is very difficult to calculate return periods for flooding in Brisbane. However, four floods well in excess of the 1974 levels have occurred in the past 133 years

A 5

FLOODS OF FEBRUARY 1893 - TIMELINE

1893	Date	Day							
			107.6 inches at Chromhurst in 27 days						
			(Headwaters of Stanley River)						
January	21		Cyclone passed over Brisbane						
	22		causing damage to ships and Buildings						
	23								
	24								
	25								
	26								
	27								
	28								
	29								
	30								
	31								
February	1								
	2	1	Wikipedia - First and only mention of start						
	3	2							
	4	3	Greatflood 8' water at Edward Street & Courier corner (BOM)						
	5	4	Indoorpily rail bridge washed away						
	6	5	Victoria Bridge destroyed					**Feet**	**Inches**
			Water rose 23' 9" above spring tide					23	9
	7	6	Flood waters subsiding						
			(Reading of the Brisbane Courier intent appears "almost gone")						
	8				Converts metres				**7.25**
	9				PORT OFFICE				
	10								
	11								
	12								
	13		Flood	No further comment by Bureau					
	14								
	15								
	16		More rain furher flood predicted						
	17	1	Flood						
	18	2	"Elamang floated off the Botanical gardens						
	19	3	Gunboat "Paluma" safely floated off gardens						
			Another span Indoorpilly rail bridge washed away						
			Third flood reached maximun height 12 noon 10" below firstflood						
								Feet	**Inches**
Sunday	20	4	Peak (Brisbane Courier)			3PM		22	10
Mon	21	5	Flood waters subsiding						
Tues	22		Tues morning Drop 16ft 10"		35 hours	2AM		-16	-10
				Above ordinary high				6	0
				water springs					
								22	10
					Convert metres				**6.97**
					PORT OFFICE				

5/2/1893	The Indooroopilly railway bridge washed away by the flood. Heaviest floods known in Brisbane and suburbs.
6/2/1893	The lower part of South Brisbane completely submerged. The flood rose 23'9" above the mean spring tides and 10 feet above flood mark of 1890; north end of the Victoria Bridge destroyed.
7/2/1893	Flood waters subsiding. Sydney mail train flood bound at Goodna, unable to either proceed or return.
13/2/1893	Second flood for the year in the Brisbane River.
16/2/1893	More rain in the south east districts; another rise in the Brisbane; further floods predicted.
17/2/1893	A third flood occurred in the Brisbane River for the year.
18/2/1893	The 'Elamang" floated off from the Botanical Gardens. Business at a standstill in Brisbane. Ipswich and other towns. **Several deaths by drowning reported**.
19/2/1893	The gunboat "Paluma" safely floated off the Gardens, and the "Natone" off Eagle Farm flats. Another span of the Indooroopilly railway bridge carried away. The third flood reached its maximum height at 12 noon, viz. 10 inches below the first flood.
21/2/1893	Flood waters subsiding.
11/6/1893	Flood waters of the Brisbane River still rising.
10/6/1893	A fresh in the Brisbane River.
12/6/1893	Flood at Brisbane reached a height of 10 feet 10 inches above low water or 1'4" above the level of the flood of 1887; water stationary at 10 am.
28/2/1907	Brisbane: Considerable rise in the Brisbane after the recent heavy rains; immense quantities of water hyacinth washed down to the city reaches of the river.
15/3/1908	At Brisbane the river rose to 14'8 1/2" above low water springs. Serious flood at Rosewood.
Mar 1908	Esk: Heaviest rain and floods since 1903. All traffic practically suspended for many days. Extraordinary season. Goodna: River Height at 2 pm 15th 38'4". Harrisville creeks all bankers 13th to 17th and all low lying lands flooded. Ipswich: Bremer River in flood rose to 48'. Laidley: Excessive rains throughout district from 14th to 17th cause local floods and washaways and some damage to crops. Pinkenba floods in river, and half of Pinkenba under flood for three days. Redbank: Flood covering all low lying lands. Rocklea: Owing to heavy rains on 14th and 15th, flood prevailed in this district but did not reach quite as high as 1903 flood.
Mar 1910	Crohamhurst River constantly in flood. Esk: River 12' over normal. Goodna: Slight fresh during month. Cedar Pocket: Creek in a continual fresh. Harrisville: Warrill Creek in flood twice.

A 5

THE FLOODS.

RECEDING OF THE WATERS.

REPORTS OF FURTHER DAMAGE.

DESTRUCTION OF LOGAN RAILWAY BRIDGE.

THE SECOND FLOOD AT IPSWICH.

RAILWAY SERVICES.

LATEST FROM THE BRISBANE WATERSHED.

MR. WRAGGE'S FORECAST.

The flood waters have continued since last report to steadily recede, and at noon yesterday they had fallen 6ft. 2in. below the highest point reached on Sunday. The weather, however, was intensely cloudy and humid during the day, and early in the evening steady rain again set in, continuing up to the time of our going to press, at 2 a.m. At that hour, on inquiry at the Port Office, we learned that the water had dropped a total of about 16ft. 10in. since it began to fall on Sunday afternoon. The level was thus 6ft. above ordinary high water springs.

ment being made to get a bridge fr
street. He had been told that this wa
be a temporary structure, but if a
structure was erected there it would be
with an idea for safety, and would cos
sum of money. Once such a bridge wa
it would remain in use for a number
If it was possible to put up a wooden
above the present site, it would be bet
sidering finances, to complete Victori

The Mayor said that Mr. Brady had
Colonial Secretary that the remaining
Victoria Bridge was unsafe; but as it
second flood he believed it must be sa

Mr. Lutz seconded the motion for
of discussion. The remaining part of
Bridge had yet to be proved unsafe,
required an expert's opinion. He took
the permanent structure of the future
built at the present site of Victoria
(Hear, hear.) The question was—Wha
be done in the meantime? Rather in
to a structure very far above Victori
he would support a bridge below it.
the Joint Board would consult the
authorities, and this would take some t
the meanwhile he did not see why the
should be put to any greater incon
than was absolutely necessary,
temporary work should be erected as
as possible. From a cursory examin
though the Victoria Bridge was safe,

Mr. Hardgrave said the north si
take good care that the structure sh
erected at the Victoria Bridge. He
the motion might be withdrawn, and
left to be settled by the Joint Board.

Mr. Jones thought the representativ
council on the board should be given t
stand that the council wished to h
bridge erected on the site of the

A 5

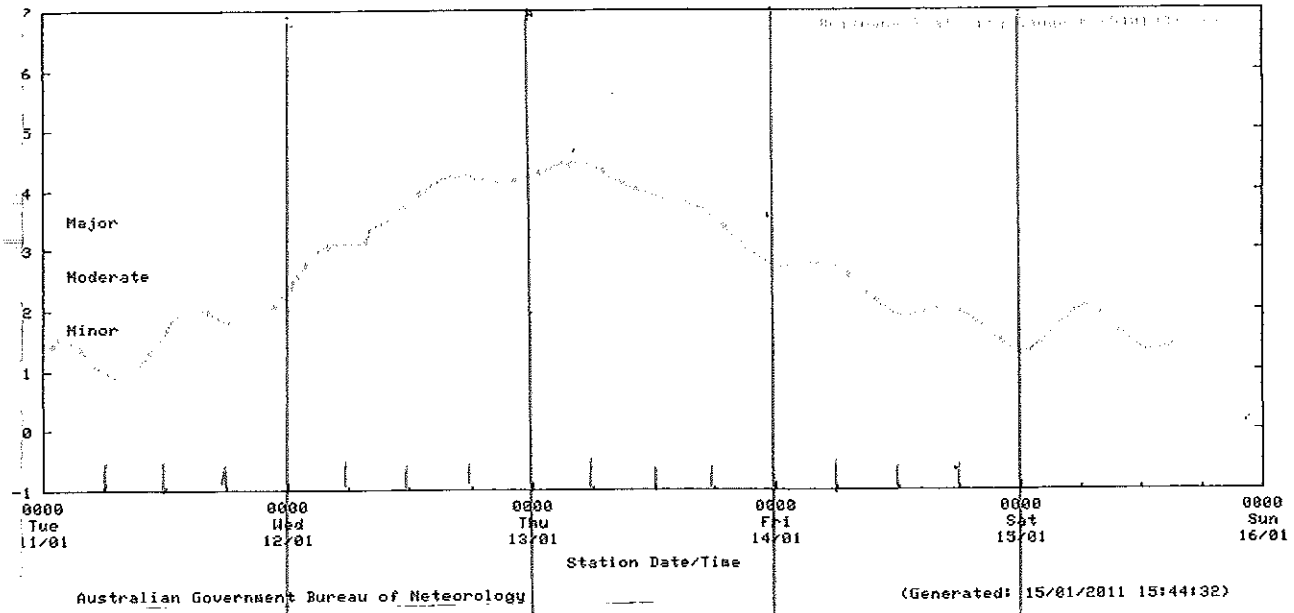
est River Heights for Brisbane R at City Gauge

ued at 3:44 pm EST Saturday 15 January 2011

bout river heights plots | About this Plot

n details: Station Number: 540198 Name: Brisbane R at City Gauge # Owner: SEQWCO:143838
od levels: Minor 1.70 Moderate 2.60 Major 3.50

+- from the previous 4 days.



Australian Government Bureau of Meteorology (Generated: 15/01/2011 15:44:32)

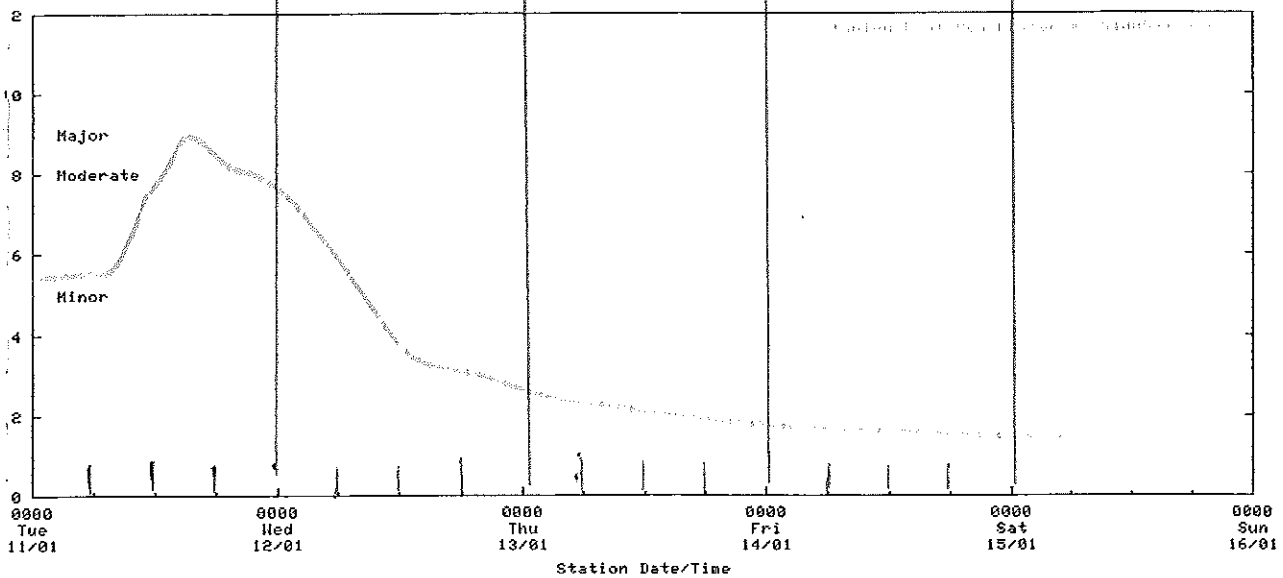
est River Heights for Stanley R at Peachester

ued at 6:41 am EST Saturday 15 January 2011

bout river heights plots | About this Plot

on details: Station Number: 540059 Name: Stanley R at Peachester # Owner: SEQWCO:143990
od levels: Minor 5.00 Moderate 8.00 Major 9.00

ta from the previous 4 days.



Australian Government Bureau of Meteorology (Generated: 15/01/2011 06:41:28)

Bring us a monsoon

Let it rain

Summer rainfalls in Wivenhoe, Somerset and North Pine Dam catchments

DECEMBER 1991 – MARCH 1992
922.8mm registered at Kilcoy

DECEMBER 1993 – MARCH 1994
414.7mm registered at Esk

DECEMBER 1994 – MARCH 1995
384.2mm registered at Kilcoy

DECEMBER 1995 – MARCH 1996
572.4mm registered at Blackbutt

DECEMBER 1998 – MARCH 1999
838.7mm registered at Esk

DECEMBER 1999 – MARCH 2001
426.2mm registered at Esk

DECEMBER 2003 – MARCH 2004
571.7mm registered at Esk

DECEMBER 2005 – MARCH 2006
392.3mm registered at Kilcoy

Near-tropical storms needed to fill storages

Amanda Gearing

CYCLONES in the Gulf of Carpentaria that have dropped half a metre of rain in tropical Queensland in the past week may have filled dams in the area to overflowing.

But similar amounts of rain would be needed to break the drought gripping southeast Queensland and replenish dwindling water supplies.

The combined storage volume of the region's three main dams is down to 22.17 per cent, well below the previous record low of 44.7 per cent set in November 1995.

SEQWater operations manager for Wivenhoe, Somerset and North Pine dams Rob Drury said a low or a major depression would be needed to cover the whole catchment area of the dams.

Wivenhoe would need 300mm-350mm of rain falling at 120mm a day over three days to fill, he said.

Wivenhoe has the capacity to store 1,165,000 megalitres of water as well as an additional capacity of 1,450,000Ml to mitigate flooding. Brisbane's second largest dam, Somerset Dam, upstream of Wivenhoe, would need 350mm-400mm of intense rain to fill because it has a smaller catchment area, Mr Drury said.

North Pine Dam, which has an even smaller catchment area would need 600mm-650mm of intense rain to fill.

"You do need large, uncommon events to fill large dams. You don't fill them every year," Mr Drury said. "There have been only four main rainfall events in the past 15-16 years. It has been seven years since we had a major rainfall event that has given us a refill of 50 per cent of the dam."

The only two rainfall periods that generated major inflows that filled the dams since 1990 were 922.8mm registered at Kilcoy in the four months to March 1992 and 838.7mm registered at Esk in the four months to March 1999.

"The dam levels were dropping 15-18 per cent a year (before water restrictions began) but last year it was only 10 per cent," Mr Drury said.

A 8

FREQUENCY OF "LARGE SCALE RAIN EVENTS ".

(Known by SEQWater as "uncommon events")
Flood gauge BOM is at Bribane City. Localised in catchments are marked "no reading" but appear in written BOM flood information affecting the catchments.

Year	Catchment Somerset MM	Catchment Wivenhoe MM	Flood Gauge BOM Metres	Years Since	Below Average 1	2	3	4	Above average gap 5	6	7	8	9	10	11	12	13	14
1841	n/a	n/a	8.5	n/a														
1843	n/a	n/a	2.8	2														
1844	n/a	n/a	7.0	1														
1852	n/a	n/a	3.0	8														
1857	n/a	n/a	5.0	5														
1863	n/a	n/a	3.4	6														
1864	n/a	n/a	3.8	1														
1867	n/a	n/a	2.4	3														
1870	n/a	n/a	3.0	3														
1873	n/a	n/a	2.8	3														
1875	No bureau records		2.8	2														
1879	kept to here		2.8	4														
1887	n/a	454	3.8	8														
1888	n/a	324	3.8	1														
1890	n/a	385	5.3	2														
1892	394	302	n/a	2														
1892	395	287	n/a	0														
1893	1422	1036	8.5	1														
1893	4 floods in 1893		1.9	0														
1893			8.3	0														
1893			2.4	0														
1898	505	336	2.5	5														
1908	394	309	3.3	10														
1911	436	225	No reading	3														
1915	322	152	No reading	4														
1918	352	168	No reading	3														
1927	564	260	1.8	9														
1928	413	252	2.1	1														
1929	257	129	1.9	1														
1931	216	250	3.4	2														
1934	292	201	No reading	3														
1939	294	140	No reading	5														
1950	479	286	No reading	11														
1955	532	289	2.4	5														
1956	429	250	1.8	1														
1967	310	251	2.0	11														
1968	526	292	2.0	1														
1971	468	296	1.8	3														
1972	304	318	No reading	1														
1973	474	257	No reading	1														
1974	790	517	5.4	1														
1976	671 3mths	534 3mths	No reading	2														
1983	529 3mths	697 3mths	No reading	7														
	Wivenhoe dam in place								Wivenhoe dam 1986									
1988	440	294	Dam filling	5														
1989	564	262	1.9	1					Overflowed									
1992	1062 4 mths		1.9	3					Overflowed									
1996	308	205	-	4					Close to top									
1999	544	296	1.9	3					Overflowed									
2001	251	204	n/a	2					Overflowed									
2007	Near miss		n/a	6						"Worst drought ?"								
OVERALL TOTALS / AVERAGE				50														

SUMMARY

Years Since	No. of Events	Total Events
Below the average		
0	4	
1	12	
2	7	
3	10	72%
4	3	36
Above the average		
5	5	
6	2	
7	1	
8	2	
9	1	
10	1	
11	2	
12		
13		28%
14		14
Total		50

Notes :

11 years is the largest gap

72% of events occur within 4 years

Average gap is 3.7 yrs

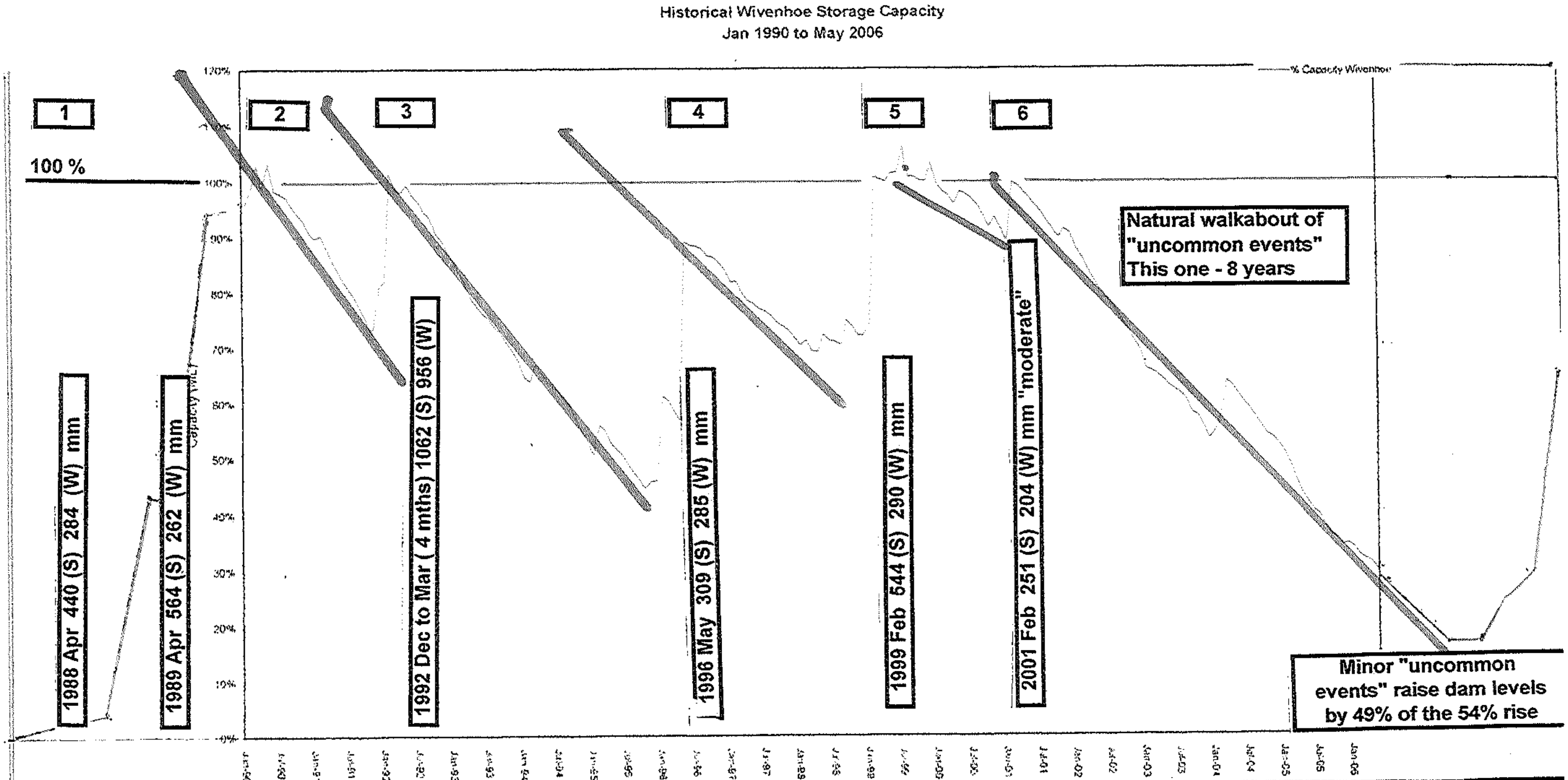
SEQWater rainfall requirements to fill dams
Required in a few days
Wivenhoe 300-350mm

Somerset 350-400mm

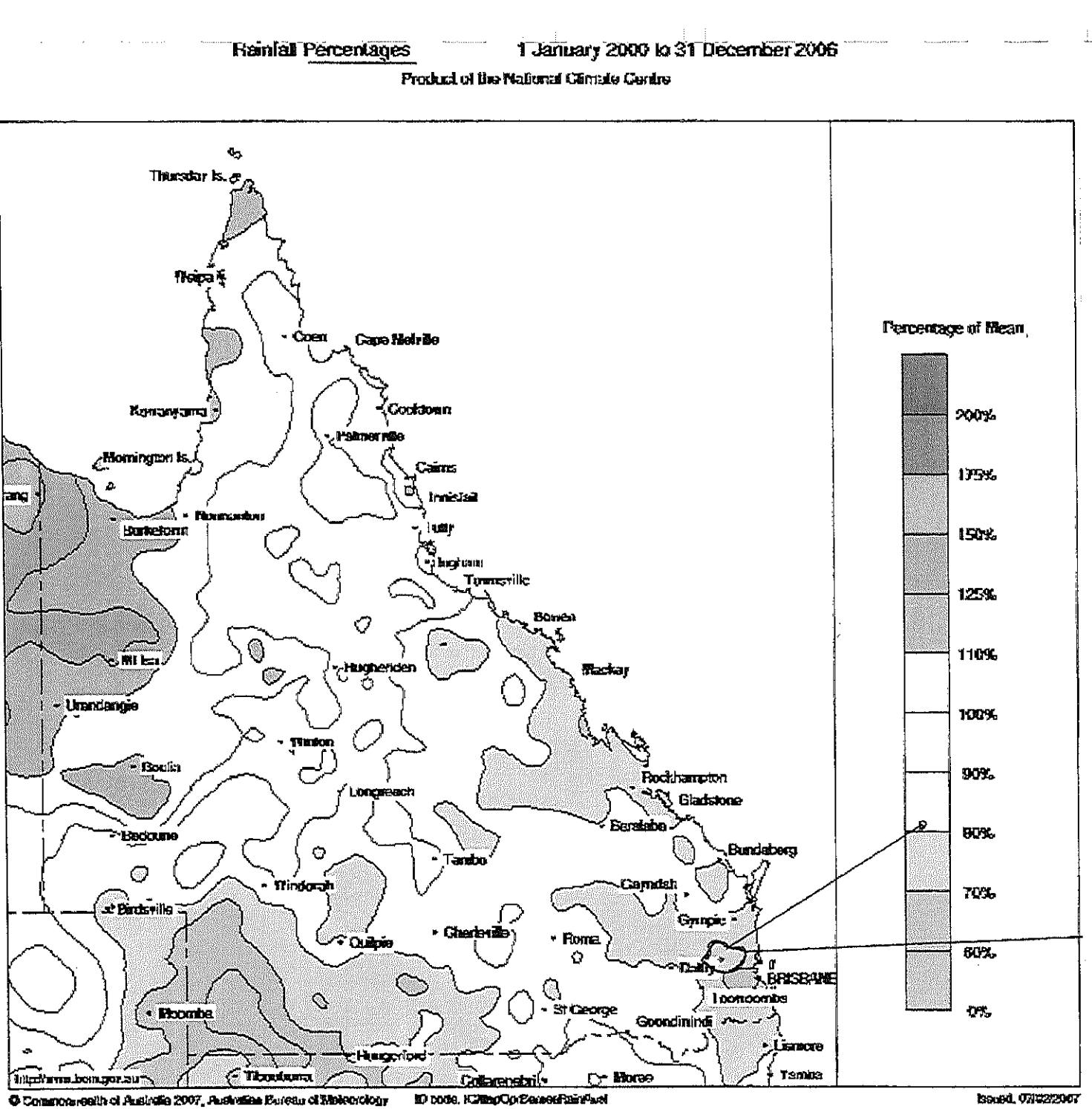
Bureau flood gauge
Major 3.6 metres
Moderate 2.6 metres
Revision date January 2011

A 9

Wivenhoe dam levels supplied by SEQWater matched with "Uncommon events"
Wivenhoe Dam completed in 1986



Year	Mth	%
1986	Start	
1987	Jan	n/a
1987	Jul	n/a
1988	Jan	n/a
1988	Jul	n/a
1989	Jan	n/a
1989	Jul	n/a
1990	Jan	97
1990	Jul	98
1991	Jan	93
1991	Jul	85
1992	Jan	73
1992	Jul	100
1993	Jan	92
1993	Jul	80
1994	Jan	70
1994	Jul	84
1995	Jan	50
1995	Jul	50
1996	Jan	47
1996	Jul	60
1997	Jan	89
1997	Jul	80
1998	Jan	76
1998	Jul	70
1999	Jan	71
1999	Jul	100
2000	Jan	100
2000	Jul	100
2001	Jan	97
2001	Jul	100
2002	Jan	90
2002	Jul	80
2003	Jan	70
2003	Jul	80
2004	Jan	53
2004	Jul	64
2005	Jan	50
2005	Jul	40
2006	Jan	32
2006	Jul	29
2007	Jan	24
2007	Jul	18
2008	Jan	18
2008	Jul	26
2009	Jan	30
2009	Jul	64



Bureau of Metrology map showing rainfall percentages for Queensland.

Same rainfall as map supplied by Mr Beattie and Ms Bligh Period 01/01/2000 to 31/12/2006

Courier mail 3rd February 2007
Queensland only selected for clarity
(author)

Catchment

Wivenhoe/Somerset /North Pine dams
(author)

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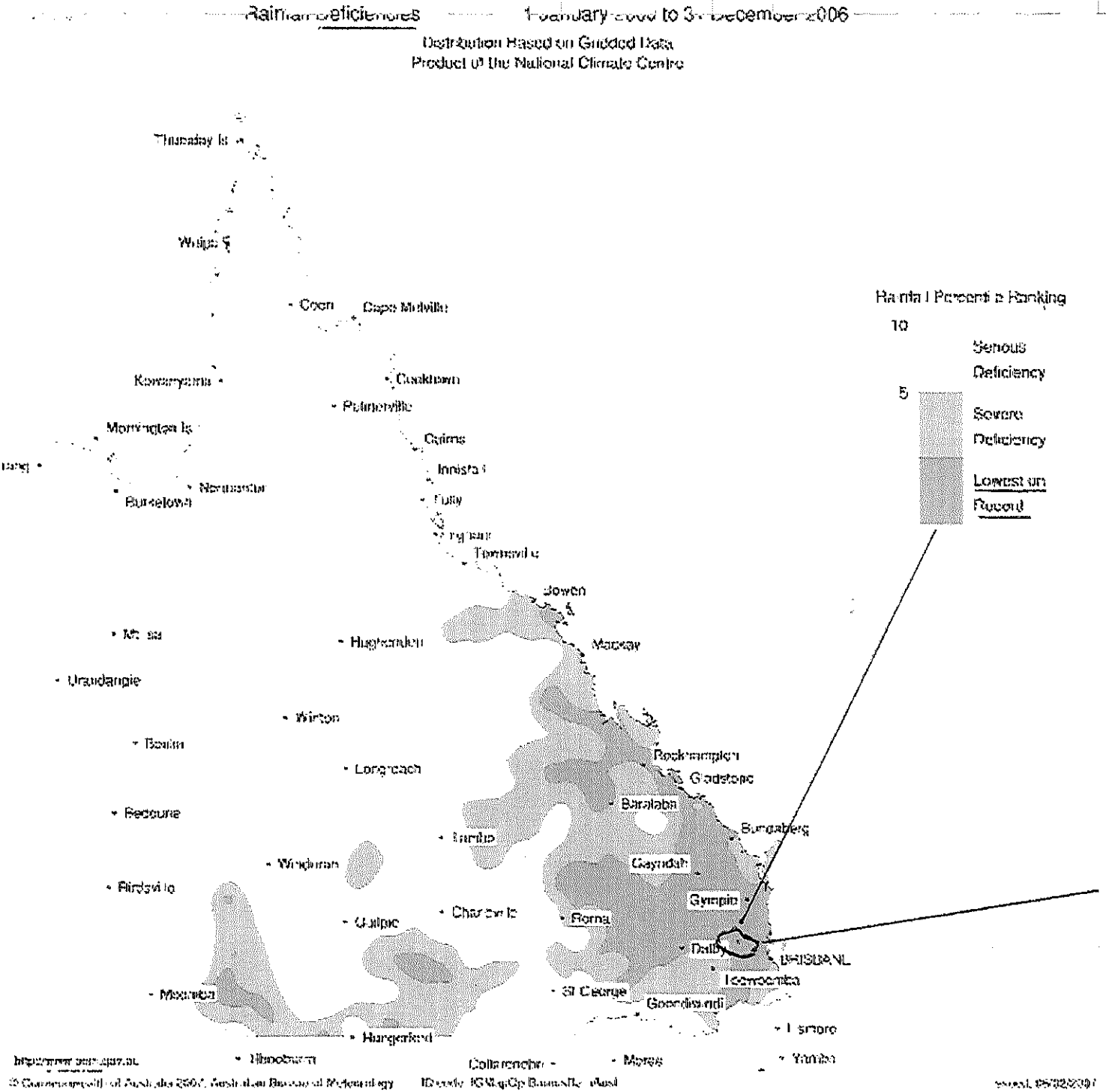

Bureau of Metrology map showing rainfall deficiencies for Queensland.

Same rainfall as map supplied by Mr Beattie and Ms Bligh Period 01/01/2000 to 31/12/2006

Courier mail 3rd February 2007
Queensland only selected for clarity
(author)

Catchment

Wivenhoe/Somerset /North Pine dams
(author)

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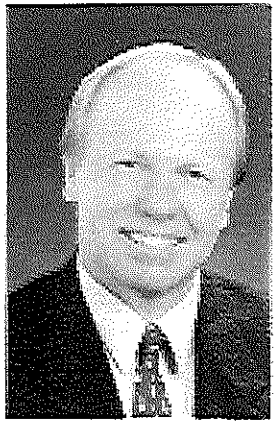
Building the foundations



The Smart State is growing at a record rate. Our economy is booming, we are gaining 1500 new Queenslanders each week and global demand for our exports has surged.

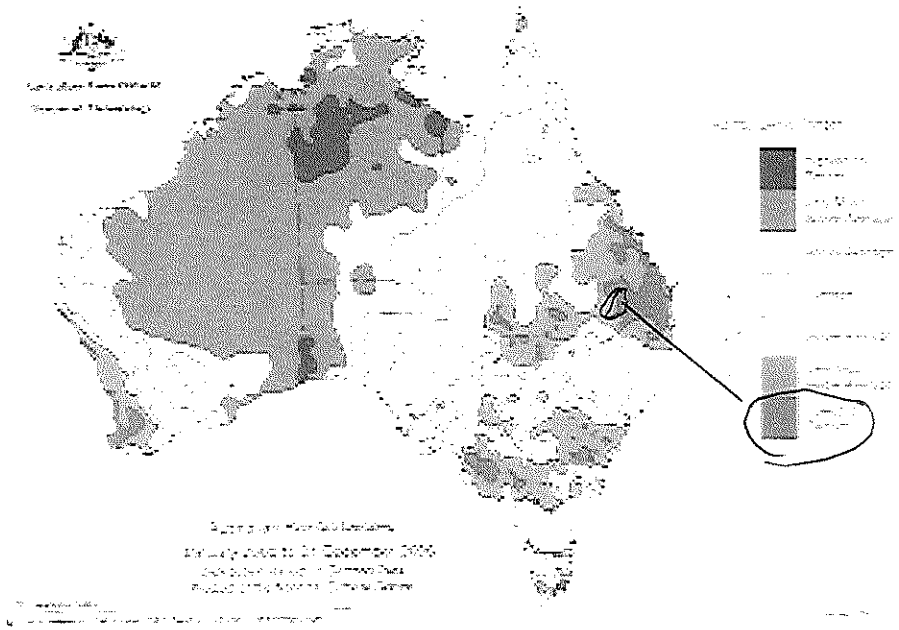
To sustain this growth and maintain our enviable lifestyle, we need to build more hospitals and schools, and improve roads and public transport for Queenslanders.

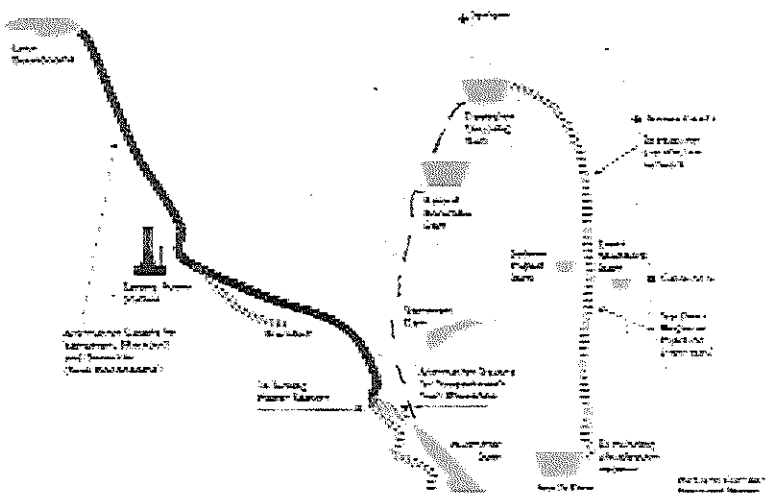
We are also enduring the worst drought on record and that means an absolute commitment to securing our water supply for the future is vital. Our plans for water infrastructure will therefore remain at the forefront.

We need to build now and plan for the future, so we have the infrastructure necessary to ensure prosperity, jobs, health, education and training in the Smart State.

The Queensland Government is due to spend a record $11.6 billion across the state this year to meet our current

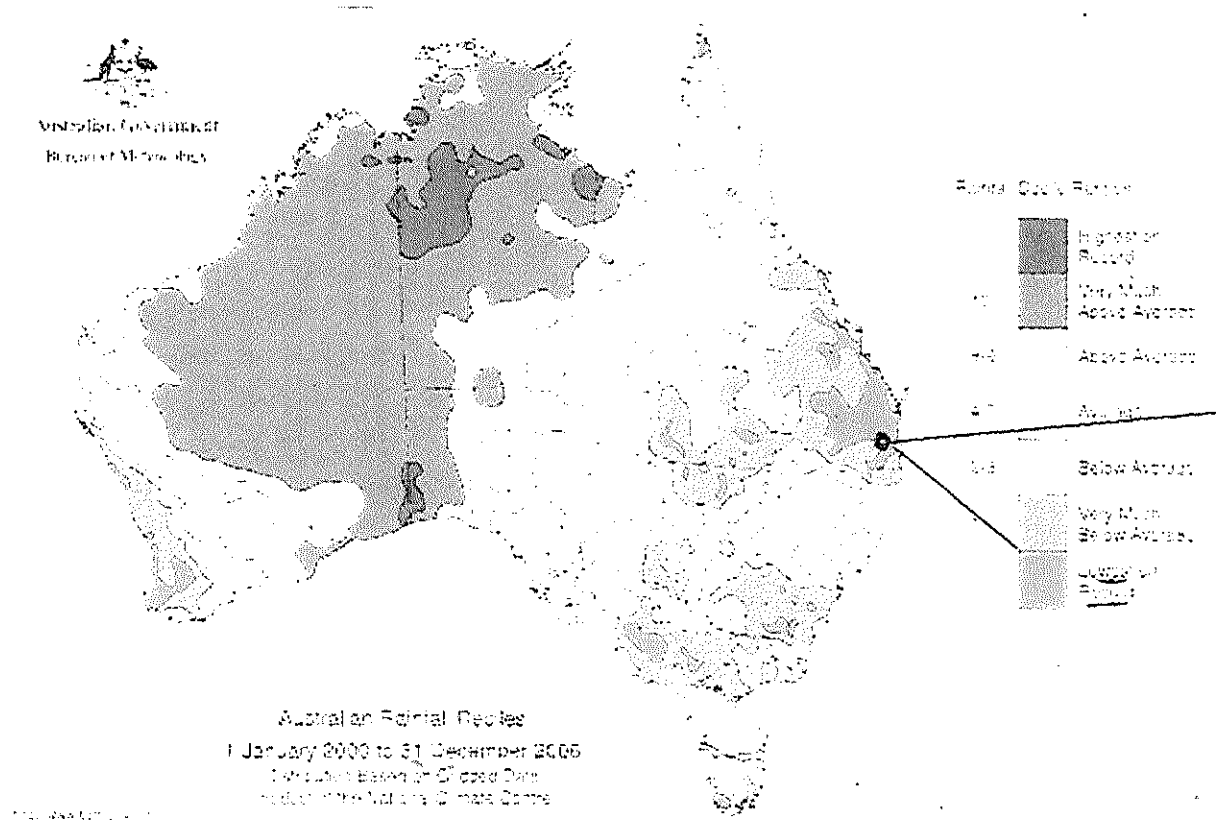
...g unprecedented demands on South-East Queensland's water supply.





Bureau of Metrology map expanded for clarity
(author)

unprecedented demands on South-East Queensland's water supply.



Catchment
Wivenhoe/Somerset
/North Pine dams
(author)

A 11 B

WIVENHOE DAM																		Summer	Non S	Stations	Summer	Non S	Summer	Non S	
	40060	40060	40307	40307	40301	40301	40020	40020	40382	40382	40075	40075	40205	40205	40188	40188	Total	Total		Annual Avg.	Annual Avg.	6 years	6 year	
1962	348	513	522	558	441	525	543	538	515	649	512	560	531	524	730	243	4142	4110	8	518	514			
1963	335	321	374	322	426	347	515	316	516	374	576	420	622	382	393	814	3757	3295	8	470	412			
1964	320	419	325	434	403	384	478	388	479	380	458	366	508	372	469	305	3438	3028	8	430	379			
1965	194	403	157	401	179	433	182	448	200	461	213	353	345	373	479	564	1947	3436	8	243	429			
1966	392	503	521	497	483	486	503	477	495	626	329	549	293	570	606	489	3620	4197	8	453	525			
1967	403	494	418	579	362	581	575	550	462	637	503	678	626	662	513	405	3861	4586	8	483	573			
1968	324	207	398	247	375	221	501	213	450	289	728	247	705	221	193	401	3673	2046	8	459	256			
1969	266	286	253	346	251	307	276	284	254	416	174	312	228	265	320	642	2021	2858	8	253	357			
1970	384	329	410	410	398	385	387	450	443	455	355	542	395	478	614	814	3385	3863	8	423	483	2313	2623	
1971	764	232	763	164	671	225	892	201	854	257	773	282	878	254	705	213	6300	1828	8	787	228			
1972	445	382	577	428	412	418	569	443	528	506	600	489	539	417	258	375	3927	3457	8	491	432			
1973	399	362	327	485	342	365	507	390	469	365	392	447	475	496	457	572	3367	3462	8	421	433			
1974	468	585	500	561	621	565	862	752	798	578	924	624	869	714	826	323	5868	4701	8	733	588	Flood		
1975	438	388	424	493	432	404	309	367	404	471	392	378	489	350	693	490	3582	3341	8	448	418	Abnormal		
1976	457	376	516	435	489	414	629	480	691	545	675	533	844	451	265	417	4566	3652	8	571	457	3451	2555	
1977	276	511	244	539	289	423	301	408	326	507	208	475	192	447	1078	915	2913	4226	8	364	528			
1978	231	212	256	360	284	266	285	230	325	286	374	264	335	236	362	404	2452	2257	8	307	282			
1979	303	467	358	571	286	521	391	499	344	552	405	481	312	478	744	476	3142	4046	8	393	506			
1980	390	351	472	451	273	352	338	340	235	363	197	304	302	320	204	511	2410	2993	8	301	374			
1981	484	425	537	464	505	424	377	404	436	480	414	417	413	368	435	287	3601	3268	8	450	408			
1982	382	325	496	318	492	271	672	349	645	301	730	347	559	355	565	465	4540	2731	8	567	341	2382	2440	
1983	205	649	246	661	321	618	263	795	313	564	266	677	248	748	286	462	2147	5174	8	268	647			
1984	276	524	263	490	233	505	244	545	272	587	251	582	225	478	613	407	2380	4119	8	298	515			
1985	294	412	270	615	258	452	319	639	280	493	362	611	378	539	611	403	2771	4184	8	346	520			
1986	149	284	277	309	290	377	254	358	234	429	140	360	335	412	283	799	1963	3328	8	245	416			
1987	217	493	268	501	278	443	387	440	307	472	237	489	287	386	206	650	2186	3852	8	273	482			
1988	270	451	729	495	448	509	470	595	486	636	353	752	375	590	411	592	3541	4621	8	443	578	1874	3157	
1989	371	470	414	549	294	508	435	754	337	566	510	813	431	752	228	450	3021	4863	8	378	608			
1990	337	543	277	703	312	604	432	670	288	570	426	613	407	577	412	431	2892	4712	8	361	589			
1991	285	147	342	128	271	168	421	206	263	181	263	232	297	207	374	908	2516	2176	8	315	272			
1992	510	327	563	273	423	280	641	331	525	286	866	334	653	293	480	933	4660	3056	8	583	382			
1993	199	263	199	268	175	256	196	325	219	306	224	285	204	262	489	710	1905	2675	8	238	334			
1994	435	210	382	248	305	220	461	240	393	245	415	216	323	218	381	275	3075	1889	8	384	234	2259	2419	
1995	423	207	372	204	335	185	425	192	412	169	419	152	356	170	956	279	3699	1556	8	462	195			
1996	432	632	477	587	410	527	572	579	407	683	373	708	417	612	280	249	3368	4575	8	421	572			
1997	145	368	205	388	282	356	326	405	265	365	289	428	210	399	391	283	2113	2991	8	264	374			
1998	431	550	473	521	261	491	243	464	370	508	223	534	301	455	475	194	2776	3716	8	347	465			
1999	548	409	428	424	517	351	555	379	643	393	839	339	737	423	303	800	4571	3518	8	571	440			
2000	326	407	395	426	355	324	400	473	355	476	392	464	329	434	278	460	2830	3463	8	354	433	2420	2477	
2001	439	302	389	253	335	316	377	396	448	263	426	268	347	229	383	524	3143	2551	8	393	319			
2002	229	426	272	386	365	411	242	434	369	422	308	402	315	390	631	539	2730	3410	8	341	426			
2003	302	292	328	234	320	261	371	298	438	370	477	319	349	197	348	549	2933	2518	8	367	315			
2004	623	211	528	234	611	167	599	219	494	175	572	190	608	168	479	272	4513	1635	8	564	204			
2005			249	333	306	337	310	369	305	385	294	302	279	293	269	477	2012	2496	7	287	357			
2006			315	312	249	241	364	324	267	312	248	387	254	347	322	290	2019	2213	7	288	316	2241	1937	4177
2007			228	190	163	162	308	248	215	223	272	273	270	179	594	185	2050	1459	7	293	208			
	15445	16661	17736	18775	16529	17386	19706	19204	18773	19556	19373	19797	19394	18465	21369	22246				Totals		16939	17609	34548
																				Average		2420	2516	4936
																				2001-2006		2241	1937	4177
																				Per cent		92.6	77.0	84.6
															1962 to 2007		148324	152089						
															Verification			300413		Totals		16939	17609	34548
															Verification			300413		Les 1971-1976		-3451	-2555	-6006
																				Totals less 1971-76		13488	15054	28542
																				Average		2248	2509	4757
																				2001-2006		2241	1937	4177
																				Per cent		**99.7**	**77.2**	**87.8**

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SOMERSET DAM											Summer	Non S	Sataions	Summer	Non S	Summer	Non S	
	40635	40635	40102	40102	40110	40110	40189	40189	40145	40145	Total	Total		Annual	Annual	6 years	6 years	
														Avg.	Avg.			
1965	247	534	289	617	216	445	183	451	282	629	1216	2677	5	243	535			
1966	0	0	527	469	394	508	382	626	477	931	1780	2535	4	445	634			
1967	0	0	741	801	608	697	594	712	1128	1201	3071	3410	4	768	852			
1968	785	456	743	299	942	202	803	344	1132	338	4406	1639	5	881	328			
1969	233	356	216	403	212	344	243	406	339	639	1243	2148	5	249	430			
1970	607	454	457	526	500	424	467	469	664	711	2695	2584	5	539	517	3124	3296	
1971	897	245	1031	224	1062	220	1150	322	678	398	4819	1409	5	964	282			
1972	977	604	889	545	630	480	751	453	1466	746	4713	2829	5	943	566			
1973	521	430	566	444	423	413	470	420	769	539	2748	2247	5	550	449			
1974	923	925	929	959	696	764	850	853	2400	1402	5799	4902	5	1160	980	Flood		
1975	354	411	383	511	341	429	443	507	553	578	2074	2436	5	415	487	Abnormal		
1976	769	606	810	498	592	391	746	480	1537	854	4455	2829	5	891	566	4921	3330	
1977	317	450	295	562	319	440	291	673	483	632	1705	2757	5	341	551			
1978	414	224	556	299	359	206	436	311	675	416	2440	1455	5	488	291			
1979	580	562	496	632	441	456	465	531	935	727	2917	2908	5	583	582			
1980	353	484	335	450	358	408	338	391	534	760	1918	2493	5	384	499			
1981	614	524	461	440	550	500	484	431	1031	750	3140	2646	5	628	529			
1982	677	395	611	388	804	417	776	397	1119	598	3987	2196	5	797	439	3221	2891	
1983	294	860	278	914	261	816	329	741	457	1127	1619	4459	5	324	892			
1984	197	639	272	684	169	671	206	663	349	953	1193	3609	5	239	722			
1985	562	733	459	667	508	570	460	567	637	831	2626	3368	5	525	674			
1986	393	431	338	409	304	388	420	539	324	685	1778	2453	5	356	491			
1987	337	535	312	530	188	447	298	450	405	699	1539	2660	5	308	532			
1988	381	851	416	724	361	854	465	962	548	1477	2173	4867	5	435	973	2186	4283	
1989	610	885	521	896	505	909	536	1000	1252	1799	3424	5489	5	685	1098			
1990	534	681	488	720	554	535	633	663	1006	886	3213	3485	5	643	697			
1991	269	304	323	299	280	344	337	308	489	387	1697	1642	5	339	328			
1992	1025	395	1008	292	923	338	936	357	1420	523	5311	1905	5	1062	381			
1993	439	307	431	342	271	237	224	341	488	353	1853	1580	5	371	316			
1994	496	399	450	456	411	379	468	315	989	608	2814	2158	5	563	432	3662	3252	
1995	562	250	415	276	384	179	338	210	800	361	2499	1277	5	500	255			
1996	495	697	650	412	458	555	475	640	663	1114	2740	3418	5	548	684			
1997	294	393	342	425	185	413	258	480	583	588	1662	2299	5	332	460			
1998	357	684	443	632	353	537	280	629	512	686	1945	3169	5	389	634			
1999	1045	786	872	566	836	505	909	592	1296	1025	4957	3474	5	991	695			
2000	471	696	459	626	344	517	366	521	637	993	2277	3353	5	455	671	3216	3398	
2001	485	439	589	428	356	364	340	255	789	472	2559	1958	5	512	392			
2002	262	457	275	406	257	427	324	417	325	386	1444	2093	5	289	419			
2003	489	378	393	401	453	311	476	328	670	216	2482	1634	5	496	327			
2004	665	288	701	405	560	241	605	172	834	353	3366	1459	5	673	292			
2005	363	472	318	480	248	384	298	276	425	534	1652	2146	5	330	429			
2006	513	381	492	309	392	255	345	311	587	541	2330	1797	5	466	359	2766	2217	4983
2007	214	217	221	217	268	184	295	208	364	354	1362	1180	5	272	236			
	21020	**20817**	**21800**	**21584**	**19276**	**19105**	**20489**	**20720**	**33050**	**30802**								

1965 to 2007	115634	113027
Verification		228662
Verification		228662

Totals	23097	22667	45764
Average	3300	3238	6538
2001-2006	2766	2217	4983
Per cent	**83.8**	**68.5**	**76.2**
Totals	23097	22667	45764
Less 1971-1976	-4921	-3330	-8252
Totals less 1971-76	18176	19336	37512
Average	3029	3223	6252
2001-2006	2766	2217	4983
Per cent	**91.3**	**68.8**	**79.7**

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A 14

Archive - 24 Monthly rainfall deciles for Queensland

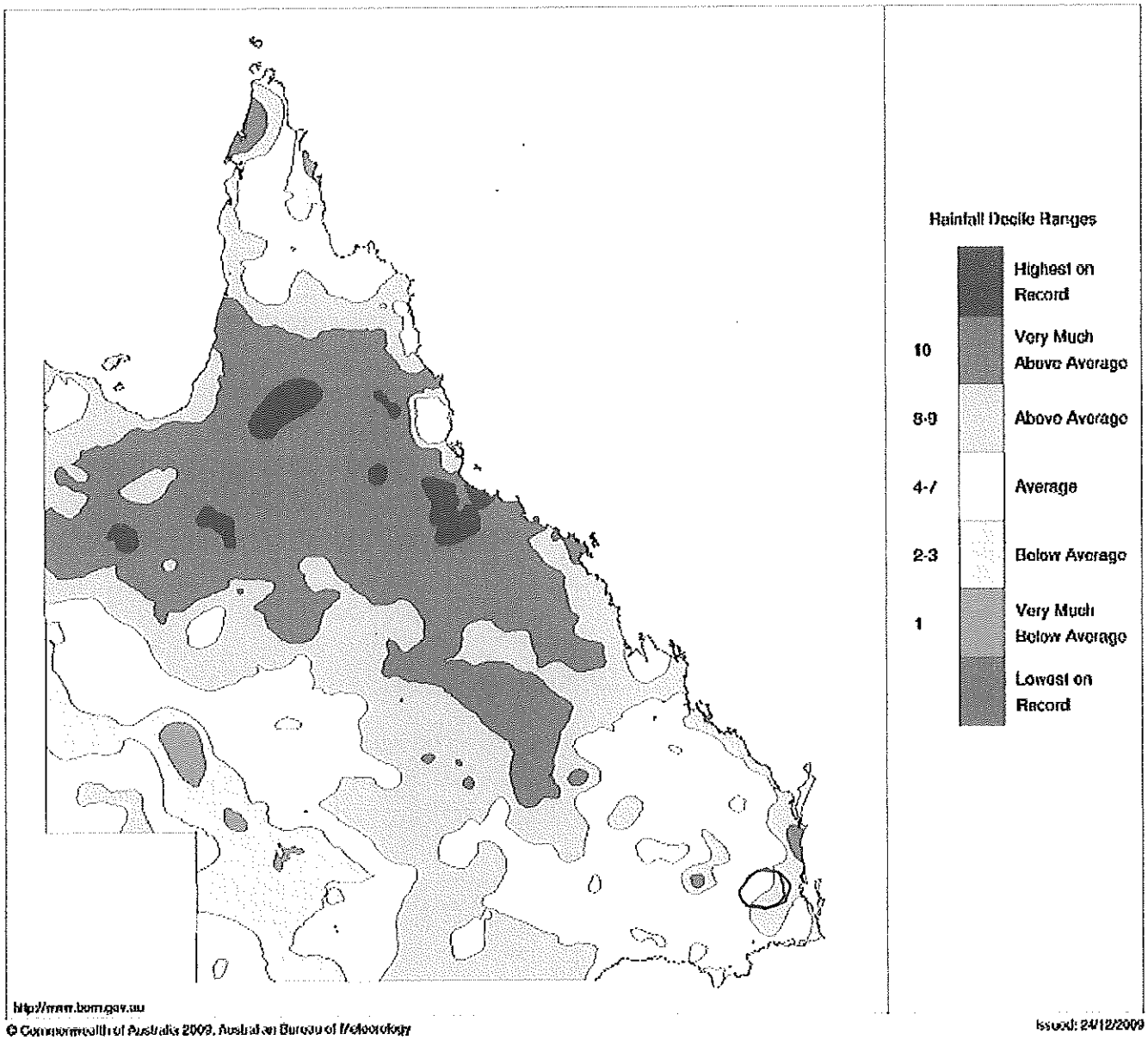
Map	Rainfall Deciles
Period	24 months
Area	Queensland

Year	Month	Day
2009	Apr	30
EARLIER / LATER	EARLIER / LATER	

Zoom out

Queensland Rainfall Deciles 1 May 2007 to 30 April 2009

Distribution Based on Gridded Data
Product of the National Climate Centre



Issued: 24/12/2009

Product Code: IDCKAR74Q0

A 15

Archive - 24 Monthly rainfall percentages for Queensland

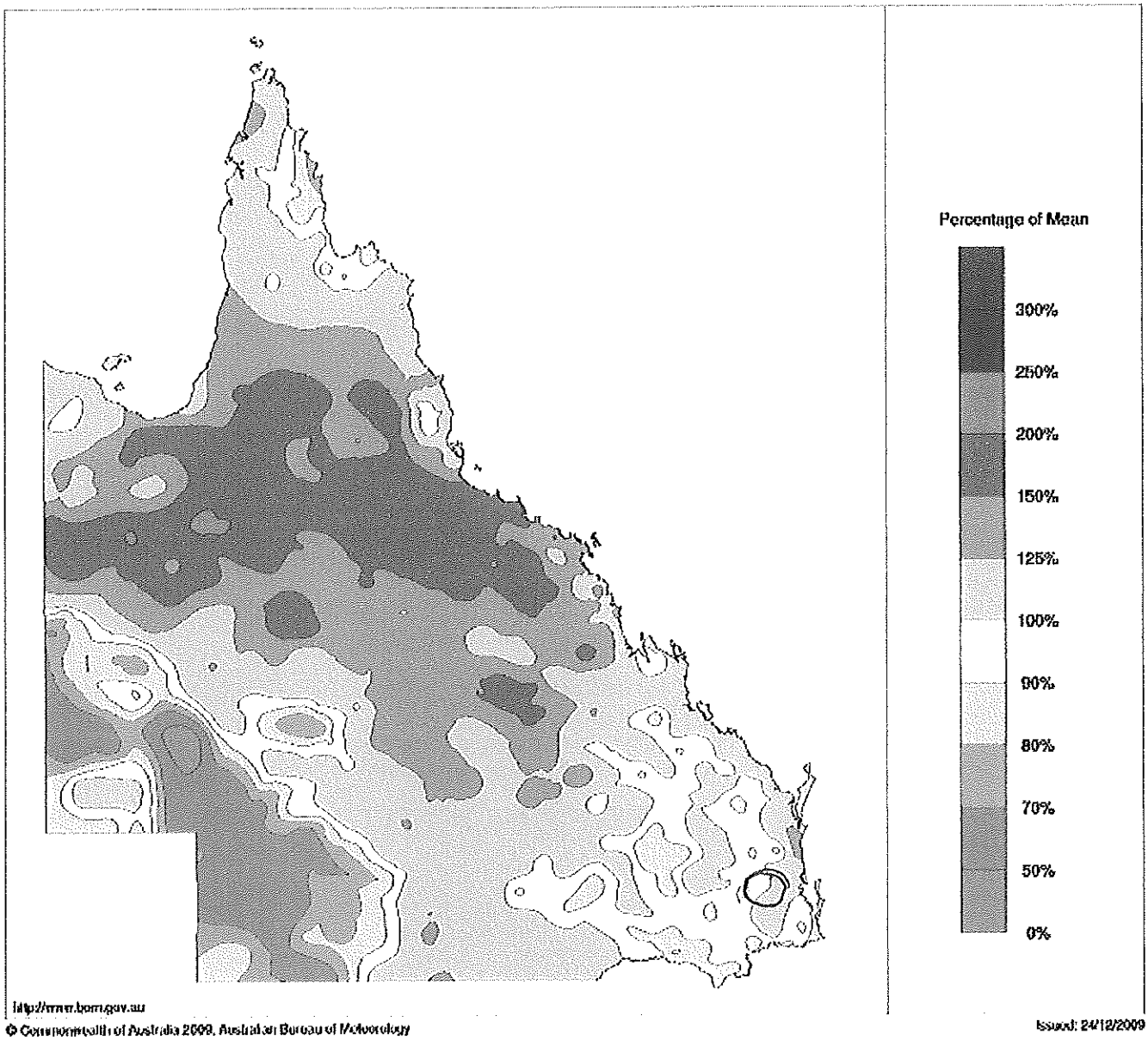
Map	Rainfall Percentages
Period	24 months
Area	Queensland

Year	Month	Day
2009	Apr	30
EARLIER / LATER	EARLIER / LATER	

Zoom out

Queensland Rainfall Percentages **1 May 2007 to 30 April 2009**

Product of the National Climate Centre



Product Code: IDCKAR74P0

However, levels of risk, particularly in non-tidal reaches, are more directly related to the timing and magnitude of flows affected rather than total volumetric change. For example, extraction of a given volume of water under low flow conditions would have greater ecological implications than extraction of the same volume of water under high flow conditions, all other things being equal. Thus, total flow volume indicators are useful for descriptive purposes and for calculating catchment loads, but are too insensitive to changes in key aspects of the flow regime to be useful for predicting ecological impacts other than in general terms.

Long-term Indicators

Three of the statistical indicators in Table 5.1 relate to total flow volumes:

- mean annual flow;
- median annual flow; and
- APFD.

Mean annual flow is a measure of the total volume of flow carried by a river or stream at a particular site. It is a useful and easily understood communication tool for summarising net flow regime change in volumetric terms. However, it can be skewed by years with very large flows. Impacts of water resource development can be hidden if there is little change in high flow regime or the water stored in a dam is transported via supplementation of the river channel, particularly if evaporation rates are low. For example, the flow regime of Brisbane River below Wivenhoe Dam is highly modified, yet mean annual flow is 86% of pre-development (Brizga et al. 2006a).

Median annual flow is another measure of central tendency in annual flows, which, unlike the mean, is not skewed by wetter years and thus is more informative about typical flow conditions, particularly in river systems with highly variable flow regimes. Unlike the mean, it does not provide information about the total flow volume carried by a stream at a particular site. In supplemented streams, it is a less sensitive measure of flow regime change than the mean as it can be made to appear more "natural" by increasing levels of flow supplementation. Thus, it is considered a useful indicator only in unsupplemented rivers/streams.

APFD is a composite measure of deviation from the natural (or pre-development) flow regime with regard to total flow volumes, interannual variability and seasonality based on monthly timestep data. A drawback of this indicator is that, on its own, it does not enable differentiation of the relative contribution of these components to flow regime change. However, unlike the other statistical measures proposed as key flow indicators, APFD is based on comparisons of simulated flows in specific months (for example, developed and natural flows in June 1995) rather than long-term averages. It is thus more sensitive to natural variability in its definition of baseline condition. A totally natural flow regime will result in an APFD score of zero. The greater the deviation from the natural flow regime, the greater the APFD score.

A correlation between APFD and fish species diversity was identified by Gehrke et al. (1995) based on work in the Murray–Darling River system. Statistical relationships between APFD and fish species diversity have not been assessed in the Moreton and Gold Coast WRP areas or any other Queensland coastal rivers. A statistical correlation does not necessarily imply a causal relationship and the ecological processes underlying the

Chapter 3
Environmental Flow Assessment Framework

An environmental flow assessment framework is required for comparison of alternative water resource management scenarios and ultimately as a basis for specification of EFOs in the Moreton and Gold Coast WRPs. Environmental flow indicators (i.e. statistical indicators that quantify geomorphologically and ecologically relevant attributes of the flow regime) are discussed in Section 3.1. The use of risk assessment models for determining levels of ecosystem risk associated with various levels of flow regime change are discussed in Section 3.2. Section 3.3 outlines criteria for determining environmental implications of methods for extracting and delivering water.

3.1 Environmental Flow Indicators

The flow regimes of rivers and streams are directly susceptible to alteration as a result of water resource development (i.e. extraction, supplemented deliveries and interbasin transfers of water). They can also be influenced by other factors including irrigation returns, point source inputs and catchment land use, particularly urbanisation.

Changes in river/stream flow regimes can have significant implications for associated ecosystems, including instream, riparian zone, riverine wetland, floodplain, estuarine and nearshore marine ecosystems. Linkages between flow regime change and implications for a single ecosystem component may sometimes be direct and simple (for example, reduction in aquatic habitat as a result of reduction in flow), but overall ecosystem implications are generally much more complex. In addition to direct primary impacts, flow regime change generally also has secondary, tertiary and higher order impacts (via changes to geomorphology, water quality, vegetation cover, biotic composition, intensity of predation/competition and disease), especially for higher order organisms, and feedback effects often occur. As a result, a complex web of ecosystem implications can be drawn for any specific change in flow regime.

Daily flow hydrologic models have been developed by NRMW using IQQM to generate hydrological simulations of the river systems in the Moreton and Gold Coast WRP areas. These models provide simulated representations of the flow regimes of the river systems via networks of nodes. Flows at these nodes are established for a period of approximately 110 years, so that long-term comparisons of the implications of alternative water resource management strategies can be made. Because the IQQMs operate on a daily timestep, the key flow indicators must be suitable for describing the flow regime using data based on a daily, or coarser, timestep.

The flow regime of a river or stream is far more complex than any simple set of flow statistics can fully represent. However, six major categories of flow characteristics are of particular ecological relevance (Clausen & Biggs 1997; Poff et al. 1997; Poff & Ward 1989; Puckridge et al. 1998; Pusey & Arthington 1996; Pusey et al. 2004a; Richter et al. 1996a, 1996b), as well as being sensitive to the changes produced in flow regimes by

1974 flood still included in "simulation period"

The 66% at the Brisbane River mouth was defined by the Act and is constant
It included 2 major floods at the very start of the period and excluded
the most recent period without a major event occuring at the end of the period.

Simulation period : 1/07/1889 to 30/06/2000 : 111 years				Includes the floods of 1890 and 1893
Mean annual flow as defined by Act		1,641,331	(Govt IQQM model)	Mean Annual flow is the sum of those 111 years divided by 111 years for the yearly average.
Number of years		111		
Total flow for 111 years		182,187,741		1,641,331 X 111 years
Current distributions as defined by the Act			**Volume**	
Percentage	Ecology	66.00	1,083,278	
	Consumption	34.00	558,053	
		100.00	1,641,331	
Simulation period 01/07/1893 to 30/06/2006				Excluding years 1890 to 1893 adding years 2001 to 2006
Mean annaul flow for the 111 years - above 1890 to 2000			182,187,741	
Deduct				
Floods 1890 & 1893 included at Start 01/07/1899 to 30/06/2000				Flood volumes determined by IQQM government computer model - see in this section.
1893 flood for Wivenhoe/Som		7,500,000		
Extract 2 minor floods 1893-allow		(1,500,000)		
1890 flood for Wivenhoe/Som		4,300,000		
Total for Wivenhoe/Somerset		10,300,000		
Wivenhoe/Somerset represents		58.20		Government advice
Whole of catchment		100.00		
Volume for whole of catchment			(17,697,595)	
Years (111-2)		109		
Add				
INSERTING YEARS 2001 to 2006				Estimates based on Qld Water Commission graph and graph verified by CEO of the QWC.
Year 2001 estimate		250,000		
2002-2006				
Annual Vol	90,000			
Years	5	450,000		
Wiv 58.2%	58.2	700,000		Wivenhoe/Somerset share is 58.2%
Whole of catchment	100.00		1,202,749	Whole of catchment
years (109 + 6)		115		Number of years 113
Revised mean annual flow 1893 to 2006			**165,692,896**	
Annual mean annual flow			1,440,808	(165,692,896 divide 115 years)

IMPLICATIONS OF THE REVISED MEAN ANNUAL FLOW

The important point here is that the volume calculated in the simulated period 1890 to 2000 is maintained. The altered state of the real world is ignored with the 1,083 278 remaining constant under all conditions.

Distribution as defined by the Act			Revised percent
Static state	Ecology	1,083,278	75.19
Variable state	Consumption	357,529	24.81
		1,440,808	100.00

Distribution maintaining the 66% requirement under the Act			
	Mean annual flow 1894 to 2006		1,440,808
		66.00	950,933
		34.00	489,875
	Mean annual flow		1,440,808

Variance from actual to requirement of the Act	
Ecology under simulation period 1889 to 2000	1,083,278
Ecology under period 1894 to 2006	950,933
Consumption shortchanged by statistical aberration	132,345

Our proposal	
Requirement under phase 2. Release of unallocated water held for stochastic reasons	84,000
Requirement under phase 3 : Additional water identified by engineers GHD	50,000
	134,000

1974 flood excluded from "Simulation period"

The 66% at the Brisbane River mouth was defined by the Act and is constant
It included 2 major floods at the very start of the period and excluded
the most recent period without a major event occuring at the end of the period.

Simulation period : 1/07/1889 to 30/06/2000 : 111 years				Includes the floods of 1890 and 1893
Mean annual flow as defined by Act		1,641,331	(Govt IQQM model)	Mean Annual flow is the sum of those 111 years divided by 111 years for the yearly average.
Number of years		111		
Total flow for 111 years		182,187,741		1,641,331 X 111 years
Current distributions as defined by the Act			Volume	
Percentage	Ecology	66.00	1,083,278	
	Consumption	34.00	558,053	
		100.00	1,641,331	
Simulation period 01/07/1893 to 30/06/2006				Excluding years 1890 to 1893 adding years 2001 to 2006
Mean annaul flow for the 111 years - above 1890 to 2000			182,187,741	
Deduct				
Floods 1890 & 1893 included at Start 01/07/1899 to 30/06/2000				Flood volumes determined by IQQM government computer model - see in this section.
1893 flood for Wivenhoe/Som		7,500,000		
Extract 2 minor floods - allow		(1,500,000)		
1890 flood for Wivenhoe/Som		4,300,000		
1974 Flood for Wivenhoe/Som		4,300,000		
Extract possible minor flood March		(600,000)		
Total for Wivenhoe/Somerset		14,000,000		
Wivenhoe/Somerset represents		58.20		Government advice
Whole of catchment		100.00		
Volume for whole of catchment			(24,054,983)	
Years (111-3)		108		
Add				
INSERTING YEARS 2001 to 2006				Estimates based on Qld Water Commission graph and graph verified by CEO of the QWC.
Year 2001 estimate	1	250,000		
2002-2006				
Annual Vol	90,000			
Years	5	450,000		
Wiv 58.2%	58.2	700,000		Wivenhoe/Somerset share is 58.2%
		114		
Whole of catchment	100.00		1,202,749	Whole of catchment
years (108 + 6)		114		Number of years 113
Revised mean annual flow 1893 to 2006			**159,335,507**	
Annual mean annual flow			1,397,680	(115.77,260 divide 114 years)

IMPLICATIONS OF THE REVISED MEAN ANNUAL FLOW

The important point here is that the volume calculated in the simulated period 1890 to 2000 is maintained. The altered state of the real world is ignored with the 1,083 278 remaining constant under all conditions.

Distribution as defined by the Act			Revised percent
Static state	Ecology	1,083,278	77.51
Variable state	Consumption	314,401	22.49
		1,397,680	100.00

Distribution maintaining the 66% requirement under the Act		
	Mean annual flow 1894 to 2006	1,397,680
	66.00	922,469
	34.00	475,211
	Mean annual flow	1,397,680

Variance from actual to requirement of the Act	
Ecology under simulation period 1889 to 2000	1,083,278
Ecology under period 1894 to 2006	922,469
Consumption shortchanged by statistical aberration	160,810

Our proposal	
Requirement under phase 2. Release of unallocated water held for stochastic reasons	84,000
Requirement under phase 3 : Additional water identified by engineers GHD	50,000
	134,000

surface supply or to bring forward new infrastructure which effectively reduces the risk of failure.

The **managed hydrological risk approach** considers contingency planning as an important part of water supply planning. Deliberate reliance on contingency planning is built into water supply planning to achieve the lowest cost (social, economic and environmental) over the longer term.

As an example, on reaching contingency storage level triggers, level 2 restrictions would be imposed and supplies would start to be drawn from the contingency storage while previously planned contingency supplies are implemented. The chance of the storage itself actually running out of water is again extremely small but is not a cause for concern as the contingency supply will ensure the essential needs of the community are met, regardless of the climatic conditions. Once implemented, the contingency supply may become part of the permanent supply arrangements and will postpone the need to implement new future supplies.

The size of the contingency storage is determined by the time required to implement the contingency supplies and may be significant. Because of the need to assign some of the working storage to contingency storage, the dams must be significantly de-rated.

Stochastically generated flow sequences each of 100 years length for the Wivenhoe–Somerset dams combined storage system have been developed. Two cases (i.e. 98 and 500 flow replicates with similar statistical characteristics to that of the historical record) have been analysed.

The results are summarised in Figure 6 and Table 6. These indicate that for the Wivenhoe–Somerset dams system it would be impractical to reduce the ARI of restrictions to less than 1 in 50 years. At this ARI, the yield of the Wivenhoe–Somerset dams system would have to be de-rated from the HNFY of 373 000 ML/a (refer to Figure 6 for HNFY behaviour curve) to about 285 000 ML/a (about equal to the existing allocations from the dam). The trigger volume to implement a contingency plan would be about 30% of storage and mean duration below the trigger would be about 13 months. Reducing the ARI of level 2 restrictions to 1 in 100 years would result in a further de-rating of the yield to about 260 000 ML/a.

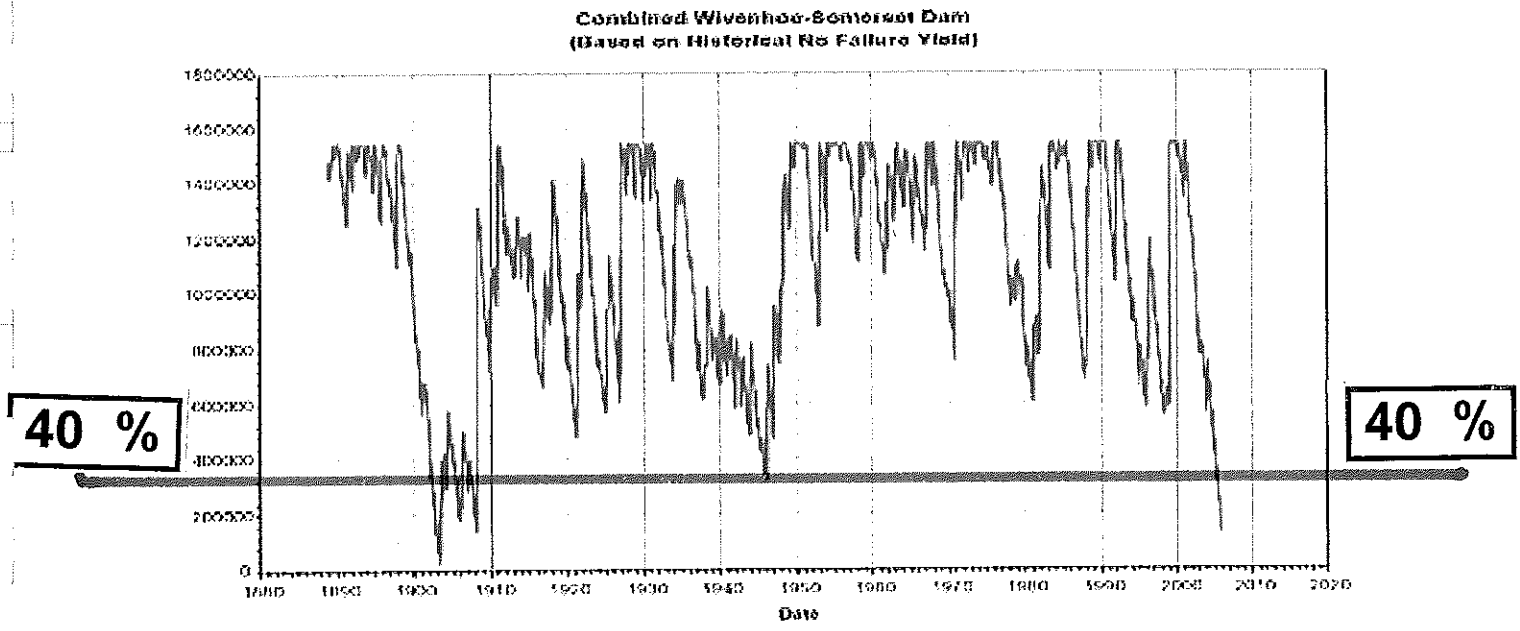
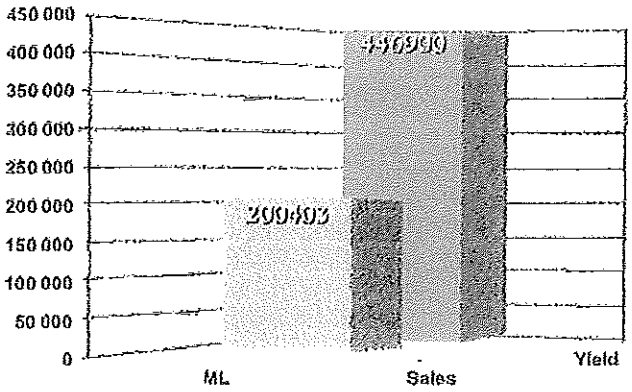
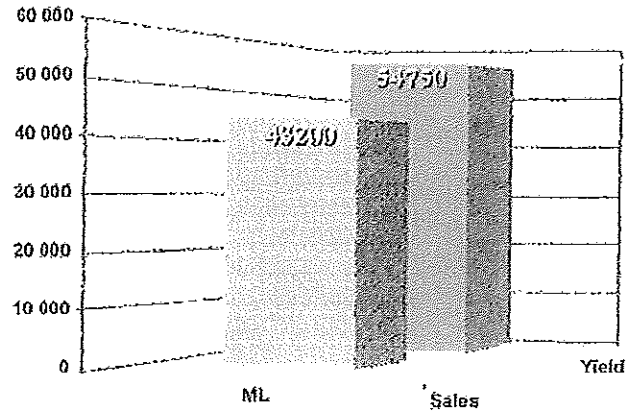


Figure 5 Simulated storage behaviour for the historical record of the Wivenhoe–Somerset dams system

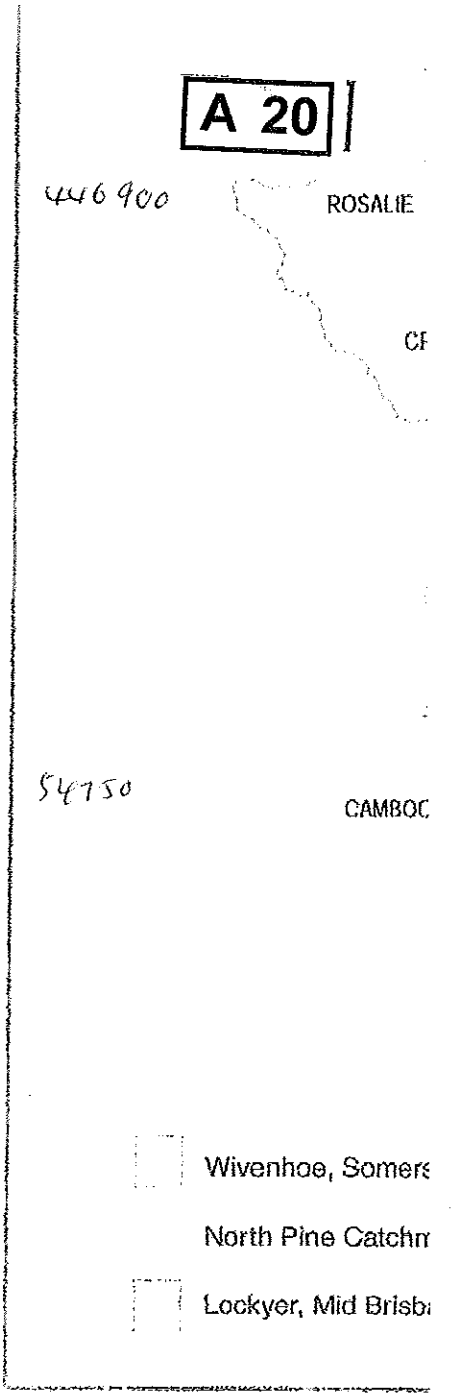


Wivenhoe, Somerset Catchment



North Pine Catchment

Yield is the amount of water captured for use by our dams each year



Supply catchments for

Table 10-6 Enlarged Borumba Dam Cost Estimate

	Option 1			Option 2 Similar TCD Risk Profile		
Stage	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 1**	**Stage 2**	**Stage 3**
Capacity	665,000 ML	1,200,000 ML	1,645,000 ML	445,000 ML	525,000 ML	1,645,000 ML
Dam Construction Cost for Stage, including	519.6 m	340.5 m	532.4 m	437.5 m	177.9 m	652.8 m
▪ Dam Wall						
▪ Spillway						
▪ Saddle Dams -Stage 3 only						
Hydro Power Station (Refer Section 8.2.2)	61.4 m	5.4 m	5.8 m	61.4 m	3.6 m	7.0 m
Land acquisition	28.9 m	15.6 m	8.5 m	22.2 m	2.3 m	28.5 m
Services/roads and restoration	3.5 m	Included in Stage 1	Included in Stage 1	3.5 m	Included in Stage 1	Included in Stage 1
Total per Stage ($)	**613.4 m**	**361.5 m**	**546.7 m**	**524.6 m**	**183.8 m**	**688.3 m**
Cumulative Total ($)	**613.4 m**	**974.9 m**	**1,521.6 m**	**524.6 m**	**708.4 m**	**1,396.7 m**

Note:- Cost above include contingency, design, management and other on-costs

Schedule 15 (continued)

SEQ regional plan see the *Integrated Planning Act 1997*, section 2.5A.10.

simulated mean annual diversion, for a water allocation or group of water allocations, means the total volume of water simulated to have been taken under the allocation or group, if the allocation or group were in existence for the whole of the simulation period, divided by the number of years in the simulation period.

simulation period means the period from 1 July 1889 to 30 June 2000.

started, for an existing water bore or existing overland flow works, means—

(a) construction of the bore or works had physically begun or, if construction had not physically begun, a contract had been entered into to begin construction; and

(b) an independently verifiable construction program existed for progressive construction towards completion of the bore or works; and

(c) detailed design plans existed showing, among other things, the extent of the bore or works; and

(d) if a permit under the *Local Government Act 1993*, section 940, was required for the bore or works—the permit had been issued; and

(e) if a development permit was required for the bore or works—the permit had been given.

subcatchment area see section 6.

SunWater means the entity continued in existence under the *Government Owned Corporations Regulation 2004*, section 34.

supplemented groundwater means groundwater that is recharged by water supplied under an interim resource operations licence, resource operations licence or other authority to operate water infrastructure.

supplemented groundwater area, for groundwater unit 1 in an implementation area, means the part of the groundwater unit

FLOOD PROOFING BRISBANE

from damaging floods to the point of extinction.
Flood mitigation in Ipswich and Gympie

Drought proofing South East Queensland

Submission to the Queensland Floods Commission of Inquiry *A*

Objections to the Borumba Dam proposal 25th July 2008 when being considered as an alternative to the Traveston Dam ***B***

The fundamental flaw in calculation of water to the ecology *C*
Proof that the "Millennium" drought did not exist in the catchments and *D*
Proof that our low dam levels were not caused by any drought *D*

B 1 **Objections to the Borumba Dam proposal 25th July 2008 when being considered as an alternative to the Traveston Dam**

Attachments

2 Gold Coast Bulletin rebuttal by Mr Newton
3 J.W.P Engineering cost estimate of the Borumba Dam wall to 1,650,000ML.
4 Pattern of rainfall Stanley and Mary Rivers.
5 Mr Drury SEQWater operations manager Courier Mail 10th February 2007

J. V. HODGKINSON F.C.A
Chartered Accountant

Correspondence

[redacted]

28th February 2011

Objections to Borumba Dam proposal 25th July 2008 ***B1***

Mr Graham Newton CEO Qld Water Infrastructure P/L. The proponents of the Traveston Dam.
as set out in the Gold Coast Bulletin 25th July 2008 ***B2***

As this information is two and one half years old, Mr Newton may now have a different opinion in the light of the demise of the Traveston project and more information available especially about flood protection.

Ron McMah, grazier from Imbil, had proposed an enlarged Borumba Dam as an alternative to the Traveston Dam. When asked about it, Deputy Premier Anna Bligh had given an "iron clad" guarantee to the people of Gympie at a public meeting on the 3rd November 2006 that if Borumba Dam alternative "stacked up" then that would be the way they would proceed.

The Gold Coast Bulletin had run a "Focus" article on the Borumba alternative to the Traveston Dam. Mr Newton's considered response is now examined.

- *He said that while the report (Hydrology report) did not consider the piped water from the Wivenhoe/Somerset Dam, it was because such approach would breach guidelines set in Moreton Water Resource Plan to maintain the health of the Brisbane River and Moreton Bay.*

  There were two reports. The Engineering report of J W P Engineering Pty Ltd dated 22nd January 2007 and the Hydrology report of Gilbert and Associates bearing a September 2007 date. The evidence is that the Engineering report referred to the Hydrology report to eliminate examination of the two-way piping from Wivenhoe/Somerset for later return. Their initial report was obviously completed before the 22nd January 2007. ***B3*** ***B4***

  However, the Hydrology report was dated September 2007 with an "Appendix" relating to our August 2007 information forwarded to the Deputy Premier Anna Bligh that dealt with the transfer of water from the Wivenhoe/Somerset for later

return.

<u>The transfer of this water for later return was critical to the McMah proposal</u>.

Examination of the Act reveals, and Minister Robertson confirms, that the ecology requires 66% of the "Mean Annual Flow" (MAF) to arrive at the Brisbane River mouth.

The Mean Annual flow requires a "Simulation period". The Technical Advisory Panel warned against the inclusion of very large floods in the calculations as they will "skew" the result. Despite this warning, the floods of 1890, 1893 (4) and 1974 were included in the definition of "Simulation period".

The net effect of the application of that <u>once only permanent</u> calculation when applied to the 112 years 1894 to 2006, but excluding 1974, the figure previously determined to be 66 per cent becomes 78 percent, thus diverting an additional 160,810ML annually to the Ecology.

This volume of 160,810ML is larger than the Traveston Dam project all three stages at 150,000ML. The third stage of 40,000ML was ephemeral according to Premier Beattie's public statements.

This is fully laid out in my letter to [redacted] as directed by the Minister with a copy to Minister Robertson with an overriding letter. Refer section "*<u>C1</u>*"

The Water Resource (Moreton) Plan 2007 was passed into law on the 19th March 2007 a full two months after the reports were completed.

It is also of interest that on the 31st January 2007, Deputy Premier Bligh was corresponding with Mr McMah to have the terms of reference completed so that the reports could be carried out. The reports were, in fact, completed and dated the 21st January 2007. Refer section "*<u>C</u>*'.

The authors of the Hydrology report, Gilbert and Associates, received a special mention by the Technical Advisory Panel in their report notes. (page 8) ***<u>C14</u>***

- *Estimated capital cost of $3.1 billion.*

The initial McMah proposal included Weirs in the Mary Valley. This was an expensive exercise for a handful of megalitres. According to Ron McMah it was designed at the time to impede the unstoppable march of the Traveston.

With no water from the Wivenhoe/Somerset the chief supervising engineer remarked on reviewing the Engineering plan that "you were stitched up

BONZER". He conveyed this in writing to the QWC. Weirs do not form part of this submission and did not form part of our recent and ignored proposal to the QWC. However one useful calculation did present itself and it follows.

The estimates made by J W P Engineering Pty ltd were a capital cost of a three stage wall at **$1.397 billion**. The estimate includes a hydro electric plant and two saddle dams. The estimates were based on a dam to 1,650,000ML. The proposal is for a single stage of construction and that should lessen costs. That cost estimate is **attached.** ***B3***

No estimates of the pipes and pumping equipment were made. The former chief Supervising Engineer of the construction of the Wivenhoe Dam assisted us to determine the pumping requirements with complex matrices. He made an "heroic" estimate of $500 million for the pipes and pumping equipment.

A dam already exists. We owned all the land with no initial outlays required for resumptions that were, and still are, disruptive to the Mary Valley residents in respect of the Traveston Dam proposal.

- *The Gilbert and associates September 2007 report found the Traveston Crossing Dam had a "greater likelihood" of capturing and maintaining sufficient water supplies with the Borumba scheme far more dependent on sporadic high rainfall events.*

  Mr Newton said unlike the Borumba scheme, the Traveston Crossing Dam was not as dependent on high flow events to reach full supply as its catchment captured coastal rainfalls and on average recorded 55 per cent more rainfall than the Wivenhoe catchment.

  The Stanley and Mary Rivers have their source in the same place. By "rights" they should have flowed to the coast. However they turned west. The Mary through the Mary Valley with the mouth at Hervey Bay. The Stanley met up with the Upper Brisbane River at Wivenhoe.

  They have exactly the same rainfall pattern and the same rainfall. The measurement of 55% is with the Upper Brisbane River (Wivenhoe) catchment which is further west with lower rainfall. It is a fundamental flaw in his argument. ***B4***

  It should be noted that Yabba Creek on which the Borumba Dam stands has similar rainfall to the Pine River dam which is coastal.

  Like the Wivenhoe/Somerset, our water supply is highly dependent on these "sporadic high rainfall events". Mr Drury of SEQWater calls them "uncommon events" and he adds that they are required to fill these large dams and they do not come every year. ***B5***

It seems that Mr Newton was not aware in 2008 that they are our main water supply. The presence of full dams through saturation rain is part of the Inquiry's examination. ***CI***

Conclusion

- The presence of a reserve supply in the Borumba Dam expanded to 2,000,000ML takes the requirement to maintain full dams out of play. It gives the Dam managers an additional 1,500,000ML being the current full supply levels of the Wivenhoe and Somerset dams. The very large floods since 1893 would have been full before each event. This gives the Dam Managers the ability to release early with impunity.

  With a total all-up capacity of 3,500,000ML the dam managers have sufficient space to retain all water from the largest flood, 1974, which, according to the Government calculated pre-development flows, was larger than the two majors of 1893.

  With the waters from the Wivenhoe Somerset held, the Bremer River and the Lockyer Creek have the ability to run free without the backup of waters when the flood waters of the Wivenhoe/Somerset are in full flight. This should result in diminished flooding in Ipswich. Flood mitigation in both the cities of Ipswich and Brisbane are therefore substantially reduced or entirely extinguished.

John Vincent Hodgkinson F.C.A.

His mum and dad, Caroline and Tim, will be raising a quiet toast today to Louise Brown, her parents and the two doctors who pioneered the IVF process.

"We're so grateful the process is available," said Caroline yesterday.

"Anybody who goes through the process deserves a medal as far as I'm concerned, but to be the first must have been something."

Louise Brown doesn't give too many interviews these days, and who can blame her.

From the moment of her birth she has been identified by the means of her conception.

Not even the doctors who were responsible for developing the technique, Patrick Steptoe and Robert Edwards, have received the attention she did.

In a rare interview with the BBC to commemorate her 30th birthday, Louise said that as a child in Bristol she became used to the media attention.

She was recognised in the street and often fielded some strange questions.

"When I was growing up they would ask things like how do you fit in a test tube and things like that," she said.

These days she rarely thinks about her iconic status as the first IVF baby.

"It's quite scary to think I'm the first of them all, but it's also a nice feeling that perhaps if I hadn't been born then all those people wouldn't be here, and IVF has helped so many couples," she said.

Louise is now a mother herself, to 18-month-old Cameron, although he was conceived naturally.

Louise's mother, Lesley Brown, had to go into hiding once the news of her pregnancy leaked to the press.

Professor Edwards recalled how his colleague, Patrick Steptoe, who died in 1988, smuggled Lesley away in his car.

"We were concerned she would lose the baby, the fetus, because the press were chasing Mrs Brown all over Bristol, where she lived," he told the BBC.

"So secretly Patrick Steptoe hid Lesley in his car and drove her to his mother's house in Lincoln – the press didn't know where she was."

Louise's mother said once she was in hospital reporters tried a variety of methods to sneak into her room – from a bomb hoax to posing as cleaners.

Louise's birth made front-page headlines all over the world.

Mrs Brown went on to have another daughter, Natalie, by IVF and is delighted Steptoe and Edwards helped her.

"I'm just so grateful I'm a mum at all because without IVF, I never would have been and I wouldn't have my grandchildren," she said.

Caroline Curgenven wholeheartedly agreed.

"Anyone going through IVF is going through it for hope," she said yesterday. "It's difficult and stressful, but the outcome so outweighs all of that it's absolutely worth it."

Joshua won't have the media attention Louise Brown has to live with, simply because IVF babies are much more commonplace.

"We'll tell him how he was conceived when he's old enough to understand, but I don't think it will be a problem," said Caroline.

Chances are Joshua will go to kindy or school with other IVF children.

Louise Brown was the pioneer.

One of the witnesses to her birth, Dr John Webster, who was a registrar of Dr Steptoe's at the time, said the relief of her delivery was 'palpable'.

Louise's was a caesarean delivery.

"She didn't have to be resuscitated at all and the pediatrician who examined her for any defects didn't find any. We had all been a little ment, we had no idea what to expect. The relief we felt when we saw her and heard her strong, powerful cry was immense."

After the birth Dr Steptoe went home to sleep but the rest of the team went to Dr Webster's flat.

"Bob Edwards and I were hanging around with a few others, so we went back to my house," he recalled in a recent interview.

"I didn't have any alcohol, not even a bottle of beer, so we had cups of tea and slices of cheese on toast. It was all terribly British and understated.

"It's amazing looking back on things to see how they have changed. This is something Patrick Steptoe and Bob Edwards were fighting for for years."

Joshua Curgenven is living proof the work begun by Steptoe and Edwards has become a medical fixture in our society.

"The process has been around a long time now," said his mother.

"Thank goodness."

Rainfall statistics pipe dreams muddy Traveston waters

The controversy over the proposed building of the Traveston Crossing Dam continues. Last week *The Gold Coast Bulletin* ran the story of three men who have come up with an alternate plan to expand the existing Borumba Dam. **Graeme Newton**, chief executive officer of Queensland Water Infrastructure, responds.

THE Traveston Crossing Dam is the most reliable and cost-effective way to provide additional water supplies to southeast Queensland, according to expert investigations.

The Traveston Crossing Dam, to be located on the Mary River 27km upstream of Gympie, was chosen after a comprehensive review of 80 potential sites across southeast Queensland.

Graeme Newton, the chief executive officer of Queensland Water Infrastructure, which is the proponent for the Traveston Crossing Dam, said the dam would deliver 70,000 million litres of water each year into the Southeast Queensland Water Grid and was due for completion in 2011 subject to approvals.

Commenting on an alternative proposal to significantly raise the Borumba Dam wall and use pipes to transfer water between the Wivenhoe/Somerset Dams and Borumba Dam during high-flow events, Mr Newton said studies found the proposal to be significantly less reliable and more expensive than the Traveston Crossing Dam.

An engineering assessment found the Borumba scheme would have an estimated capital cost of $3.1 billion, nearly double the amount for the $1.6 billion Traveston Crossing Dam Project.

The *Gilbert and Associates September 2007* report found the Traveston Crossing Dam had a 'greater likelihood' of capturing and maintaining sufficient water supplies, with the Borumba scheme far more dependent on sporadic high rainfall events.

Mr Newton said unlike the Borumba scheme, the Traveston Crossing Dam was not as dependent on high flow events to reach full supply as its catchment captured coastal rainfalls and on average recorded 55 per cent more rainfall than the Wivenhoe Dam catchment.

He said while the report did not consider piped water transfers between the Wivenhoe/Somerset Dams and Borumba Dam, it was because such an approach would breach guidelines set in the Moreton Water Resource Plan to maintain the health of the Brisbane River and Moreton Bay.

The report stated there was 'little to no potential' for additional water to be transferred out of the system in line with the Borumba Scheme.

Mr Newton said in contrast to the scheme, the Traveston Crossing Dam would ensure flushing environmental flows and irrigators' water entitlements on the Mary River would be maintained.

"These flows and entitlements will be met while still ensuring 90 per cent of the Mary River's mean annual flow still reaches the river mouth with the dam in place," he said.

In response to comments about evaporation and leakage at Traveston Crossing Dam, an independent engineering review by Snowy Mountains Engineering Corporation (SMEC) confirmed the dam's annual evaporation estimate of 520mm is 'reasonable' and 'the risk of leakage is insignificant'.

The SMEC review concluded the extensive geological investigations and dam design 'provide an excellent basis for a successful project'.

The Traveston Crossing Dam would also provide a range of innovative projects to deliver recreational, employment, business and environmental opportunities for the local area.

Mr Newton said the Traveston Crossing Dam was the best option to secure water supplies for southeast Queensland, unlike the Borumba scheme which was investigative and conclusively dismissed in 2007.

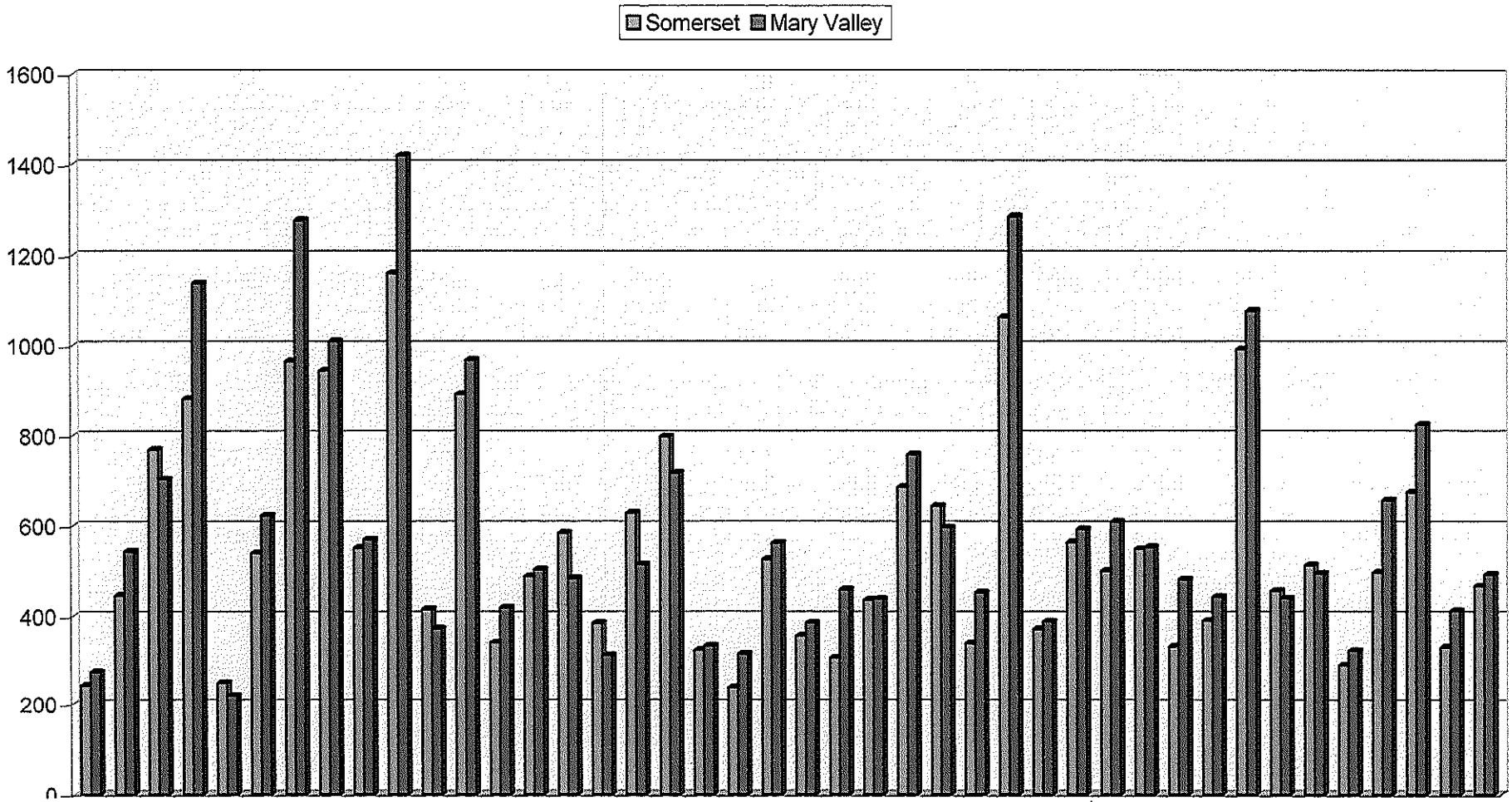
B 2

Table 10-6 Enlarged Borumba Dam Cost Estimate

	Option 1			Option 2 Similar TCD Risk Profile		
Stage	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 1**	**Stage 2**	**Stage 3**
Capacity	665,000 ML	1,200,000 ML	1,645,000 ML	445,000 ML	525,000 ML	1,645,000 ML
Dam Construction Cost for Stage, including ▪ Dam Wall ▪ Spillway ▪ Saddle Dams -Stage 3 only	519.6 m	340.5 m	532.4 m	437.5 m	177.9 m	652.8 m
Hydro Power Station (Refer Section 8.2.2)	61.4 m	5.4 m	5.8 m	61.4 m	3.6 m	7.0 m
Land acquisition	28.9 m	15.6 m	8.5 m	22.2 m	2.3 m	28.5 m
Services/roads and restoration	3.5 m	Included in Stage 1	Included in Stage 1	3.5 m	Included in Stage 1	Included in Stage 1
Total per Stage ($)	**613.4 m**	**361.5 m**	**546.7 m**	**524.6 m**	**183.8 m**	**688.3 m**
Cumulative Total ($)	**613.4 m**	**974.9 m**	**1,521.6 m**	**524.6 m**	**708.4 m**	**1,396.7 m**

Note:- Cost above include contingency, design, management and other on-costs

Comparison of Summer Rainfall Dec to March of the Somerset Dam catchment with the Mary Valley catchment of the Proposed Traveston Dam.



Year	Som	MV
1965	243	274
1966	445	543
1967	768	702
1968	881	1138
1969	249	219
1970	539	622
1971	964	1277
1972	943	1009
1973	550	569
1974	1160	1420
1975	415	372
1976	891	967
1977	341	418
1978	488	503
1979	583	483
1980	384	312
1981	628	514
1982	797	716
1983	324	334
1984	239	315
1985	525	561
1986	356	385
1987	306	458
1988	435	437
1989	685	757
1990	643	596
1991	339	452
1992	1062	1286
1993	371	388
1994	563	592
1995	500	608
1996	548	552
1997	332	481
1998	389	442
1999	991	1076
2000	455	439
2001	512	494
2002	289	322
2003	496	656
2004	673	823
2005	330	411
2006	466	492

B 4

Bring us a monsoon

Let it rain

Summer rainfalls in Wivenhoe, Somerset and North Pine Dam catchments

DECEMBER 1991 - MARCH 1992
922.8mm registered at Kilcoy

DECEMBER 1993 - MARCH 1994
414.7mm registered at Esk

DECEMBER 1994 - MARCH 1995
384.2mm registered at Kilcoy

DECEMBER 1995 - MARCH 1996
572.4mm registered at Blackbutt

DECEMBER 1998 - MARCH 1999
838.7mm registered at Esk

DECEMBER 1999 - MARCH 2001
426.2mm registered at Esk

DECEMBER 2003 - MARCH 2004
571.7mm registered at Esk

DECEMBER 2005 - MARCH 2006
392.3mm registered at Kilcoy

Near-tropical storms needed to fill storages

Amanda Gearing

CYCLONES in the Gulf of Carpentaria that have dropped half a metre of rain in tropical Queensland in the past week may have filled dams in the area to overflowing.

But similar amounts of rain would be needed to break the drought gripping southeast Queensland and replenish dwindling water supplies.

The combined storage volume of the region's three main dams is down to 22.17 per cent, well below the previous record low of 44.7 per cent set in November 1995.

SEQWater operations manager for Wivenhoe, Somerset and North Pine dams Rob Drury said a low or a major depression would be needed to cover the whole catchment area of the dams.

Wivenhoe would need 300mm-350mm of rain falling at 120mm a day over three days to fill, he said.

Wivenhoe has the capacity to store 1,165,000 megalitres of water as well as an additional capacity of 1,450,000Ml to mitigate flooding. Brisbane's second largest dam, Somerset Dam, upstream of Wivenhoe, would need 350mm-400mm of intense rain to fill because it has a smaller catchment area, Mr Drury said.

North Pine Dam, which has an even smaller catchment area would need 600mm-650mm of intense rain to fill.

"You do need large, uncommon events to fill large dams. You don't fill them every year," Mr Drury said. "There have been only four main rainfall events in the past 15-16 years. It has been seven years since we had a major rainfall event that has given us a refill of 50 per cent of the dam."

The only two rainfall periods that generated major inflows that filled the dams since 1990 were 922.8mm registered at Kilcoy in the four months to March 1992 and 838.7mm registered at Esk in the four months to March 1999.

"The dam levels were dropping 15-18 per cent a year (before water restrictions began) but last year it was only 10 per cent," Mr Drury said.

B 5

FLOOD PROOFING BRISBANE

from damaging floods to the point of extinction.
Flood mitigation in Ipswich and Gympie

Drought proofing South East Queensland

Submission to the Queensland Floods Commission of Inquiry *A*
Objections to the Borumba Dam proposal 25th July 2008 when being considered as an alternative to the Traveston Dam *B*

The fundamental flaw in calculation of water to the ecology *C*

Proof that the "Millennium" drought did not exist in the catchments and *D*
Proof that our low dam levels were not caused by any drought *D*

C 1 **The fundament flaw in the calculation of water to the ecology**
Letter to Mr Harris at direction of Minister Robertson
2 **Covering letter to Minister Robertson**

Attachments
3 Personnel at DERM meeting 2nd February 2010
Calculation of the volume "skewed" towards the Ecology.
4 With 1974 included in calculation - 132.345ML annually
5 With 1974 excluded in calculation - 160,810ML annually
6 Technical Advisory Panel (TAP) statement on "mean Annual flow" skewed by large floods
7 Calculation of "mean annual flow" by WRP page 91
8 Definition of "simulation period" by WRP page 97
9 Pre-Development flows (No dams or people)
10 Public notice by Premier Beattie - The "Facts" on Traveston
The third stage ephemeral.22/07/2006
11 J W P Engineering report sign off date 22/01/2007
12 Correspondence Dep Premier Bligh requesting completion of terms of reference 31/01/2007 10 days after Reports were completed
13 "Advice" that no water could be taken from the Wivenhoe/Somerset system
A J W P Engineering
B Gilbert and Associates Pty Ltd
14 Gilbert and Associates, Hydrologist, contribution to TAP report acknowledged
15 J W P Engineers costing of three stage Borumba dam wall to 1,650,000ML
16 Mr Drury. SEQWater Dam manager Courier Mail 10th February 2007
17 Sequence of low pressure systems

J. V. HODGKINSON F.C.A
Chartered Accountant

[redacted]

C1

16th November 2010

[redacted]
Principal Project Officer
Water Planning South East
Department of Natural Resources, Mines and Energy
Postal: 80 Meiers Rd
Indooroopilly QLD 4068

C2

Copies to:
Minister Stephen Robertson Minister for Natural Resources, Mines and Energy
Ms Mary Boydell Chair QWC
Professor Angela Arthington
Professor Paul Greenfield

Daniel,

Minister Robertson responded on the 2nd June 2010 to my letter of the 20th April 2010 which was very much appreciated. In addition he was good enough to give me your name as contact person should I have any further enquiries. No doubt you are familiar with its contents.

As you were present at our meeting involving Trevor Herse, myself and senior executives of DERM held on the 2nd February 2010 and also classified as a contributor to the **Moreton and Gold Coast environmental Investigations** (TAP) issued in July 2006, you will be very familiar with what I have to say. *C3*

Minister Robertson has pointed out that the conclusions of these investigations formed the basis of the Water Resource (Moreton) Plan 2007 which was enacted on the 19th March 2007. He classified the period July 2006 to March 2007 as sufficient time for public scrutiny. He also pointed out to me the former in his letter of the 6th August 2009 responding to my letter to the previous Minister.

The following straightforward Yes/No question tests the veracity of Minister Robertson claims in both of those letters. The answer either way has severe consequences for the residents of SEQ.

The question

Arithmetical calculation

The question deals with an arithmetical calculation. It has two factors:
1. 66% of the water that passes through the Wivenhoe/Somerset catchments is required at the Brisbane River mouth. (WRP page 64 Node E : page 72 Node E column 3 MAF)
2. The other factor is the annualised volume of water over a period called the "simulation period". (WRP

page 93). The period in the Act is 01/07/1889 to 30/06/2000. To arrive at this annualised volume of water, pre-development flows are added together and divided by the number of years. That annual required volume is a once only calculation that remains for good and must be met for all succeeding years.

The net result is 66% (1) of the annualised volume calculated by the "simulation period" (2) must reach the Brisbane River mouth

The question

Was it the intention of the TAP personnel and the Review Panel to include the major floods of 1890, 1893 and 1974 in the calculation of the "simulation" period?

If the answer is "**no**" then the **66%** is calculated on the wrong base and denies us 130,568ML annually or the equivalent of the output of 3 desalination plants the size of Tugun.

If the answer is "**yes**" then that volume, inflated by the floods, when applied to the 113 years 1894 to 2006, increases the actual percentage to **75%**. The statement attributed by the Minister then becomes "False" in terms of Boolean logic "True or False". It then needs widespread public rectification because of the huge cost of this calculation.

This is all set out in my calculations attached to this letter. It was setout in a letter on the 25th February 2010 to [redacted] Director of Water Assessment DERM with a request for critical analysis. The QWC Commissioner Mary Boydell also requested [redacted] to respond direct to me on this matter. There was no response. All of the above recipients of this letter and those present at our meeting have also received a copy with the exception of the Minister. ***C4*** ***C5***

Why the question?

Information: Establishing the official information

The Moreton and Gold Coast environmental Investigations (TAP) had this to say about the inclusion of large floods on page 52 of that document.

*"**Mean annual flow** is a measure of the total volume of flow carried by a river or stream at a particular site. It is a useful and easily understood communication tool for summarising net flow regime change in volumetric terms. **However, it can be skewed by years with very large flows.**"* The second set of bold letters is mine for emphasis. ***C6***

It also had this to say about the "simulation" period on page 42 of that document. It is the only statement on establishing the years to be observed.

"Flows at these nodes are established for a period of approximately 110 years"

The Water Resource (Moreton) Plan 2007 has the following definitions:

*"**mean annual flow**, for a node, means the total volume of flow, at the node, in the **simulation period** divided by the number of years in the simulation period."* ***C7***

*"**simulation period** means the period from 1 July 1889 to 30 June 2000."* ***C8***

Assessment of the information

It is difficult to understand why the Technical Advisory Panel was so vague in the critical phase of selection of the simulation period. Their observation is deficient in two matters:

1. The Act selected 111 years (01/07/1889 to 30/06/2000) and not the "approximate 110" years.
2. The inclusion of the major floods 1890, 1893 and 1974 in the simulation period. The **attached chart** of pre-development flows illustrates the impact of these floods even to the uninitiated. The chart was drawn up by the official IQQM model. I requested this information prior to and at our meeting on the 2nd February 2010. I received it subsequently.

Conclusion of the above

Whatever may be rationalized of the above, there is no escape from reality when this "once only" volume, calculated in accordance with the Act, is applied to the 113 years 01/07/1893 to 30/06/2006. That period excludes the 1890 and 1893 floods "conveniently located" at the very start of the simulation period. The annual volume that must reach the mouth of the Brisbane River is **75%** of the predevelopment flows even with the 1974 flood included.

The TAP advice that **major floods will "skew" the result is proven.**

Attempts to have some well qualified members of the Technical Advisory Panel (TAP) and its Review Committee clarify this situation have strangely met with silence. Perhaps they have referred my correspondence to you or others in your Department.

Information in public domain for some time

Minister Robertson made reference to the TAP information being in the public arena for some time. The import of that statement was that objections and variations should have been raised at that point.

I find two essential matters that should have been accounted for before passing into Law the Water Resource (Moreton) Plan 2007

1. The absence of the pre-development flows in the public domain.
2. The ongoing examination the McMah proposal

Absence of pre-development flows

The **Moreton and Gold Coast environmental Investigations** (TAP) document is dated July 2006. The Water Resource (Moreton) Plan 2007 was passed by Parliament on the 19th March 2007.

While the TAP document was on the web-site, the important arithmetical factor of the pre-development flows was not. The 1890, 1893 and 1974 floods were well know to me but the pre-development flows could only be estimates and therefore not usable by anyone in an assessment. ***C9***

The McMah proposal

At a public meeting in Gympie on the 3rd November 2006, the then Deputy Premier Anna Bligh gave an

iron-clad guarantee to the people Mary Valley that if his proposal stacked up then that would be the way they would go rather than the Traveston dam proposal.

Mr McMah's proposal conformed to the publicly promoted advice of Premier Beattie (Public advertisement attached) ***C10***. Looking back with hindsight, Premier Beattie and Ron McMah were near the mark with 110,000ML from the first two sections with the third section in the category of ephemeral. The current water strategy has three desalination plants in mind with an output of 135,000ML and well into the future at that. The Terms of reference that were drawn up required all three sections contrary to Premier Beattie's public position.

There is sufficient evidence that there was conflict with the proposed Water Resource (Moreton) plan that had not been resolved and Deputy Premier Bligh's undertaking to the people of Gympie not fulfilled.

- The Engineering report was clear that it, and the Hydrological report, were completed on the **22nd January 2007**. The Hydrological report carried an "appendix" and was re-dated September 2007. ***C11***

- Correspondence from the then Deputy Premier Bligh to Mr McMah about settlement of the Terms of Reference so that the Engineering and Hydrological Reports could commence, was still in evidence at the **31st January 2007** being the last date of her correspondence to Mr McMah. It was **dated 8 days after the reports had been finalized** on the basis that there was no water from the Wivenhoe/Somerset system. (Letter from Premier Bligh and sign-off section of the Engineering report attached) ***C12***

- Both of those reports said at the outset that they had declined to provide any assessment of the use of surplus water from the Wivenhoe/Somerset system as "advice" had been given that there was no water available from that system. That there was an unresolved dispute before, and at the time, the Water Resource (Moreton) Plan 2007 was enacted by Parliament, is clear from the evidence. ***C13***

- The "appendix" of the Hydrological report dealt with flood waters, we believe, as a result of our August 2007 correspondence to Deputy Premier Bligh. Their primary contention was that as all of SEQ was generally covered by these large events (agreed), then the Borumba Dam expanded to 2,000,000ML would be overflowing at the same time. All of DERM and the QWC personnel at our meeting of the 2nd February 2010 disagreed with this central statement of the "appendix". The catchment is simply too small. ***C3***

- It should be noted that the "Final" report of the Hydrology firm carried a September 2007 date, some six months after the passing into Law the Water Resource (Moreton) Plan 2007.

- Deputy Premier Bligh's letter of the 31st January 2007 also utilised three paragraphs to deflect Ron McMah's insistence on an independent review. With the Consultants' reports already ***C12*** complete, perhaps she was unaware that the Hydrology firm was one of two acknowledged contributors to the **TAP Moreton and Gold Coast environmental investigations** on which the Technical Advisory Panel conclusions were based. The third contributor acknowledged was yourself. (attached) ***C14***

I am therefore in disagreement with Minister Robertson's view that there was sufficient time for public comment. **Clearly even the (then) Deputy Premier Bligh was ignored and exposed to duplicity.**

The Relationship of the McMah proposal to the determination of what the Technical Advisory Panel really meant when making the allocation to the River

The "advice" received by the Hydrologists and Engineers "that there was no water available from the Wivenhoe/Somerset system" disappears altogether if the Technical Advisory Panel did not intend that floods 1890, 1893 and 1974 be included in the "simulation period". If they intended that they be included against their own advice, then the reality of its application for the 113 years 1894 to 2006 becomes 75% for the River and leaves Minister Robertson to explain why 75%, with its huge associated cost, is allocated to the River and not 66%. ***C4*** ***C5***

The McMah proposal rested on the collection and retention for later return of water from the Wivenhoe/Somerset system. The Water Resource (Moreton) Plan 2007 provides for this. The evidence is that there were two impediments to this essential ingredient to the McMah proposal:

- The change to a stochastic approach and away from the normal HYNF method of calculating the yield of the Wivenhoe/Somerset dams. (SEQWater Strategy page62 para 3.3)
- The inclusion of the major floods in the simulation period. ***C8***

The McMah proposal eliminates the need for the change to a stochastic approach. As you are aware from our addendum to his proposal, there is only need to return not more than 700,000ML in any period measured by your IQQM model. This is to maintain our dams at a level not less than 40% using a yield of 373,000ML calculated by this IQQM model. There were only two such periods involved in 120 years and they were for 5 years and 6 years.

This permits the release of 87,000ML/a being the difference between the yield of 373,000ML calculated by your IQQM computer model and the current allocations of 286,000ML/a

The inclusion of the major floods in the simulation period determines that the people of SEQ were shortchanged by 130,568ML/a by the inclusion of these floods. The 87,000ML/a eliminated by "no need for the stochastic approach" is included in this figure. ***C4*** ***C5***

The essential and only required ingredients of consequence in the McMah proposal was the construction of the dam wall at Borumba to expand that dam to 2 million ML and a two-way pipeline to Wivenhoe/Somerset. The Engineers provided a costing for a three stage wall to 1,650,000ML with hydro and two saddle dams. The cost is attached at $1.397billion. The Chief supervising engineer on the construction of the Wivenhoe Dam gave an "heroic" estimate of the cost of piping equipment and installation to be $500 million. A check on the cost of pipes, on his recommendation, indicated that it was somewhere near the mark. ***C15***

Pumping requirements would be minimal. The first 1,500,000ML could be pumped over a number of years under normal conditions with the withdrawals not required for many years. (The SEQWS intends that the Borumba dam be expanded to 350,000ML utilizing its own catchment). The Hydro plant should pay its way.

With the denial of storage water from the Wivenhoe/Somerset system, the concentration of the reports, claimed to relate to the McMah proposal, was on the "throw away" suggestion of the Weirs in the Mary Valley. This was a highly expensive proposition and used extensively in media arguments. On examination of the Engineering report the former chief supervising engineer of the Wivenhoe Dam remarked "You were stitched up BONZER" and conveyed his thoughts to the QWC.

Mathematics

Above calculation
We have seen above that the calculation required is of basic arithmetic. It required two factors to arrive at an answer. Only one factor, the 66% requirement had a firm foundation. The absence of a firm foundation for the other opened the way for serious error for the unwary.

Dam filling events occur on average every 3.7 years.
Mr Drury of SEQWater enunciated the requirements to fill these large dams in the Courier Mail 10th February 2007. 300mm in a few days is a flood capable under certain conditions of filling the dams from scratch to overflow. On the other hand 100mm per month for 3 months is a comparative trickle. ***C16***

A review of Bureau of Meteorology records of the rainfall stations in the catchments and the Bureau's flood information reveals that these large events ignore the month of the year and can happen at any time. Their frequency occurs on average every 3.7 years since 1841 with the majority under that average. Therefore those above can be quite lengthy as we experienced in the 2001 to 2007 period. It was defined as a "drought" even with the catchments receiving 99.1% and 91.4% in the summer months with the 20% deficiency in the low flow non-summer months. ***C17***

It was interesting to note that the QCCCE in their comparison of the 1898 – 1903 Federation period with the 2001 – 2007 period, declined to use the pre-development flows through lack of data. In spite of this we see above the commencement of the pre-development flows at 1890 with the federation drought being 1898 to 1903. Even without the large events, which did not occur in either period, one would have found significant difference as the Federation drought rainfall was spread out over the years with very little concentrated rain. It was entirely different in the period 2001 to 2007. ***D1***

The qualifications made by the QCCCE, evidenced in the previous Water Strategy, have been omitted from the current version. ***D1***

Embrace of the "Millennium drought" is at the heart of your Department's thinking, solutions and rationale of past events ***D1***

As events unfold

****

Extract from my letter to Hon. Mr S. Hinchliffe, Minister for Infrastructure and Planning, sent on the 23rd April 2009 three weeks before the May 2009 event

"The way I see it, the difficulty for you and all who support the Traveston is that on the mathematical certainty of the return of the "uncommon events" the dams will overflow. That by itself should have people in SEQ questioning if those in charge understand what they are doing. Historically there has been 11 "uncommon events" within 1 year of each other (April 1988 & April 1989 for example) and there will be a tremendous loss of water over spillways with full dams. In my view justification of the Traveston will be under severe stress and storage in the Borumba Dam together with its additional yield, vindicated."

The May 2009 event was relatively minor, never-the-less it filled the dams to near capacity and Premier Bligh declared her particular brand of "drought" over. A review of the Bureau drought section in their website indicated that SEQ had been drought free for two years prior to May 2009.

Again the October 2010 was a relatively minor event but enough to create significant overflow of dams almost full from May 2009 event.

******

The following is an extract from my letter **to Premier Anna Bligh** on the 18th January 2008 when dealing with the Traveston Dam project.

"Uncommon events" proved to be the lifeblood of SEQ from 1986 to 2001, filling the Dams to overflow four times and covering expanding population requirements with ease. Although the official records disclose there was an absence of "uncommon events" between 1974 and 1988, there were five such events in the short life of the Wivenhoe Dam (1988 to 1999 and a topup in Feb.2001). A high proportion of those events flowed over the spillway and were lost because of lack of storage.

***They will return.** When the uncommon events return, we will **not** have sufficient **storage space** to retain the surplus water from them, except for the first one. Most of that water from uncommon events would now be lost whereas they were our main provider for the 16 years to 2001".*

****

Not prophetic, Not Climate Change – just mathematics

Billions of dollars have been squandered recently by ignoring the past activities of our main water supply "uncommon events".

The future

Everyone present at our meeting held on the 2nd February 2010 was left in no doubt that the 66% proposed by the Technical Advisory Panel was considered inadequate by some of those present and that steps had been taken to improve it. That they had the authority or authorization is assumed.

It is my view there is billions of dollars of future expenditure resting on the decisions enumerated in this letter and in the end the decisions will have to be justified. Deferring these matters to 2017, when the Water Plan is up for renewal, is not an option as three unnecessary desalination plant sites have been selected and the location of the new dam wall (300,000ML capacity) at the Borumba dam will preclude a wall to 2 million ML capacity unless modified before any construction is commenced.

Conclusion

The responsibility of the Minister and your Department is to examine the requirements of the ecology of the River and the needs of the people of SEQ and to equitability balance the requirements of both.

I wish you well in your deliberations.

Regards

.....
John V Hodgkinson F.C.A.

J. V. HODGKINSON F.C.A
Chartered Accountant

[redacted]

[redacted]

[redacted]

17th November 2010

Hon Stephen Robertson MP
Minister for Natural Resources
Level 17
61 Mary St
BRISBANE 4000

C2

Dear Minister,

Thank you for your letter of the 2nd June 2010. I have responded as you suggest to Mr. Daniel Harris.

I have enclosed a copy of my response as it affects the veracity of statements, drawn from the way the Water Resource (Moreton) Plan 2007 is written, and attributed to you.

The hydrology of the Moreton Plan is accepted. The arithmetic of the plan is not accepted. The application of the Act to the 113 years 1894 to 2006 determines that 75% of the water that passes through the Wivenhoe/Somerset must reach the Brisbane River mouth and not the 66% attributed in the Act and as a consequence your statements to me and the people of SEQ.

While the percentage of 66% is clear, what is not clear is 66% of what? The Technical Advisory Panel (TAP) did not specify the years of the "Simulation period". They were quite vague with approximations.

The "Simulation period", selected in the Act, began on the 01/7/1889 and ended on the 30/06/2000. It included three major floods of 1890, 1893 and 1974. The TAP **Moreton and Gold Coast environmental Investigations** issued in July 2006 drew attention to the fact that large floods would skew the result.

A glance at the pre-development flows (included in the attachments), prepared by the IQQM computer model enshrined in the ACT, shows this propensity to skew, even to the uninitiated. The 1890 and very large flood of 1893 are conveniently located at the start of the "Simulation period" chosen for the exercise.

The "Mean Annual Flow" on which the 66% is based is calculated permanently on this once only calculation including the floods. The reality is that the volume becomes 75% when applied to the 113 years 1894 to 2006, which excludes the 1890 and 1893 floods responsible for the "skewed result" but still includes the 1974 flood as well as the period 01/07/2000 to 30/06/2006 when rainfall was equal to 76% of the long term average.

The variance in the volume of water involved as a result is 130,568ML annually denied to consumers which represents the equivalent of the output of 3 desalination plants of the Tugun size. This represents

future infrastructure costs in the billions of dollars and is worthy of your reconsideration.

We are here to help, the "we" being Trevor Herse retired of the Gold Coast, Ron McMah grazier of Imbil and myself also retired. We represent no one except the people of SEQ. Our initial interest was to replace the Traveston with the Borumba Dam expanded to 2,000,000ML.

Even at this stage we see no impediment to this proposal. Certainly not the Water Resource (Moreton) Plan 2007, as has been suggested, which requires the Minister to regularly review and, if necessary, amend it's provisions to ensure adequate water supply to SEQ consumers.

Regards

.....
John V. Hodgkinson F.C.A.

Queensland water Commission

Securing our water, together.

Our ref: ME/10/0037

18 JAN 2010

C 3

Mr John Hodgkinson
[redacted]

Dear Mr Hodgkinson

Thank you for your letter of 11 January 2010 concerning a meeting with representatives from the Queensland Water Commission (QWC) and the Department of Environment and Resource Management (DERM) on 2 February 2010.

The meeting will be held at 120 Meiers Road, Indooroopilly, as indicated by the red cross on the map I have enclosed. Parking is available at this location. Please enter via the reception desk and ask for [redacted]. If further directions are required, please contact [redacted] and ask for [redacted].

Attendees at this meeting will include:

- [redacted], Director Water Assessment, DERM;
- [redacted], Director Water Planning (South East), DERM, currently on secondment to QWC in the role of Director Water Strategy;
- [redacted], Principal Project Officer, Water Planning (South East), DERM; and
- [redacted], Principal Policy Officer, Infrastructure Implementation, QWC.

[redacted], Acting Executive Director, QWC, will be unable to attend the meeting due to another commitment and sends his apologies.

You may wish to forward an outline of any specific questions or matters that you would like to raise at the meeting so that the hydrologists may have material at hand to assist in their response.

If you require any further information, please contact me on 3247 4461.

Yours sincerely

[redacted]

pp. [redacted]

Executive Assistant to the Senior Director
Regional Planning and Policy

Enc (1)

Also Present

[redacted]

Principal Hydrologist, Water Planning Sciences
Enviroment and resource Sciences

Queensland Water Commission
PO Box 15087 City East Qld 4002
Ph: +61 7 3227 8207 Fax: +61 7 3227 8227
ABN: 65 242 908 036 **web: www.qwc.qld.gov.au**

C 4

1974 flood still included in "simulation period"

The 66% at the Brisbane River mouth was defined by the Act and is constant
It included 2 major floods at the very start of the period and excluded
the most recent period without a major event occuring at the end of the period.

Simulation period : 1/07/1889 to 30/06/2000 : 111 years				Includes the floods of 1890 and 1893
Mean annual flow as defined by Act		1,641,331	(Govt IQQM model)	Mean Annual flow is the sum of those 111 years divided by 111 years for the yearly average.
Number of years		111		
Total flow for 111 years		182,187,741		1,641,331 X 111 years
Current distributions as defined by the Act			**Volume**	
Percentage	Ecology	66.00	1,083,278	
	Consumption	34.00	558,053	
		100.00	1,641,331	
Simulation period 01/07/1893 to 30/06/2006				Excluding years 1890 to 1893 adding years 2001 to 2006
Mean annaul flow for the 111 years - above 1890 to 2000			182,187,741	
Deduct				
Floods 1890 & 1893 included at Start 01/07/1899 to 30/06/2000				Flood volumes determined by IQQM government computer model - see in this section.
1893 flood for Wivenhoe/Som		7,500,000		
Extract 2 minor floods 1893-allow		(1,500,000)		
1890 flood for Wivenhoe/Som		4,300,000		
Total for Wivenhoe/Somerset		10,300,000		
Wivenhoe/Somerset represents		58.20		Government advice
Whole of catchment		100.00		
Volume for whole of catchment			(17,697,595)	
Years (111-2)		109		
Add				
INSERTING YEARS 2001 to 2006				Estimates based on Qld Water Commission graph and graph verified by CEO of the QWC.
Year 2001 estimate		250,000		
2002-2006				
Annual Vol	90,000			
Years	5	450,000		
Wiv 58.2%	58.2	700,000		Wivenhoe/Somerset share is 58.2%
Whole of catchment	100.00		1,202,749	Whole of catchment
years (109 + 6)		115		Number of years 113
Revised mean annual flow 1893 to 2006			**165,692,896**	
Annual mean annual flow			1,440,808	(165,692,896 divide 115 years)

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IMPLICATIONS OF THE REVISED MEAN ANNUAL FLOW

The important point here is that the volume calculated in the simulated period 1890 to 2000 is maintained. The altered state of the real world is ignored with the 1,083 278 remaining constant under all conditions.

Distribution as defined by the Act			Revised percent
Static state	Ecology	1,083,278	75.19
Variable state	Consumption	357,529	24.81
		1,440,808	100.00

Distribution maintaining the 66% requirement under the Act			
	Mean annual flow 1894 to 2006		1,440,808
		66.00	950,933
		34.00	489,875
	Mean annual flow		1,440,808

Variance from actual to requirement of the Act	
Ecology under simulation period 1889 to 2000	1,083,278
Ecology under period 1894 to 2006	950,933
Consumption shortchanged by statistical aberration	132,345

Our proposal	
Requirement under phase 2. Release of unallocated water held for stochastic reasons	84,000
Requirement under phase 3 : Additional water identified by engineers GHD	50,000
	134,000

1974 flood excluded from "Simulation period"

The 66% at the Brisbane River mouth was defined by the Act and is constant
It included 2 major floods at the very start of the period and excluded
the most recent period without a major event occuring at the end of the period.

Simulation period : 1/07/1889 to 30/06/2000 : 111 years				Includes the floods of 1890 and 1893
Mean annual flow as defined by Act		1,641,331	(Govt IQQM model)	Mean Annual flow is the sum of those 111 years divided by 111 years for the yearly average.
Number of years		111		
Total flow for 111 years		182,187,741		1,641,331 X 111 years
Current distributions as defined by the Act			Volume	
Percentage	Ecology	66.00	1,083,278	
	Consumption	34.00	558,053	
		100.00	1,641,331	
Simulation period 01/07/1893 to 30/06/2006				Excluding years 1890 to 1893 adding years 2001 to 2006
Mean annaul flow for the 111 years - above 1890 to 2000			182,187,741	
Deduct				
Floods 1890 & 1893 included at Start 01/07/1899 to 30/06/2000				Flood volumes determined by IQQM government computer model - see in this section.
1893 flood for Wivenhoe/Som		7,500,000		
Extract 2 minor floods - allow		(1,500,000)		
1890 flood for Wivenhoe/Som		4,300,000		
1974 Flood for Wivenhoe/Som		4,300,000		
Extract possible minor flood March		(600,000)		
Total for Wivenhoe/Somerset		14,000,000		
Wivenhoe/Somerset represents		58.20		Government advice
Whole of catchment		100.00		
Volume for whole of catchment			(24,054,983)	
Years (111-3)		108		
Add				
INSERTING YEARS 2001 to 2006				Estimates based on Qld Water Commission graph and graph verified by CEO of the QWC.
Year 2001 estimate	1	250,000		
2002-2006				
Annual Vol	90,000			
Years	5	450,000		
Wiv 58.2%	58.2	700,000		Wivenhoe/Somerset share is 58.2%
		114		
Whole of catchment	100.00		1,202,749	Whole of catchment
years (108 + 6)		114		Number of years 113
Revised mean annual flow 1893 to 2006			**159,335,507**	
Annual mean annual flow			1,397,680	(115.77,260 divide 114 years)

C 5

IMPLICATIONS OF THE REVISED MEAN ANNUAL FLOW

The important point here is that the volume calculated in the simulated period 1890 to 2000 is maintained. The altered state of the real world is ignored with the 1,083 278 remaining constant under all conditions.

Distribution as defined by the Act			Revised percent
Static state	Ecology	1,083,278	77.51
Variable state	Consumption	314,401	22.49
		1,397,680	100.00

Distribution maintaining the 66% requirement under the Act			
	Mean annual flow 1894 to 2006		1,397,680
		66.00	922,469
		34.00	475,211
	Mean annual flow		1,397,680

Variance from actual to requirement of the Act	
Ecology under simulation period 1889 to 2000	1,083,278
Ecology under period 1894 to 2006	922,469
Consumption shortchanged by statistical aberration	160,810

Our proposal

Requirement under phase 2. Release of unallocated water held for stochastic reasons	84,000
Requirement under phase 3 : Additional water identified by engineers GHD	50,000
	134,000

However, levels of risk, particularly in non-tidal reaches, are more directly related to the timing and magnitude of flows affected rather than total volumetric change. For example, extraction of a given volume of water under low flow conditions would have greater ecological implications than extraction of the same volume of water under high flow conditions, all other things being equal. Thus, total flow volume indicators are useful for descriptive purposes and for calculating catchment loads, but are too insensitive to changes in key aspects of the flow regime to be useful for predicting ecological impacts other than in general terms.

Long-term Indicators

Three of the statistical indicators in Table 5.1 relate to total flow volumes:

- mean annual flow;
- median annual flow; and
- APFD.

Mean annual flow is a measure of the total volume of flow carried by a river or stream at a particular site. It is a useful and easily understood communication tool for summarising net flow regime change in volumetric terms. However, it can be skewed by years with very large flows. Impacts of water resource development can be hidden if there is little change in high flow regime or the water stored in a dam is transported via supplementation of the river channel, particularly if evaporation rates are low. For example, the flow regime of Brisbane River below Wivenhoe Dam is highly modified, yet mean annual flow is 86% of pre-development (Brizga et al. 2006a).

Median annual flow is another measure of central tendency in annual flows, which, unlike the mean, is not skewed by wetter years and thus is more informative about typical flow conditions, particularly in river systems with highly variable flow regimes. Unlike the mean, it does not provide information about the total flow volume carried by a stream at a particular site. In supplemented streams, it is a less sensitive measure of flow regime change than the mean as it can be made to appear more "natural" by increasing levels of flow supplementation. Thus, it is considered a useful indicator only in unsupplemented rivers/streams.

APFD is a composite measure of deviation from the natural (or pre-development) flow regime with regard to total flow volumes, interannual variability and seasonality based on monthly timestep data. A drawback of this indicator is that, on its own, it does not enable differentiation of the relative contribution of these components to flow regime change. However, unlike the other statistical measures proposed as key flow indicators, APFD is based on comparisons of simulated flows in specific months (for example, developed and natural flows in June 1995) rather than long-term averages. It is thus more sensitive to natural variability in its definition of baseline condition. A totally natural flow regime will result in an APFD score of zero. The greater the deviation from the natural flow regime, the greater the APFD score.

A correlation between APFD and fish species diversity was identified by Gehrke et al. (1995) based on work in the Murray–Darling River system. Statistical relationships between APFD and fish species diversity have not been assessed in the Moreton and Gold Coast WRP areas or any other Queensland coastal rivers. A statistical correlation does not necessarily imply a causal relationship and the ecological processes underlying the

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Schedule 15 (continued)

IQQM computer program means the department's Integrated Quantity and Quality Modelling computer program, and associated statistical analysis and reporting programs, that simulate daily stream flows, flow management, storages, releases, instream infrastructure, water diversions, water demands and other hydrologic events in the plan area.

irrigation purposes means any of the following purposes—

(a) aquaculture;

(b) dairying;

(c) irrigation;

(d) piggery;

(e) stock or domestic purposes;

(f) water harvesting.

low flow regime, for a watercourse, means the minimum flows that provide a continuous flow through the watercourse.

management area—

(a) for part 6, division 2, see section 63; or

(b) for part 6, division 3, see section 66; or

(c) for part 6, division 4, see section 76.

mean annual flow, for a node, means the total volume of flow, at the node, in the simulation period divided by the number of years in the simulation period.

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medium priority group means the water allocations in a water supply scheme that are stated to be medium priority group in the water allocations register.

monthly supplemented water sharing index, for water allocations in a water supply scheme, means the percentage of months in the simulation period in which the allocations are fully supplied.

C 8

Schedule 15 (continued)

SEQ regional plan see the *Integrated Planning Act 1997*, section 2.5A.10.

simulated mean annual diversion, for a water allocation or group of water allocations, means the total volume of water simulated to have been taken under the allocation or group, if the allocation or group were in existence for the whole of the simulation period, divided by the number of years in the simulation period.

simulation period means the period from 1 July 1889 to 30 June 2000.

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started, for an existing water bore or existing overland flow works, means—

(a) construction of the bore or works had physically begun or, if construction had not physically begun, a contract had been entered into to begin construction; and

(b) an independently verifiable construction program existed for progressive construction towards completion of the bore or works; and

(c) detailed design plans existed showing, among other things, the extent of the bore or works; and

(d) if a permit under the *Local Government Act 1993*, section 940, was required for the bore or works—the permit had been issued; and

(e) if a development permit was required for the bore or works—the permit had been given.

subcatchment area see section 6.

SunWater means the entity continued in existence under the *Government Owned Corporations Regulation 2004*, section 34.

supplemented groundwater means groundwater that is recharged by water supplied under an interim resource operations licence, resource operations licence or other authority to operate water infrastructure.

supplemented groundwater area, for groundwater unit 1 in an implementation area, means the part of the groundwater unit

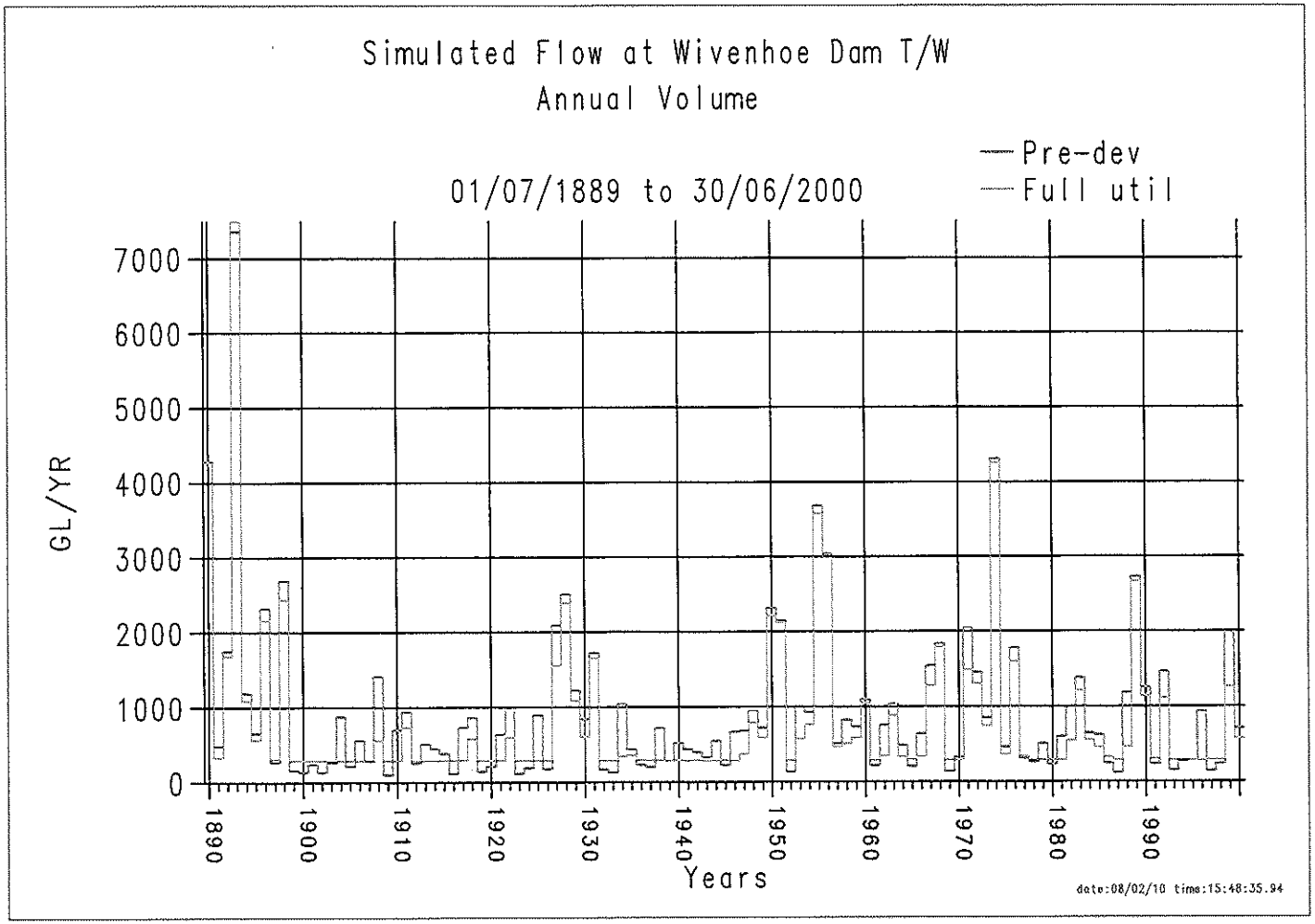

Figure 1: Annual flow volume simulated at Wivenhoe Dam TW for pre-development and full utilisation of existing entitlements scenario

Traveston Crossing Dam – the facts

South East Queensland is currently experiencing the worst drought in 100 years. The Queensland Government is working to ensure we have enough water to get through the dry, address climate change and meet the needs of our booming population.

The Department of Natural Resources report, *Water for South East Queensland: A Long Term Solution* outlines the process used to reach decisions on essential new water infrastructure in the region. This is available at **www.nrm.qld.gov.au/water**

This report draws on work undertaken over the last two decades and commissioned work, such as the desktop GHD review of dams sites in the region. It has been supplemented by available hydrologic information and more recent hydrological assessments at selected sites.

Based on this information the Queensland Government announced this month our intention, to build the Traveston Crossing Dam and raise Borumba Dam in the Mary River catchment in three stages:

- Construction of stage one of the Traveston Crossing Dam by the end of 2011. Stage one elevation level will be 71 metres providing a yield of 70,000 megalitres each year.
- Raising Borumba Dam by a maximum of 30 metres by 2025 to provide 40,000 megalitres each year.
- Final stage of the Traveston Crossing Dam completed by 2035 at an elevation level of 79.5 metres. This stage will only be completed if stage one and two are insufficient to meet South East Queensland demand based on rainfall and usage patterns.

The Government made the decision to proceed with this option based on factors such as potential yield, cost effectiveness, environmental, cultural and social impact, strategic value, and reliability of the sources.

The report, *Water for South East Queensland: A Long Term Solution*, identified it as the best catchment area available.

The three projects can provide a total of 150,000 megalitres each year. The final phase of the Traveston Crossing Dam will only go ahead based on an assessment of the region's water use and rainfall patterns.

The construction of the Traveston Crossing Dam also offers the potential of flood mitigation for the downstream communities of Gympie and Maryborough.

The Government's decision to build Traveston Crossing Dam in the Mary River catchment follows preliminary investigations of the dam site.

The Government is committed to meeting all State and Commonwealth environmental requirements and will be required to complete studies into:

- aquatic animal impacts
- native vegetation impacts
- cultural heritage impacts
- economic evaluation
- reliability and performance
- riverine conservation values assessment.

Some of these detailed studies will take up to three years to complete and will support comprehensive impact assessments.

The impact of the dam on the people who live and work on the Mary River can not be underestimated. The people of Cooloola Shire are making a huge sacrifice to ensure the security of South East Queensland's water supply. For this reason our plan allows people whose properties are affected by the dam to sell to the government while remaining in their home until the dam is completed.

Generous terms will be applied to lease-back arrangements, including the maximum of $1000 per year rental for all landowners affected in stage one.

In addition, through the newly established Community Futures Taskforce, the Government will look at practical ways we can try and help address local concerns. We want to help rebuild communities so the dams become valued assets and create new work and recreation opportunities.

If you need more information about the Mary River water initiatives, visit **www.nrm.qld.gov.au/water** or phone **1800 243 585**. An independent hotline for counselling has also been established on **1300 667 791**.

Peter Beattie MP
Premier

Queensland **the Smart State**

Queensland Government

DNRW10

Authorised by the Queensland Government, George St, Brisbane.

Information removed here

Anna Bligh MP

Queensland Government

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Deputy Premier,
Treasurer and
Minister for Infrastructure

31 JAN 2007

Mr R E McMah
[redacted]

Dear Mr McMah Ron:

Thank you for your letter of the 24th January 2007 concerning my offer for you to meet with departmental officers to resolve the terms of reference for the study of your proposal. I note the issues you raise in response.

You clearly stated at the Gympie meeting, and on several occasions since, that your proposal would negate the need to build the Traveston Crossing Dam. The State Government, as part of its SEQ Regional Water Supply Strategy, requires a system that is capable of 70,000 ML pa yield at stage 1 and a yield of 150,000 ML pa at stage 2. The proposed Traveston Crossing Dam is able to deliver this.

If your proposal, as you state, is to replace Traveston, the alternative needs to be measured against the same required yield.

In respect of your advice that you want an independent investigation by consultants, I would think it unlikely that you would find a reputable firm that has not at some stage undertaken work for the Queensland Government.

As I am sure you understand, the professional reputation of the consultant, including the reputation for high quality independent expert advice is critical to the strength of any consultancy firm.

I remind you that not only will this consultancy be independent, the State Government has undertaken to publish the results of the consultancy, which will be subject to the full glare of public scrutiny and analysis including the analysis of your own advisors and experts.

I am sure that there are a number of people who heard your proposal at the Gympie meeting are anxious for it to be genuinely analysed.

I urge you to meet with officers of the Department to resolve this matter as soon as possible.

Executive Building
100 George Street Brisbane
GPO Box 611 Brisbane
Queensland 4001 Australia
Telephone +61 7 3224 6900
Facsimile +61 7 3229 0642
Email DeputyPremier@ministerial.qld.gov.au
ABN 65 959 415 158

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Your early advice would be appreciated.

Yours sincerely

[redacted]

Anna Bligh MP
Deputy Premier
Treasurer and
Minister for Infrastructure

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Table 10-6 Enlarged Borumba Dam Cost Estimate

	Option 1			Option 2 Similar TCD Risk Profile		
Stage	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 1**	**Stage 2**	**Stage 3**
Capacity	665,000 ML	1,200,000 ML	1,645,000 ML	445,000 ML	525,000 ML	1,645,000 ML
Dam Construction Cost for Stage, including ▪ Dam Wall ▪ Spillway ▪ Saddle Dams -Stage 3 only	519.6 m	340.5 m	532.4 m	437.5 m	177.9 m	652.8 m
Hydro Power Station (Refer Section 8.2.2)	61.4 m	5.4 m	5.8 m	61.4 m	3.6 m	7.0 m
Land acquisition	28.9 m	15.6 m	8.5 m	22.2 m	2.3 m	28.5 m
Services/roads and restoration	3.5 m	Included in Stage 1	Included in Stage 1	3.5 m	Included in Stage 1	Included in Stage 1
Total per Stage ($)	**613.4 m**	**361.5 m**	**546.7 m**	**524.6 m**	**183.8 m**	**688.3 m**
Cumulative Total ($)	**613.4 m**	**974.9 m**	**1,521.6 m**	**524.6 m**	**708.4 m**	**1,396.7 m**

Note:- Cost above include contingency, design, management and other on-costs

Bring us a monsoon

Let it rain

Summer rainfalls in Wivenhoe, Somerset and North Pine Dam catchments

DECEMBER 1991 - MARCH 1992
922.8mm registered at Kilcoy

DECEMBER 1993 - MARCH 1994
414.7mm registered at Esk

DECEMBER 1994 - MARCH 1995
384.2mm registered at Kilcoy

DECEMBER 1995 - MARCH 1996
572.4mm registered at Blackbutt

DECEMBER 1998 - MARCH 1999
838.7mm registered at Esk

DECEMBER 1999 - MARCH 2001
426.2mm registered at Esk

DECEMBER 2003 - MARCH 2004
571.7mm registered at Esk

DECEMBER 2005 - MARCH 2006
392.3mm registered at Kilcoy

Near-tropical storms needed to fill storages

Amanda Gearing

CYCLONES in the Gulf of Carpentaria that have dropped half a metre of rain in tropical Queensland in the past week may have filled dams in the area to overflowing.

But similar amounts of rain would be needed to break the drought gripping southeast Queensland and replenish dwindling water supplies.

The combined storage volume of the region's three main dams is down to 22.17 per cent, well below the previous record low of 44.7 per cent set in November 1995.

SEQWater operations manager for Wivenhoe, Somerset and North Pine dams Rob Drury said a low or a major depression would be needed to cover the whole catchment area of the dams.

Wivenhoe would need 300mm-350mm of rain falling at 120mm a day over three days to fill, he said.

Wivenhoe has the capacity to store 1,165,000 megalitres of water as well as an additional capacity of 1,450,000Ml to mitigate flooding. Brisbane's second largest dam, Somerset Dam, upstream of Wivenhoe, would need 350mm-400mm of intense rain to fill because it has a smaller catchment area, Mr Drury said.

North Pine Dam, which has an even smaller catchment area would need 600mm-650mm of intense rain to fill.

"You do need large, uncommon events to fill large dams. You don't fill them every year," Mr Drury said. "There have been only four main rainfall events in the past 15-16 years. It has been seven years since we had a major rainfall event that has given us a refill of 50 per cent of the dam."

The only two rainfall periods that generated major inflows that filled the dams since 1990 were 922.8mm registered at Kilcoy in the four months to March 1992 and 838.7mm registered at Esk in the four months to March 1999.

"The dam levels were dropping 15-18 per cent a year (before water restrictions began) but last year it was only 10 per cent," Mr Drury said.

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FREQUENCY OF "LARGE SCALE RAIN EVENTS ".

(Known by SEQWater as "uncommon events")
Flood gauge BOM is at Bribane City. Localised in catchments are marked "no reading" but appear in written BOM flood information affecting the catchments.

Year	Catchment Somerset MM	Catchment Wivenhoe MM	Flood Gauge BOM Metres	Years Since	Below Average 1	2	3	4	Above average gap 5	6	7	8	9	10	11	12	13	14
1841	n/a	n/a	8.5	n/a														
1843	n/a	n/a	2.8	2														
1844	n/a	n/a	7.0	1														
1852	n/a	n/a	3.0	8														
1857	n/a	n/a	5.0	5														
1863	n/a	n/a	3.4	6														
1864	n/a	n/a	3.8	1														
1867	n/a	n/a	2.4	3														
1870	n/a	n/a	3.0	3														
1873	n/a	n/a	2.8	3														
1875	No bureau records		2.8	2														
1879	kept to here		2.8	4														
1887	n/a	454	3.8	8														
1888	n/a	324	3.8	1														
1890	n/a	385	5.3	2														
1892	394	302	n/a	2														
1892	395	287	n/a	0														
1893	1422	1036	8.5	1														
1893	4 floods in 1893		1.9	0														
1893			8.3	0														
1893			2.4	0														
1898	505	336	2.5	5														
1908	394	309	3.3	10														
1911	436	225	No reading	3														
1915	322	152	No reading	4														
1918	352	168	No reading	3														
1927	564	260	1.8	9														
1928	413	252	2.1	1														
1929	257	129	1.9	1														
1931	216	250	3.4	2														
1934	292	201	No reading	3														
1939	294	140	No reading	5														
1950	479	286	No reading	11														
1955	532	289	2.4	5														
1956	429	250	1.8	1														
1967	310	251	2.0	11														
1968	526	292	2.0	1														
1971	468	296	1.8	3														
1972	304	318	No reading	1														
1973	474	257	No reading	1														
1974	790	517	5.4	1														
1976	671 3mths	534 3mths	No reading	2														
1983	529 3mths	697 3mths	No reading	7														
	Wivenhoe dam in place								Wivenhoe dam 1986									
1988	440	294	Dam filling	5														
1989	564	262	1.9	1					Overflowed									
1992	1062 4 mths		1.9	3					Overflowed									
1996	308	205	-	4					Close to top									
1999	544	296	1.9	3					Overflowed									
2001	251	204	n/a	2					Overflowed									
2007	Near miss		n/a	6						"Worst drought ?"								
OVERALL TOTALS / AVERAGE				50														

SUMMARY

Years Since	No. of Events	Total Events
Below the average		
0	4	
1	12	
2	7	
3	10	72%
4	3	36
Above the average		
5	5	
6	2	
7	1	
8	2	
9	1	
10	1	
11	2	
12		
13		28%
14		14
Total		50

Notes :

11 years is the largest gap

72% of events occur within 4 years

Average gap is 3.7 yrs

SEQWater rainfall requirements to fill dams
Required in a few days
Wivenhoe 300-350mm

Somerset 350-400mm

Bureau flood gauge
Major 3.5 metres
Moderate 2.6 metres
Revision date January 2011

FLOOD PROOFING BRISBANE

from damaging floods to the point of extinction.
Flood mitigation in Ipswich and Gympie

Drought proofing South East Queensland

Submission to the Queensland Floods Commission of Inquiry *A*
Objections to the Borumba Dam proposal 25th July 2008 when being considered as an alternative to the Traveston Dam *B*
The fundamental flaw in calculation of water to the ecology *C*

Proof that the "Millennium" drought did not exist in the catchments and
Proof that our low dam levels were not caused by any drought ***D***

D 1 **Proof that the "Millennium drought" did not exist in the catchments**
Proof that our low dam levels were not caused by any "drought".
Letter to Mr Bagdon at the direction of the Water Commissioner.

Attachments

2 QCCCE Accumulated deficit for Federation and Millennium droughts
3 QCCCE Previously issued as the "South East Queensland drought to 2007"
4 No deficit rainfall 24 months 01/05/07 to 30/04/09
5 Percentage of rainfall 100% and above 01/05/07 to 30/04/09
6 Qualifications attached to 2007 QCCCE report omitted in current South East Qld Water Strategy.

7 Brochures produced by Premier Beattie and Dep Premier Bligh
A Brochure promoted to all households in SEQ
B Brochure map expanded for clarity- period 1st January 2000 to 31st December 2006

8 Pre-development flows - No dams and no people
Calculated by Government IQQM computer.
9 Bureau Of Meteorology confirmation rainfall of three years at close to 80% of the long term average
10 Mr Drury. SEQWater Dam manager Courier Mail 10th February 2007
Low pressure systems our main water supply.
11 Federation drought/ "Millennium" - Rainfall in both periods compared
12 Federation drought/ "Millennium" - Concentration of rainfall compared
13 Schedule of "uncommon events" compiled from BOM records
14 Dam level graph with accent on decline and refill by low pressure systems.
15 Comparison of dam levels February 1992/Nov 1995 with February 2001/Nov 04 revealing that "the "drought" period had more in reserve than the "no drought" period.