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# EXHIBIT COPY

**Statement of  
the Honourable  
STEPHEN ROBERTSON  
MP**

**Volume 1 of 2**

## ***OATHS ACT 1867***

In the matter of the  
Queensland Floods Commission of Inquiry

and

In the matter of a Requirement to Provide Statement to  
Commission of Inquiry pursuant to section 5(1)(b) of the  
*Commissions of Inquiry Act 1950*

### **STATEMENT OF STEPHEN ROBERTSON**

I, the Honourable Stephen Robertson, Minister for Energy and Water Utilities, of 61 Mary St, Brisbane, do solemnly and sincerely declare that:

1. I make this statement pursuant to a requirement dated 25 March 2011 served on me to provide information to the Queensland Floods Commission of Inquiry.
2. Between 26 March 2009 and 20 February 2011, I was the Minister for Natural Resources, Mines and Energy and Minister for Trade and was the responsible Minister referred to in the Water Supply (Safety and Security) Act 2008, the South East Queensland (Distribution and Retail) Restructuring Act 2009 and the South East Queensland Water (Restructuring) Act 2007. These Acts will collectively be referred to in this statement as "the Water Acts".
3. I respond to the following numbered items contained in requirement number 1562772 as follows:
4. **Item 1: My knowledge in relation to seasonal forecasts received from the Bureau of Meteorology from 1 September 2010 to 31 March 2011 and any action taken by me in response.**
5. On 18 October 2010, at a Cabinet meeting held in the Executive Building, a powerpoint presentation was given to Cabinet by representatives from the Bureau of Meteorology. That presentation has already been provided to the Commission.
6. That briefing, given by Mr. Jim Davidson from the Bureau, addressed:
  - 2010 rainfall Australia-wide;
  - the record rainfall across Australia during September;
  - rainfall totals for the week of 14 October, and observations on the Southern Oscillation Index, including sea surface temperature anomalies for September 2010;
  - the rainfall outlook for October to December 2010;

- the rainfall outlook for November 2010 to January 2011 (chance of exceeding the median rainfall);
- the outlook for tropical cyclones in the Australian forecast region for 2010 to 2011;
- historical data on Queensland tropical cyclones from 1959 to 2010; and
- the La Nina effect generally
- The final slide of the Bureau of Meteorology presentation is reproduced below:-

## Seasonal Outlook for Queensland

- This is not a run-of-the-mill La Nina
- The current La Nina event is now quite strong and well established - and the majority of global computer models indicate that it will persist until at least March next year
- No two La Ninas are the same although La Nina events are usually - but not always - associated with enhanced tropical cyclone activity in the Coral Sea and above normal rainfall over much of Queensland
- Therefore expect with some degree of confidence a fairly active cyclone season and a continuation of the above average rains and associated flooding
- Unable to predict very far in advance where cyclones will cross the coast or which rivers will flood
- Many catchments are saturated so runoff is likely to occur with less rainfall than normally required



Australian Government  
Bureau of Meteorology

7. In short, the briefing from the Weather Bureau indicated that a confluence of conditions meant there was an increased risk of serious flooding events over the course of the 2010/2011 summer /wet season in Queensland.
8. I was also informed at the Cabinet meeting on 18 October 2010 that all Directors-General had earlier received the same briefing from Mr Davidson of the Bureau of Meteorology.
9. Following this briefing, the Premier recommended that all ministers follow up with their respective Directors General to ascertain their level of preparedness for the forthcoming wet/cyclone season. A media release was issued on that same day by the Premier to that same effect. This media release is attached and marked "SR1".
10. Following discussions with the Director General of the Department of Environment and Resource Management, Mr. John Bradley in the days following the Cabinet meeting of the 18 October 2010, I considered that it was prudent, (and

with the agreement of the Director General), to write to the Chair of the SEQ Water Grid Manager to ask whether, in light of the BOM briefing, they had given consideration to reducing the full supply level of Wivenhoe, Somerset, North Pine and Leslie Harrison Dams.

11. Accordingly, I sent a letter, dated 25 October 2010, to Mr Gary Humphrys, the chair of the SEQ Water Grid Manager. That letter is attached and marked "SR2".
12. In the letter I sought Mr Humphrys' operational advice about whether the fact that the storages were full would provide an opportunity to reduce the volume in key dams as a means of reducing the severity, frequency and duration of flooding in events that may impact on downstream areas.
13. I asked Mr Humphrys for available options and the likely benefits of such options. I also asked for a review of the operation of Wivenhoe, North Pine and Leslie Harrison Dams.
14. I discuss his reply, along with other information I was receiving under Items 5-7 below. In short however, Mr Humphrys advised, based on the advice from the SEQ Water Grid Manager, that releasing water to below full supply level may provide some benefits in terms of reduced community and operational impacts during minor inflow events. It was also mentioned that for medium and major flood events, the SEQ Water Grid Manager considered that pre-emptive releases would provide negligible benefits.
15. The Water Grid Manager indicated that it had advised SEQ Water that from a water security perspective, it had no in principle objections to minor releases from Wivenhoe, Somerset and North Pine Dams to minimize the operational and community impacts of gate releases. Specifically, the SEQ Water Grid Manager had no in principle objection to:
  - Wivenhoe and Somerset Dams being drawn down to 95% of their combined full supply level; and
  - North Pine Dam being drawn down to 97.5% of its full supply level.
16. Following the extraordinary and unpredictable flood events of January 2011, I sought further advice from Mr. Jim Davidson from the Bureau of Meteorology regarding the likely rainfall for the remainder of the summer/wet season. This occurred on 11 February 2011.
17. The advice I received from the Bureau of Meteorology is outlined in my response to Item 7..
- 18. Item 2: My role in relation to the full supply level of Wivenhoe and Somerset Dams ("the dams").**
19. Under the Water Acts it is not the role or responsibility of the Minister to make operational decisions in determining how dams and other water storages are operated on a day to day basis in Queensland. Therefore, I had no role in

determining the full supply level of Wivenhoe and Somerset Dams during the flood in 2011 or at any other time.

20. However the Queensland Water Commission's Queensland Water Supply Strategy which I released in mid 2010 did list in its Key Actions at page 143, Number 50 (5.4.2) that the QWC would, in the medium term, "review the operation of the Brisbane River system to optimize the water supply yield and balance flood storage and water supply storage requirements. That Strategy document is attached and marked "SR3".
21. I noted in a media release dated 6 October 2010 that this review had not yet been completed. I also noted that "with our dams now full and forecasters predicting a wetter than average summer, now is not the time to be taking safety risks in relation to the flood protection of the entire south-east region". This media release is attached and marked "SR4".
- 22. Item 3: My role in relation to dam operations at Wivenhoe, Somerset and North Pine Dams.**
23. As Minister, I was aware of the existence of the "Manual of Operational Procedures for Flood Mitigation at the Wivenhoe Dam and Somerset Dam" ("Manual") which set the full supply level at Wivenhoe Dam at 67 metres AHD.
24. I am further informed that this Manual had been reviewed on as many as six occasions since 1992 by appropriate expert authorities to ensure its continuing accuracy and relevance.
25. I have previously provided a copy of the Manual to the Commission of Inquiry.
26. The Manual makes it clear that there is no role for the responsible Minister in relation to dam operations at these dams.
27. Even so, I was regularly updated on the decisions taken by dam operators during the January and other flood events. This is discussed below.
- 28. Item 4: When, how and why the full supply level which existed for the dams at the time of the January 2011 flood event was determined.**
29. This information is contained in the various versions of the Manual. It is a matter of public record.
30. I refer to Item 3 above in relation to my role, or lack thereof, in dam operations.
- 31. Item 5: My account of all discussions, correspondence, meetings or briefings I participated in from 1 September 2010 to 30 March 2011 regarding possible alteration of the full supply level of the dams.**  
  
**and**

**32. Item 6: All notes made of all discussions or meetings regarding changes to the level of the dams between 1 September 2010 and 30 March 2011.**

**And**

**33. Item 7: Decisions made by me regarding the level of the dams.**

34. Between 1 September 2010 and 31 March 2011 a number of Parliamentary Briefing Notes were provided to me regarding the Wivenhoe Dam full supply level review for the following parliamentary sittings.
35. A Ministerial Briefing Note dated 11 October 2010 was sent to me on the issue of progress of the Wivenhoe Dam full supply level review. Attached and marked "SR5" is a copy of that Ministerial Briefing Note.
36. On 11 October 2010, my Policy Advisor, Tim Watts requested advice of the QWC as to why investigations into increases of 2, 3 or 4 metres above the Full Supply Level of Wivenhoe Dam were continuing. A response was provided on 11 October 2010 by Tad Bagdon of the QWC. Copies of the correspondence are attached and marked "SR6"
37. As noted above, on 25 October 2010, I wrote to Gary Humphrys, the Chair of the SEQ Water Grid Manager, requesting advice as to whether the water security being experienced provided an opportunity to reduce the volume stored in Wivenhoe, North Pine and Leslie Harrison Dams, as a means of reducing the severity, frequency and duration of flooding in downstream areas. That correspondence was forwarded by the SEQ Water Grid Manager to the QWC for its information. A copy of that briefing note dated 22 October 2010 is attached and marked "SR7". A copy of the letter I wrote is attached and marked "SR8".
38. On 27 October 2010 I noted a DERM Hot Issues Brief regarding the Somerset/Wivenhoe Dam Floodwater Release Protocol. A copy of that brief is attached and marked "SR9".
39. On 11 November 2010 I met with Commissioner Boydell and Karen Waldman.. The meeting included a discussion about the project being undertaken to investigate the maximum level at which the Full Supply Level of Wivenhoe Dam could be raised without raising the dam wall. Attached and marked "SR10" is a copy of the Ministerial Meeting Briefing Note for the meeting.
40. On 24 December 2010 my office received a reply from the Chair of the SEQ Water Grid Manager Board to my letter of 25 October 2010. Attached and Marked "SR11" is a copy of this letter.
41. Although I had expressed concern about the rainfall outlook for the 2010-11 wet season, in my letter to Seqwater, that concern was allayed to an extent, by my knowledge that since mid December 2010 substantial releases of water were underway from Wivenhoe due to substantial rainfall throughout South East Queensland.

42. On 16 January 2011 I noted a Ministerial Brief regarding the January 2011 flood event and Wivenhoe Dam operations. A copy of that brief and its attachments is attached and marked "SR12".
43. In a letter dated 20 January 2011, I wrote to Mr Phil Hennessey, Chair of Seqwater requesting that Seqwater assist the Department of Environment and Resource Management in consideration of the appropriate full supply levels for Wivenhoe and Somerset Dams. This letter is attached and marked "SR13".
44. Also on 20 January 2011 I wrote to Commissioner Boydell requesting the provision of all necessary assistance by QWC to Seqwater to enable it to respond as a matter of priority and with urgency to my request to Mr Hennessey. This letter is attached and marked "SR14".
45. A response was provided by QWC to me on 25 January 2011. A copy of that correspondence is attached and marked "SR15". That correspondence resulted in investigations by QWC into a temporary and/or permanent lowering of the Wivenhoe Dam by 25% below the Full Supply Level.
46. On the basis of all the information I had received, I was satisfied that there was no need for me to give a direction under s.61 of the *South East Queensland Water (Restructuring) Act 2007*.
47. Following the January 2011 floods, I sought further advice from the Bureau of Meteorology regarding the rainfall outlook for the remainder of the 2010-11 summer/wet season.
48. On 11 February 2011, I met with Mr Jim Davidson of the BOM to be briefed on the rainfall outlook for Queensland and in particular SEQ up until the end of April 2011. The BOM's advice provided to me entitled "Bureau of Meteorology – Probable Rainfall Through to April (as at 12/2/11)" is attached and marked "SR16".
49. Following this briefing, I again inquired of the Director General whether it would be appropriate and prudent to seek advice on whether the levels of the major dams in South East Queensland should be reduced for the remainder of the 2010-11 summer/wet season given the impact of the recent floods and my concern that further flooding events may occur.
50. I was also cognisant of the fact that as a result of the significant rainfall in South East Queensland, the new Wyaralong Dam was full which, in my mind, substantially addressed water security concerns, at least in the short to medium term, from any reduction in the full supply levels of Wivenhoe and Somerset Dams.
51. Seqwater wrote to the Director-General of DERM on 7 February 2011, responding to my letter of 20 January 2011 and enclosing a memorandum entitled *Impact of Reducing the Full Supply Level of Wivenhoe Dam on Flood Discharges*. A copy of this letter is attached and marked "SR17".

52. Subsequently, the CEO of Seqwater, Mr Peter Borrows wrote to the Director-General of DERM (who passed on the letter to me) on 10 February 2011 that Seqwater had no objection, from a water security perspective, to Wivenhoe Dam being drawn down to 75% of its Full Supply Level (FSL) and that such a draw down, if temporary, would be unlikely to impact its obligations. The letter recommended that Wivenhoe Dam's storage level be temporarily reduced to 75% of its FSL in order to temporarily increase its flood mitigation capacity. This letter is attached and marked "SR18".
53. On 11 February 2011 my Director-General, John Bradley, wrote to Mr Peter Borrows regarding facilitating the early implementation of Seqwater's recommendation to reduce the storage level of Wivenhoe Dam to 75% of its full supply level in order to temporarily increase its flood mitigation capacity. A copy of this letter is attached and marked "SR19".
54. On 17 February 2011 my Director-General again wrote to Mr Borrows approving the revised interim program submitted by Seqwater under s.13(7)(a) of the Moreton Resource Operations Plan. A copy of this letter is attached and marked "SR20".
55. By a letter dated 30 March 2011, Mr Borrows wrote to the Director-General, DERM, (who passed on the letter to me) advising that as the Queensland Water Commission and the Water Grid manager had no objection, from a water supply perspective, to the approved Interim Supply Security Level (75% of FSL), Seqwater did not propose to submit a revised interim program. A copy of that letter and its attachments is attached and marked "SR21".
56. As stated previously, I did not participate in any operational decisions regarding the level of the dams during the flood crisis in January 2011 although I was regularly updated on the decision making process.
- 57. Item 8: Any written record regarding any decision by me regarding the level of the dams.**
58. I refer the Commission of Inquiry to paragraphs 34 to 55 above.
- 59. Item 9: How (in terms of regulatory or legislative changes, directives to operators etc), and why the amount of water in the dams decreased in February 2011.**
60. I authorized the Executive Council Minute to the Governor-in-Council for the amendment to the Moreton Resource Operations Plan. That amendment permitted a Resource Operations Licence Holder to submit a revised interim plan.
61. The Chief Executive of DERM has the power, under the ROP, as amended, to approve the revised interim plan. I understand this was in fact approved.

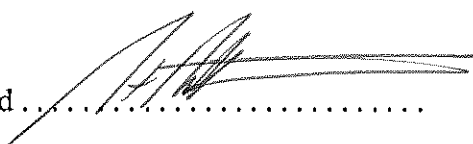


- 62. Item 10: Details, including verbatim accounts where possible, of all discussions, correspondence, meetings or briefings regarding decreasing the dams' levels in January and February 2011.**
63. In relation to correspondence, refer the Commission of Inquiry to paragraphs 34 to 55 above and the attached correspondence.
64. In relation to meetings, on 13 December 2010, I met with the SEQ Water Grid Manager for a general demonstration of the WGM's emergency management room facilities, including a demonstration of the new OCA incident manager.
65. On 10 January 2011, I met with Mr Peter Burroughs CEO SEQWater and Mr Dan Spiller from the Water Grid Manager to discuss the recent flood impacts across South East Queensland and performance of the dams.
66. On 19 January 2011, I met with the Chair and CEO of Sunwater to discuss the capacity and performance of dams under their responsibility.
67. On 20 January 2011, I met with Mr John Bradley Director General of the Department of Environment and Resource Management regarding water grid communications.
68. On 1 February 2011, I visited and inspected the damage to the Mt Crosby Water Treatment Plant.
69. On 8 February, I met with Director John Bradley, the Chair of SEQWater, Mr Phil Hennessey, SEQWater CEO, Peter Burrows and Water Grid Manager to discuss the review of full supply levels for the remainder of the wet season.
70. On 11 February 2011, I met with Mr Jim Davidson from the Bureau of meteorology regard the rainfall outlook for the remainder of the wet season.
71. On 11 February 2011, I met with the Premier and her staff to discuss the BOM's most recent advice and possible implications for further flood events in South east Queensland.
72. On 23 February 2011 I met with the Water Grid CEO's, the Queensland Water Commission and the Director General.
- 73. Item 11: Details, including verbatim accounts where possible, of all discussions, correspondence, meetings or briefings regarding releasing water from the dams to decrease their level in December 2010 or January 2011 (but without altering the full supply level).**
74. Any discussions, documents, correspondence, meetings or briefings in this category have been referred to above.
- 75. Item 12: An account of all briefings within my knowledge, verbatim where written briefings are not available, prepared by the Department of**

**Environment and Resource Management for me or any other Minister or disaster management authority or personnel between 1 October 2010 and 31 March 2011 regarding water supply in South East Queensland or the operation of Wivenhoe, Somerset or North Pine Dams.**


76. See attached bundle of briefings marked "SR22".
77. **Item 13: An account of all briefings I received, verbatim where possible, from any State Government department between 1 to 19 January 2011 regarding flooding or dam operations.**
78. Between 1 and 19 January 2011 I received briefings on a number of occasions and from a number of sources.
79. As the flood unfolded from 6 January, I received regular briefings by email from the director of operations at the SEQ Water Grid Manager (Dan Spiller).
80. I have extracted all briefings provided to me by email for the period 1 January to 19 January. They are attached as a bundle and marked "SR23".
81. In addition to the email reports from Mr. Dan Spiller, I received, by email, technical situation reports (TSRs) from 6 January until 12 January 2011. These reports were emailed to me and my office, every few hours. These reports kept me abreast of the status of inflows, dam operations, rainfall in the catchments, and storage levels at Somerset, Wivenhoe and North Pine Dams. They also addressed the impacts of Wivenhoe Dam releases downstream. They are attached and marked "SR24".
82. As well as the email updates and TSRs from SEQ Water Grid Manager, I received a number of emails from the Director-General of the Department, John Bradley. They are attached and marked "SR25".
83. **Item 14: An account of all communications I had, verbatim where possible, or any briefings received from the flood operation centre between 1 and 19 January 2011.**
84. I did not send or receive any communications between 1 and 19 January 2011 from the flood operations centre.
85. I received regular Technical Situation Reports from the South East Queensland Water Grid Manager during the flood.
86. **Item 15: An account of any communications, verbatim where possible, my Ministerial staff had with the flood operation centre between 1 and 19 January 2011.**
87. I am unaware of any communications my advisors had with the flood operations centre between 1 and 19 January 2011.

I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1867* (Qld).

Signed ..... 

Taken and declared before me, at Brisbane this

1 day of April 2011

  
.....  
~~Solicitor/Barrister/A Justice of the~~  
~~Peace/Commissioner for Declarations~~



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## Premier and Minister for the Arts The Honourable Anna Bligh

**Monday, October 18, 2010**

### **Weather Bureau paints dramatic picture for summer storm season**

Premier Anna Bligh has today directed all State Government agencies to be on alert and prepared over summer after a senior meteorologist briefed Cabinet about one of the most potentially busy storm seasons since the 1970s.

Ms Bligh said all departments that would need to jump into action should any area experience a cyclone or flooding – including Emergency Services, Main Roads, Local Government, Transport and Public Works – would be ready to work together to respond to storm or flood damage.

Bureau of Meteorology Regional Director Jim Davidson today told Cabinet Ministers that Queensland could experience up to six cyclones over summer and well above average rainfalls.

The Premier said the prediction meant all Queenslanders should be prepared for not only cyclonic conditions but potential flooding.

"That includes government departments and tomorrow annual pre-season meetings start in such areas as Innisfail and Charters Towers, including representatives of key government agencies," Ms Bligh said.

"The last thing we want to do is create panic but with these type of predictions, forewarned is forearmed.

"That's why today I've directed all Ministers to work with Directors General to ensure suitably senior staff are on duty and available throughout the summer storm season.

"That means taking an active role in rostering for senior staff over the Christmas and New Year period and through the school holidays, both centrally and at a regional level.

"Preparation is the key to safety and it's imperative that we are all on the same page not only to respond in the event of a disaster but to get accurate and timely warnings out to any community under potential threat of cyclone or flood.

"Jim has told us today that we have not seen predictions for up to six cyclones off our coast since the 1970s and also that there is a 75 per cent chance that we will experience much higher than average rainfall and we are actively heeding those warnings."

Mr Davidson said the prediction came because the state was in a La Nina climate phase - which he expects will remain the dominating influence through the spring and summer months - and which are usually associated with above normal rainfall across much of Queensland and enhanced tropical cyclone activity in the Coral Sea.


Mr Davidson said: "What this translates to is where historically we could expect an average of four cyclones a season in the Coral Sea, we now expect the number to be potentially higher, but the number of cyclones actually making landfall can be quite variable from season to season.

"However, under these conditions, we have a good chance of a cyclone crossing the coast before the year is out."

In addition to the Bureau's website at <http://www.bom.gov.au>, the latest information on Tropical Cyclones is readily available by dialling 1300 659 212, and on Flood Warnings by dialling 1300 659 219.

**Media: 3224 4500**

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" SR 2 "



Queensland  
Government

Ref CTS 19311/10

25 OCT 2010

Office of the  
Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade

Mr Gary Humphrys  
Chair  
SEQ Water Grid Manager  
PO Box 16205  
CITY EAST QLD 4002

Dear Mr Humphrys

I write in relation to seeking advice regarding options to and benefits of releasing water from key storages in anticipation of major inflows over the coming summer.

I understand that the key Water Grid storages are at 100 per cent of storage capacity going into the traditional wet season, with forecasts of higher than median rainfall and the prospect of multiple flood events.

I am also advised that our water supply is more secure than ever before, due to storages being full, key Water Grid projects completed and ongoing water efficiency.

I seek your urgent advice about whether this water security provides an opportunity to reduce the volume stored in key dams as a means of reducing the severity, frequency and duration of flooding in downstream areas.

In doing so, I note that recent releases from Wivenhoe Dam have resulted in significant inconvenience and isolation for residents in some downstream areas. With the catchments saturated, I understand that even quite minor rainfall events will result in further water releases and further inconvenience for these residents.

By end November 2010, I would appreciate your advice as to the available options and the likely benefits. At a minimum, you should review the operation of Wivenhoe, North Pine and Leslie Harrison dams. At least for Leslie Harrison Dam, this would be a return to standard operating procedures prior to the drought, when the dam was routinely drawn down to 95 per cent of capacity to minimise the impacts of storms on downstream residents.

I also seek your confirmation that these options would not significantly impact upon our current water security, measured as the probability of needing to reintroduce Medium Level Restrictions over the next five to ten years.

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**Queensland  
Government**

Office of the  
**Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade**

I emphasise that this is only a temporary measure, reflecting that dams are full prior to the commencement of the traditional wet season. I expect that your advice will include a clear date or trigger beyond which dams will be allowed to fill to their full supply level.

Thank you in advance for your assistance.

Should you have any further enquiries, please feel welcome to contact Mr John Bradley, Director General, Department of Environment and Resource Management on 3330 6298.

Yours sincerely

**STEPHEN ROBERTSON MP**

## 5.4.2 Dams and weirs

Additional surface water supplies could be developed through:

- constructing new dams and weirs
  - augmenting existing dams and weirs
- or
- water harvesting during high flow events into off-stream storages.

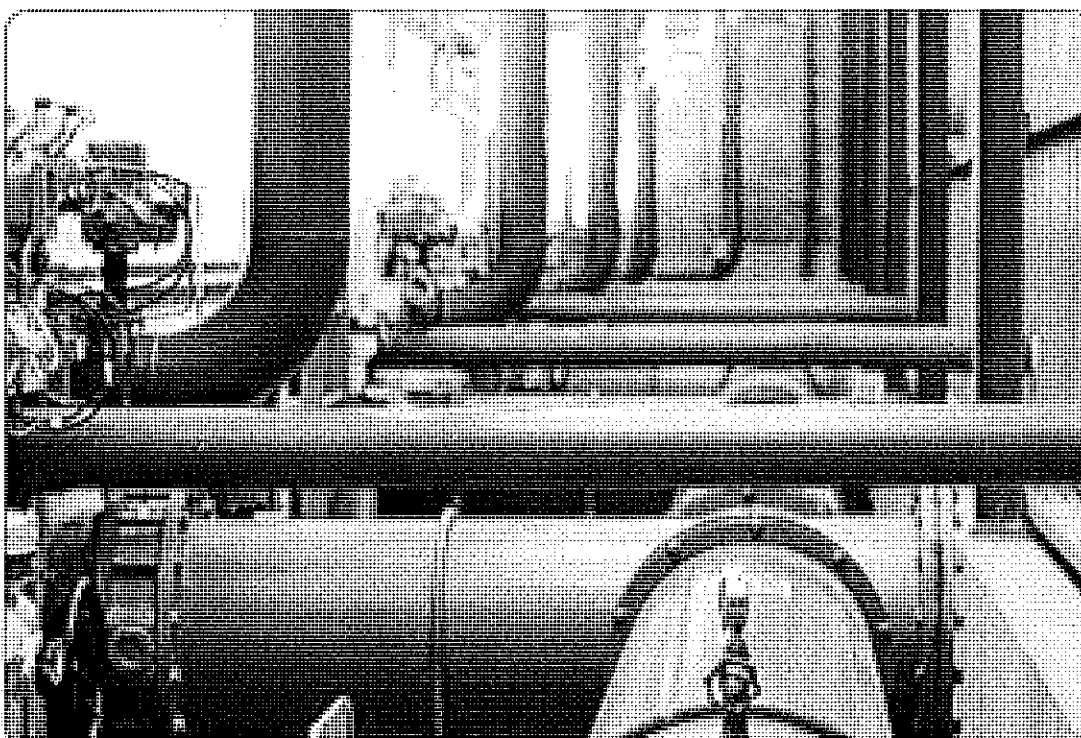
A comprehensive review has highlighted that there are no sound opportunities for developing major new dams in SEQ, beyond committed projects. This is due to the limited availability of additional water for urban use under the water resource plans and the shortage of suitable sites.

Water resource plans specify environmental flow and water allocation security objectives, as described in Section 2.1.3. Through environmental flow objectives, water resource plans for SEQ have already protected a significant portion of surface water flows for the environment.

Water resource plans contain environmental flow objectives at various locations. Table 5.5 specifies the end-of-system flow that must not be jeopardised by future water resource planning decisions in SEQ. This flow is expressed as a percentage of mean annual flow for the area in an undeveloped state. These objectives are a minimum, with actual environmental flows being higher where strategic reserves are not fully allocated for urban or rural use.

**Table 5.5 Mean annual flow objectives at river mouth**

Water resource plan	Gold Coast	Logan Basin	Mary Basin	Moreton
Location	Mouth of the Nerang River	Mouth of the Logan River	Mouth of the Mary River	Mouth of the Brisbane River
Mean annual flow objective as a proportion of pre-development flows	66 per cent	76 per cent	85 per cent	66 per cent





## Mary Basin area

The *Water Resource (Mary Basin) Plan 2006* nominates a strategic reserve of 150 000 megalitres per year as available in the Mary Basin.

The decision of the Commonwealth Minister for the Environment, Heritage and the Arts not to allow the Traveston Crossing Dam project to proceed indicates that it might be challenging to achieve environmental approvals for other water storage projects drawing on this reserve. However, given the limited surface water supply options available to the region, a number of smaller development options will be investigated.

Investigations will be undertaken in partnership with the Department of Environment and Resource Management and in collaboration with Seqwater and the Sunshine Coast and Gympie regional councils. Stakeholder input will be sought in accordance with the proposed project selection process that is outlined in Section 3.5. Options to increase the security and volume of supply to downstream urban and rural users will be considered, including for Gympie.

The options to be investigated include:

- an upgrade to Borumba Dam (Stage 3)
- a weir or pumping pool on the Mary River in the vicinity of Coles Crossing
- one or more off-stream storages
- water harvesting from the Mary River.

Combinations of options will also be considered.

Borumba Dam was raised in 1997 (Stage 2), increasing its storage capacity to 46 000 megalitres. Without water harvesting to the dam, a further (Stage 3) raising to around 350 000 megalitres capacity is considered the upper limit of practical development, taking into account the environmental flow requirements and the probability of filling the dam.

In conjunction with a new weir on the Mary River at Coles Crossing, this raising could provide an additional 20 000 to 30 000 megalitres of water per year. The weir would make available significantly more water than the dam alone, while also providing a pumping pool for extracting water from the Mary River to supply local areas and the SEQ Water Grid.

An off-stream storage could enhance the efficiency of pumping to the dam. Water harvested from the Mary River to the storage could be pumped to the dam over a longer period, reducing the capacity and cost of connecting pumps and pipes. The construction of one or more off-stream storages without pumping to the dam will also be investigated as an option to reduce cost and energy requirements. The off-stream storages could be excavated to below river level and be gravity-fed from the river, or be constructed at a higher level with pumping from the river to the storage.

In addition, the QWC will also investigate options to operate the SEQ Water Grid to provide local benefits. For example, when supply for SEQ exceeds demand, Noosa could be supplied from the Northern Pipeline Interconnector Stage 2 rather than from Borumba Dam. This would enable the SEQ Water Grid Manager to make additional water available from Borumba Dam for local purchase and use, subject to appropriate conditions. This could defer the need for additional supplies in the Mary Basin.

Similarly, should one of the smaller options be viable, the QWC will investigate options to integrate water treatment for the SEQ Water Grid with water treatment for Gympie and other local areas.

The QWC will not investigate further options to raise Borumba Dam to make available 70 000 megalitres per year at a similar level of reliability to Traveston Crossing Dam. A 2007 consultancy report, undertaken as part of the Strategy Investigations, estimated that the capital cost of such a scheme was in the order of \$3 billion. The scheme would also have high ongoing pumping costs.

Other potential dam options have also been excluded from further consideration, including the construction of dams on:

- Amamoor Creek
- Obi Obi Creek at Kidaman
- Mary River near Cambroon.

The options of future storages on the Mary River (Cambroon) and Obi Obi Creek (Kidaman) were excluded by the Queensland Government from further consideration in a 1994 study due to the high cost and significant environmental and social impacts. The dam on Amamoor Creek would also have significant environmental impacts.

## Logan Basin area

In the Logan Basin area, there is still potential for up to around 14 000 megalitres per year of high priority water allocation beyond the allocations for committed projects.

A number of options to make additional water available will be investigated, including:

- raising Cedar Grove Weir
- constructing a raw water pipeline to transfer water from the Bromelton Off-stream Storage to Wyaralong Dam
- constructing a weir on the Albert River, immediately downstream of the proposed Wolffdene Dam site
- constructing an off-stream storage adjacent to the Albert river in the vicinity of the existing Luscombe Weir
- constructing a small on-stream or off-stream storage, in the vicinity of the proposed Glendower Dam site on the Albert River.

## Moreton area

In the Moreton Water Resource Plan area, an estimated 25 000 megalitres per year of strategic reserve is available.

The introduction of drought storage reserves has reduced the working volume of dams. This, in turn, has reduced the yield from the storage. In these cases, the reduction can be partially offset by increasing the working storage of the dam. The increase in working storage can be achieved by several methods, including raising the dam wall or modifying the operating rules that balance water storage capacity and flood mitigation capacity. Downstream flood impacts will be a key consideration in investigations into any of these options.

A detailed investigation will be conducted to determine the maximum level to which the working storage of Wivenhoe Dam could be raised without raising the dam wall. The investigation will be carried out in conjunction with Seqwater and the Brisbane and Ipswich City Councils. It will include detailed consideration of:

- the impact on frequency, severity and duration of flooding both upstream and downstream of the dam
- any effect on the structural integrity of the dam and its components or any required spillway upgrades
- environmental and social impacts, including adverse effects on any roads and crossings caused by flooding.

Hydrological investigations will be carried out to determine the increased security of supply or the additional volume of water that could be made available to the SEQ Water Grid while still remaining within the requirements of the water resource plan.

Some of the reserve could be accessed by raising the Mt Crosby Weir. Another possibility is as an additional extraction from Wivenhoe Dam. Some of the reserve might also be accessed in other smaller river systems.

## Gold Coast area

In the Gold Coast Water Resource Plan area, an estimated 30 000 megalitres per year of additional high priority water allocation may be made available through the construction of additional infrastructure.

Around 7700 megalitres per year of this will become available through the raising of the wall of Hinze Dam. There is some potential to water harvest from Gold Coast creeks and the Coomera River into Hinze Dam.

### 5.4.3 Stormwater harvesting to dams

The QWC will investigate opportunities to use stormwater to augment inflows to dams, to improve system yield and benefit the local environment.

Sunshine Coast Water has undertaken preliminary investigations into a scheme for collecting stormwater from the Caloundra South development area to augment Ewen Maddock Dam. The scheme could double the catchment area of the dam, increasing the volume and reliability of supply. It would also reduce stormwater discharges from the development area.

The proposed scheme is likely to be the most feasible in SEQ, because:

- the dam is located only 7 kilometres from the potential development area, meaning that the transfer pipeline would be relatively short



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## Minister for Natural Resources, Mines and Energy and Minister for Trade The Honourable Stephen Robertson

**Wednesday, October 06, 2010**

### Flood protection the key to reviewing Wivenhoe Dam level

A review of the drinking water supply held in Wivenhoe Dam is underway, but the Queensland Government is not prepared to risk flood protection this summer by holding back too much water, the Minister for Natural Resources Stephen Robertson said today.

Raising the storage level of the dam reduces Wivenhoe's floodwater capacity which could be needed in the event of a major wet weather event, the Minister said.

Minister Robertson said the Queensland Water Commission, in conjunction with Seqwater, is currently investigating all aspects relating to changing the full supply level of Wivenhoe Dam, but that review was not yet completed.

"Reviewing the supply level is one of the actions included in the SEQ Water Strategy, released earlier this year, and we are doing that" Mr Robertson said.

"But with our dams now full and forecasters predicting a wetter than average summer, now is not the time to be taking any safety risks in relation to the flood protection of the entire south-east region.

"Everyone remembers the heartache and destruction of the 1974 floods and Wivenhoe Dam's current full supply levels were established to ensure there is never a repeat of that situation."

Wivenhoe Dam provides flood mitigation to downstream communities by storing floodwaters that are then later released over a longer period of time, Mr Robertson said.

"Wivenhoe Dam's flood mitigation capacity needs to be significant as it can take several days to safely release water from the dam after a major rain event," Mr Robertson said.

Mr Robertson said the State Government is not involved in the retail sale of water. In south-east Queensland, the price homeowners pay for water is set by council-owned water retail entities.

The 100 per cent capacity which Wivenhoe Dam achieved last weekend relates to the region's required drinking supply level. There is additional space in the dam to hold back flood waters and release them slowly. The dam was built for both purposes.

"We have been pro-active in educating south-east Queenslanders that there is additional capacity on top of full drinking supply level to handle a major wet weather event," Mr Robertson said.

The drinking water storage capacity of Wivenhoe Dam is 1.16 million megalitres. The volume for flood mitigation is another 1.45 million megalitres - equal to three times the capacity of Sydney Harbour.

"Frankly, it is pretty reckless to suggest altering the full supply level and risk flooding without a comprehensive engineering study. And this study is underway" Mr Robertson said.

All key water storages within the SEQ Water Grid have flood mitigation plans to best manage dam levels. In addition, an extensive monitoring network of 140 gauging stations across the key storages monitors rainfall, stream flow and dam levels.

**Media contact:** 0417 154 660

CTS 18474/10

**QUEENSLAND WATER COMMISSION  
MINISTERIAL BRIEFING NOTE**

TO: Minister Robertson  
FROM: Karen Waldman, Chief Executive Officer  
SUBJECT: Progress of the Wivenhoe Dam full supply level review

"SR5"

Advisor .....	OK
Dated .....	/ /
Approved/Not Approved/Noted Further information required	
Minister .....	
Dated .....	/ /

Noted /	
Further information required	
DG DERM .....	
Dated .....	/ /

**TIMEFRAME**

- Noting of this brief is required urgently as requested by the Minister's Office.

**RECOMMENDATION**

- It is recommended that the Minister note the progress of the review of Wivenhoe Dam's full supply level being conducted by the Queensland Water Commission (QWC) and Seqwater.

**BACKGROUND**

- One of the recommended planning activities to be undertaken by the QWC identified in the *South East Queensland Water Strategy* (the Strategy) is a review of the operation of the Brisbane River system to optimise the water supply yield and to balance the flood storage and water supply storage volume requirements.
- The Wivenhoe Dam is operated with a normal storage capacity at full supply level (FSL) of 1.165 million megalitres (ML). It is able to hold back a further 1.45 million ML during a flood situation. This additional storage is used to provide flood mitigation benefits along the Brisbane River downstream of the dam by spreading release over a large period.
- An investigation into increasing the yield from Wivenhoe and Somerset Dams was undertaken by Seqwater. Seqwater's March 2007 report, *Provision of Contingency Storage in Wivenhoe and Somerset Dam*, investigated three levels of possible increases to the current FSL of Wivenhoe Dam of two metres, three metres and four metres. This report, which is available on the QWC's website, did not consider the requirements of the Moreton Water Resource Plan in terms of environmental flow.

**CURRENT ISSUES**

- A detailed investigation is being conducted by the QWC in conjunction with Seqwater and in consultation with the Brisbane and Ipswich City Councils to determine the maximum level to which the FSL of Wivenhoe Dam could be raised without raising the dam wall.
- In addition, a study will be undertaken to identify alternative options to access additional water from the Brisbane River system to identify the most advantageous option.

**Key stages in the assessment**

- Pre-feasibility study** – a desk top study using existing models is anticipated to be completed by March 2011. It involves:
  - assessing the maximum yield within the environmental parameters of the Moreton Water Resource Plan;
  - assessing the upstream and downstream flooding impacts;
  - undertaking a cost benefit assessment of these impacts against the value of the water sourced;
  - identifying alternative options to access water in the system;
  - peer review of the work undertaken; and
  - preparing a report on the study.

- Cost impacts would be based on the Brisbane City Council's Brisbane River Flood Damages Study and would be undertaken in conjunction with Brisbane and Ipswich City Councils.
- Based on the pre-feasibility investigation, the QWC will recommend to the Minister whether the option warrants further investigation through a feasibility study or not to proceed.
- **Feasibility study** – This will be at a more detailed level and will involve refinement of the models and may involve some site inspections. The feasibility study is anticipated to take 12 months and would involve:
  - upstream and downstream flood hydrology sufficient to clearly identify flood risks including infrastructure impacts and upstream land acquisition (amend leases);
  - identifying dam structure impacts;
  - identifying environmental impacts including fauna and flora;
  - quantifying the project costs and yield benefits; and
  - identifying the project delivery time frame including environmental approvals.
- A report will be prepared including briefing material to advise the Minister of the outcome of the studies with a recommendation to proceed or not proceed with the preparation of a business case.

#### **Current status of project**

- Preliminary investigations have been undertaken by QWC using the Integrated Quantity and Quality Model (IQQM) and the WATHNET model to determine the additional yield meeting both the environmental requirements under the Moreton Water Resource Plan and the Level of Service criteria adopted for supplies in south east Queensland.
- The investigations also indicate that an additional 5,000 ML per annum could be accessed with a 1 metre raising of Wivenhoe Dam's FSL.
- The investigations indicate that any raising of FSL above one metre actually results in a lower overall yield from the system due to higher evaporation losses.
- The Wivenhoe system is nearly at its limit in terms of the end of system environmental flow objective (EFO) which is set under the Moreton Water Resource Plan at 67.22%. The one metre raising results in a 67.28% end of system flow whereas two metres results in 67.03%.
- QWC is currently awaiting costs from Seqwater to undertake components of the work but Seqwater will fund all its internal costs.
- The project will be overviewed by a Project Steering Committee which will include representatives from the QWC, Department of Environment and Resource Management, Seqwater, Brisbane City Council, Ipswich City Council and two independent experts in hydrology and water engineering.
- Once the costing from Seqwater is received, work on the pre-feasibility study will commence and should be completed by March 2011.
- If the pre-feasibility study indicates that a proposal is viable, at least another 12 months of further detailed technical studies at an estimated cost of \$500,000. This cost would be incurred by the QWC.
- Consultation with stakeholders and the community will be undertaken during the feasibility study, but ultimately this could easily add to that timeframe, given the complex nature of the impacts to be investigated.
- Until this work has been completed, and in consideration of the safety of the community, flood waters will be cleared in accordance with the existing Flood Operations Manual developed by Seqwater and approved by the Dam Safety Regulator.

#### **RESOURCE/IMPLEMENTATION IMPLICATIONS**

- The pre-feasibility investigations are expected to be finalised in March 2011 at an estimated cost of \$100,000. If the pre-feasibility study indicates that a proposal is viable, at least another 12 months of further detailed technical studies at an estimated cost of \$500,000. This cost would be incurred by the QWC.

## PROPOSED ACTION

- The QWC will continue to work with Seqwater to undertake a pre-feasibility study on the viability of raising the Wivenhoe Dam FSL or an alternative option if identified.

## OTHER INFORMATION

- *Consultation:* Meetings have been held with Seqwater and discussions have been arranged with Brisbane City Council and Ipswich City Council.
- *Legislation:* Any option considered will be compliant with the Moreton Water Resource Plan.
- *Key Communication Messages:* As indicated in the Strategy, the QWC, in conjunction with Seqwater, will be investigating the maximum level to which the storage level of Wivenhoe Dam could be raised without raising the dam wall, while still remaining within acceptable risk levels. Until the detailed investigations have been completed, flood waters will be cleared in accordance with the existing gazetted Flood Operations Manual developed by Seqwater and approved by the Dam Safety Regulator. It is vital the Government takes all the time needed to get it right and the Government will not be rushed into making hasty decisions in the area of public safety. Getting this wrong has the potential to endanger homes, property and livelihoods of residents both upstream of the dam and downstream as far as Brisbane City.

## MINISTER'S COMMENTS

✓ 11/1000X 18 .

"SR 6"

~~Confidential~~

---

**From:** Bagdon Tad  
**Sent:** Monday, 11 October 2010 6:50 PM  
**To:** 'Tim Watts'; Waldman Karen; Spiller Daniel (SEQWGM); Rose Rolf  
**Cc:** Sheraton Mardi; Rose Rolf  
**Subject:** RE: review of wivenhoe supply level

Tim

Original Seqwater investigation did various levels. At present only looking at 1 and 2 metre options.

Focus is on 1m but need to confirm 2m result.

Tad Bagdon

-----Original Message-----

**From:** Tim Watts [mailto:Tim.Watts@ministerial.qld.gov.au]  
**Sent:** Monday, 11 October 2010 6:18 PM  
**To:** Waldman Karen; Spiller Daniel (SEQWGM); Bagdon Tad; Rose Rolf  
**Cc:** Sheraton Mardi  
**Subject:** RE: review of wivenhoe supply level

If an increase in FSL of above 1m will decrease system yield, why are investigations into increases of 2, 3 and 4m ongoing?

Tim Watts

Policy Advisor

Office of the Minister for Natural Resources, Mines and Energy and Minister for Trade

Phone: [REDACTED]

Mobile: [REDACTED]

Fax: [REDACTED]

-----Original Message-----

**From:** Springer Kristy [REDACTED]  
**Sent:** Monday, 11 October 2010 5:25 PM  
**To:** Tim Watts  
**Cc:** Waldman Karen; Bagdon Tad; Spiller Daniel (SEQWGM); Sheraton Mardi; Rose Rolf  
**Subject:** RE: review of wivenhoe supply level

Good evening Tim

Please find attached a Ministerial Brief on increasing Wivenhoe Dam's Full Supply level approved by Karen Waldman, CEO, QWC. The brief has also been progressed urgently via MECS: CTS 18474/10.

Kind regards

Kristy Springer

A/Senior Policy and Project Officer

Corporate Policy Unit - Queensland Water Commission Department of Environment and Resource Management

[REDACTED] PO Box 15087 City East QLD 4002 | E:  
[REDACTED]

-----Original Message-----

**From:** Tim Watts [REDACTED]  
**Sent:** Monday, 11 October 2010 12:11 PM  
**To:** Waldman Karen  
**Cc:** Bagdon Tad; Sheraton Mardi; spiller daniel @ SEQWGM; Dennien Barry  
**Subject:** review of wivenhoe supply level

Hi Karen



" SR 7 "

CTS No. 19311/10

Department of Environment and Resource Management  
MINISTERIAL BRIEFING NOTE

TO: Minister for Natural Resources, Mines  
and Energy and Minister for Trade

RECEIVED  
MINISTERIAL OFFICE  
22 OCT 2010

Advisor	.....
Dated	22/10/10
<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved <input type="checkbox"/> Noted Further Information required	
Minister	.....
Dated	25/10/10

SUBJECT: Managing Flood Impacts Downstream of  
Large Water Supply Dams

TIMEFRAME

- Approval of this brief is required by 29 October 2010 to enable prompt action to be taken on this matter.

RECOMMENDATION

It is recommended that the Minister:

- sign the letter to the SEQ Grid Manager (Attachment 1) requesting him to consider options to pre-emptively reduce dam water levels to help manage low-level, downstream flood impacts. (A draft media release forms Attachment 2)
- sign the letter (Attachment 3) to Director-General, Department of Environment and Resource Management (DERM), requesting him to initiate action to remind the owners of large water supply dams about their obligations to provide advice to communities downstream of their dams about flood flows through them.
- note the draft letter (Attachment 4) from the dam safety regulator in DERM to dam owners regarding the previous points.

BACKGROUND

*Letter to the SEQ Grid Manager*

The main SEQ water supply dams have reached their full capacity, for water supply purposes. As their catchments are saturated, even quite minor rainfall events will result in water releases. A large number of minor rainfall events are anticipated between now and the end of the 2011 wet season, in early April 2011.

As these water releases will usually co-incide with local flooding (due to the rain event generating the release) downstream of the dam. These low-level flood events inconvenience a range of people, particularly those who need to access their properties over low-level crossings that traverse these streams/rivers.

Accordingly, it is suggested you request the SEQ Grid Manager to investigate the option of making small releases from these water supply dams to reduce the number of incidents resulting in low-level flooding impacts. (Preliminary advice from the Grid Manager is that such a strategy will not adversely affect water supply security).

*Letter to the Director-General*

With the exception of Wivenhoe, North Pine and Somerset Dams that have special flood management arrangements, other large water supply dams, once full, basically "pass through" the floodwaters that flow into them.

Author Name: Bob Reilly Position: GM(OWSR) Tel No: [REDACTED] Date: 22 October 2010	Cleared by Name: Bob Reilly Position: GM(OWSR) Tel No: [REDACTED] Name: Dean Ellwood Position: ADG(ENRR) Tel No: [REDACTED]	Cleared by Name: Position: Tel No: Name: Position: Tel No:	Recommended: Name: John Bradley Position: Director-General, DERM Tel No: [REDACTED] Date:
---	---	--	---

However, the local governments responsible for the communities downstream of the dams, can reasonably expect that dam owners will tell them about the volumes of floodwater flowing through their dams.

The dam safety regulator, DERM, requires the owners of large water supply dams to have, and keep current, Emergency Action Plans. Amongst other matters, these plans set out the notification protocols for local governments (and other emergency management agencies) in the event of significant floods (basically those that will impact on buildings).

DERM does not approve these plans, or review their content. Nor is it involved in the negotiations between dam owners and local government/emergency management organisations in the development of these plans.

## CURRENT ISSUES

### *SEQ Grid Manager Letter*

Given the water security situation, it is desirable to minimise the low-level flooding impacts typically associated with minor rainfall events, where practical.

### *Letter to the Director-General*

Given the likelihood of above average floods during the 2011 wet season, it is important that the Emergency Action Plans are current.

## RESOURCE/IMPLEMENTATION IMPLICATIONS

- The SEQ Grid manager will advise of any financial implications associated with the proposal contained in your letter to him.
- There were no resource issues for DERM.

## PROPOSED ACTION

- The two letters will give effect to the commitments being given to Cabinet on 25 October 2010, by yourself, on these matters.

## OTHER INFORMATION

- *Consultation:* The SEQ Grid Manager (Dan Spiller) has been consulted and supports the proposed action contained in your letter to the Grid Manager.
- *Legislation:* NA

## MINISTER'S COMMENTS

## ATTACHMENTS

- Attachment 1 – Letter to SEQ Grid Manager
- Attachment 2 – Letter to D-G, DERM
- Attachment 3 – Letter to Dam Owners

<b>Author</b> Name: Bob Reilly Position: GM(OWSR) Tel No: [REDACTED] Date: 22 October 2010	<b>Cleared by</b> Name: Bob Reilly Position: GM(OWSR) Tel No: [REDACTED] Name: Dean Ellwood Position: ADG(ENRR) Tel No: [REDACTED]	<b>Cleared by</b> Name: [REDACTED] Position: [REDACTED] Tel No: [REDACTED] Name: [REDACTED] Position: [REDACTED] Tel No: [REDACTED]	<b>Recommended:</b> Name: John Bradley Director-General, DERM Tel No: [REDACTED] Date: [REDACTED]
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**DRAFT ONLY**

## **SEQ Water Grid prepares for summer big wet**

The Minister for Natural Resources Stephen Robertson MP today announced measures to configure the Grid for improved flood mitigation in preparation for a forecast bigger than usual wet season.

Our water supply is now more secure than ever before. The Grid 12 are at 100 per cent of storage capacity, going into the traditional wet season with forecasts of higher than median rainfall and the prospect of multiple flood events.

With this security, we have the opportunity to make sure we are prepared as possible for the prospect of minor and major flooding.

Recent heavy rains which saw a flood water volume the size of Sydney Harbour – or the equivalent to 122,000 Olympic sized swimming pools – added to and released safely from Wivenhoe Dam in less than 7 days.

Minister Robertson said that while Wivenhoe is designed to handle even more water, it was prudent to consider options to increase the dam's storage compartment for the coming season. This would be achieved by temporarily decreasing its drinking water storage capacity.

"Wivenhoe Dam no longer stands alone. Because the dams are full and we've hooked them up across the Grid, we can actually rely on Wivenhoe Dam less for drinking water and more for flood mitigation which gives us a powerful advantage."

"Let's remember, Wivenhoe Dam was built to hold back flood water from Brisbane and Ipswich. This temporary move may give it even more capacity to help keep us dry, just in case we really get a huge season." Mr Robertson said.

At the very least, we expect it to reduce the frequency and duration of major dam releases, which flood crossings near the dam – isolating some residents and significantly inconveniencing others.

The operation of North Pine and Leslie Harrison dams will also be reviewed. At least for Leslie Harrison Dam, this would be a return to standard operating procedures prior to the drought, when the dam was routinely drawn down to 95 per cent of capacity to minimise the impacts of storms on downstream residents.

We have analysed water security for South East Queensland over five years, taking into account differing levels of flows and demand. Our analysis indicates that lowering the combined storage level of Grid 12 storages to 95 per cent of capacity presents a low risk of adversely effecting regional or sub-regional water security.

Seqwater and the Water Grid Manager are reviewing the operations of the dams and will provide detailed advice on the changes to operations for this summer.

Mr Robertson emphasised that this is only a temporary measure, reflecting that dams are full.

Mr Robertson also announced that the \$395 million upgrade of Hinze Dam remains on track to be completed by the end of year, providing much improved flood protection for parts of the Gold Coast.

"While we have all been focussed on water security, the improved flood management capacity is every bit as important."

"South East Queensland has a water grid for all seasons not just for drought. Being able to move water means an unprecedented level of management to direct and control our water supplies. These prudent decisions simply reflect the Grid's world class ability to respond to a changing environment in the interest of all South east Queenslanders."

Ends



**Queensland  
Government**

Ref GTS 19311/10

**25 OCT 2010**

Mr J Bradley  
Director-General  
Department of Environment and Resource Management  
GPO Box 2454  
BRISBANE QLD 4001

Office of the  
Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade

Dear Mr Bradley

It is important that the local governments (and other emergency management organisations) responsible for communities located downstream of large water supply dams, are aware of significant flood events that pass through those dams.

I understand that the Department of Environment and Resource Management in its role as dam safety regulator requires the owners of these dams to have, and keep current Emergency Action Plans. Amongst other matters, these plans deal with the matters referred to in the previous paragraph.

I request that you arrange for the relevant dam owners to be contacted and provide you with an assurance that their Emergency Action Plans are current.

I note that the owner of the three flood mitigation dams, namely Wivenhoe, North Pine and Somerset will not be asked to do this, as separate flood management arrangements apply to these dams.

Yours sincerely

**STEPHEN ROBERTSON MP**

*Rec'd - ODG*

**25 OCT 2010**

Level 17  
61 Mary Street Brisbane 4000  
PO Box 15216 City East  
Queensland 4002 Australia  
Telephone +61 7 3225 1861  
Facsimile +61 7 3225 1828  
Email [nrmnet@ministerial.qld.gov.au](mailto:nrmnet@ministerial.qld.gov.au)  
ABN 65 959 415 158

File/Ref CTS 19311/10

To the Dam Owner  
[Reply Address]  
[SUBURB STATE POSTCODE]

Dear Sir/Madam

It is important that local governments (and other emergency management organisations) responsible for communities downstream of your dam(s), are aware of significant flood events that might pass through them.

To assist in the regard, you are required under dam safety condition DS13 to have, and keep current, an Emergency Action Plan (EAP) for each of the following dam(s):

INSERT LIST

I seek your written confirmation, by 30 November 2010, that the(se) EAP(s) are current.

Please contact me on [REDACTED] if you have any queries.

Yours sincerely

Peter Allen  
**Director (Dam Safety)**  
**Office of the Water Supply Regulator**

Queensland 4 Australia

Telephone + 61 7

Facsimile + 61 7

Website [www.derm.qld.gov.au](http://www.derm.qld.gov.au)

ABN 46 640 294 485

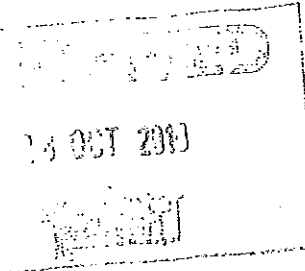


**Queensland  
Government**

Ref CTS 19311/10

**25 OCT 2010**

Mr Gary Humphrys  
Chair  
SEQ Water Grid Manager  
PO Box 16205  
CITY EAST QLD 4002



Office of the  
**Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade**

Dear Mr Humphrys

I write in relation to seeking advice regarding options to and benefits of releasing water from key storages in anticipation of major inflows over the coming summer.

I understand that the key Water Grid storages are at 100 per cent of storage capacity going into the traditional wet season, with forecasts of higher than median rainfall and the prospect of multiple flood events.

I am also advised that our water supply is more secure than ever before, due to storages being full, key Water Grid projects completed and ongoing water efficiency.

I seek your urgent advice about whether this water security provides an opportunity to reduce the volume stored in key dams as a means of reducing the severity, frequency and duration of flooding in downstream areas.

In doing so, I note that recent releases from Wivenhoe Dam have resulted in significant inconvenience and isolation for residents in some downstream areas. With the catchments saturated, I understand that even quite minor rainfall events will result in further water releases and further inconvenience for these residents.

By end November 2010, I would appreciate your advice as to the available options and the likely benefits. At a minimum, you should review the operation of Wivenhoe, North Pine and Leslie Harrison dams. At least for Leslie Harrison Dam, this would be a return to standard operating procedures prior to the drought, when the dam was routinely drawn down to 95 per cent of capacity to minimise the impacts of storms on downstream residents.

I also seek your confirmation that these options would not significantly impact upon our current water security, measured as the probability of needing to reintroduce Medium Level Restrictions over the next five to ten years.

Level 17  
61 Mary Street Brisbane 4000  
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Facsimile +61 7 3225 1828  
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ABN 65 959 415 158



**Queensland  
Government**

Office of the  
**Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade**

I emphasise that this is only a temporary measure, reflecting that dams are full prior to the commencement of the traditional wet season. I expect that your advice will include a clear date or trigger beyond which dams will be allowed to fill to their full supply level.

Thank you in advance for your assistance.

Should you have any further enquiries, please feel welcome to contact Mr John Bradley, Director General, Department of Environment and Resource Management on 3330 6298.

Yours sincerely

**STEPHEN ROBERTSON MP**

Level 17  
61 Mary Street Brisbane 4000  
PO Box 15216 City East  
Queensland 4002 Australia  
Telephone +61 7 3225 1861  
Facsimile +61 7 3225 1828  
Email [nmet@ministerial.qld.gov.au](mailto:nmet@ministerial.qld.gov.au)  
ABN 65 959 415 158



## Waldman Karen

---

**From:** Waldman Karen  
**Sent:** Thursday, 28 October 2010 11:22 AM  
**To:** Bagdon Tad  
**Subject:** Fw: Request for a review of dam operating levels

**Attachments:** Letter from Stephen Robertson MP RE Release of Water from Key Storages.tif;  
image001.gif



Letter from  
Stephen Robertson ..  
Hi Tad

For information and relevant action from QWC's perspective, Karen

----- Original Message -----

**From:** Gina O'Driscoll <[REDACTED]>  
**To:** Waldman Karen  
**Sent:** Thu Oct 28 09:52:22 2010  
**Subject:** FW: Request for a review of dam operating levels



image001.gif (391  
B)

Karen - copy of letter as promised in my previous email.

Regards

Barry Dennien

Chief Executive Officer

SEQ Water Grid Manager

Phone: [REDACTED] | Fax: [REDACTED] | Mobile: [REDACTED]

Email: [REDACTED]

Visit: Level 15, 53 Albert Street, Brisbane

Post: PO Box 16205, City East Qld 4002

ABN: 14783 317 630

Please consider the environment before printing this email. It takes 10 litres of water to make one sheet of A4 paper.

**From:** Barry Dennien  
**Sent:** Tuesday, 26 October 2010 7:37 AM  
**To:** Waldman Karen  
**Cc:** Gina O'Driscoll; Dan Spiller  
**Subject:** Request for a review of dam operating levels

Karen

The Minister has asked if we can review the flood safety benefits of pre-emptively dropping Wivenhoe supply levels a few percentage points. I letter will arrive today asking:

- seeks, by end November 2010, advice as to the available options and the likely benefits

- states that, at a minimum, a review of the operation of Wivenhoe, North Pine and Leslie Harrison dams emphasises that this is only a temporary measure, reflecting that dams are full prior to the commencement of the traditional wet season

- seeks advice about a clear date or trigger beyond which dams will be allowed to fill to their full supply level.

- seeks advice on the best method, slow release or fast release over a few days as rain events are confirmed

I will cc the letter when it comes in.

Barry Dennien

Chief Executive Officer

SEQ Water Grid Manager

Phone: [REDACTED] | Fax: [REDACTED] | Mobile: [REDACTED]

Email: [REDACTED]

Visit: Level 15, 53 Albert Street, Brisbane

Post: PO Box 16205, City East Qld 4002

ABN: 14783 317 630

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**Department of Environment and Resource Management  
Hot Issues Brief**

**STATUS OF SOMERSET/WIVENHOE DAM FLOODWATER  
RELEASE PROTOCOL**

- It is understood that the Premier is scheduled to meet with Councillor Campbell Newman Lord Mayor Brisbane City Council on 28 October 2010. While the Protocol is not currently listed as an agenda item, he may raise the matter. This brief outlines the status of the Protocol's development as at 27 October 2010.
- A copy of the draft Protocol (Attachment 1) was emailed to Brisbane, Ipswich and Somerset Councils on 21 October 2010. (Somerset dam has been included in the Protocol because the two dams are operated on an integrated basis for flood management purposes, and Somerset Council would be specifically interested in the operation of Somerset dam).
- In the email, an offer was made to meet with the councils on 22 October 2010 to answer any initial concerns/queries the councils may have about the draft Protocol. They did not wish to meet and Brisbane City Council sent a letter (Attachment 2) to that effect.
- On 22 October 2010, the Minister for Natural Resources, Mines and Energy and Minister for Trade ~~has~~ <sup>sent</sup> wrote (Attachment 3) to the Chairperson of the SEQ Water Grid Manager requesting his advice on the benefits of temporarily reducing the level in certain SEQ dams (including Wivenhoe and Somerset), so as to minimise the impacts of storms on downstream residents. This action will be referenced in the Protocol, as it is a form of flood release.
- A meeting is scheduled for 0800 28 October 2010 between senior staff from Queensland Government agencies and officers from Brisbane and Ipswich City Council to discuss the draft protocol.
- Ipswich City Council has verbally advised that they are happy with the Protocol, while Brisbane City Council currently has unspecified concerns with it.
- Somerset Council staff will not be attending the meeting, even by teleconference. They are more interested in seeing a Protocol covering flooding generally.

**Attachment:**

Attachment 1 – Protocol for the Communication of Flooding Information during Floodwater Releases – Wivenhoe and Somerset Dams

Attachment 2 – Letter from Brisbane City Council

Attachment 3 – Letter from Minister for Natural Resources, Mines and Energy and Minister for Trade

*WR*  
27/10

## **Protocol for the Communication of Flooding Information during Floodwater Releases - Wivenhoe and Somerset Dams**

### **OBJECTIVE**

The purpose of this protocol is to outline the processes to be followed by the Brisbane, Ipswich and Somerset Councils, relevant Queensland Government agencies and the Bureau of Meteorology, which will ensure the provision of consistent and robust information to the community, concerning potential flooding impact during release of floodwater from Wivenhoe and Somerset Dams.

The intent is to ensure that consistent, harmonised information, based on an agreed single point of truth, is communicated to the public in a way that contributes to disaster resilient communities.

### **BACKGROUND**

Wivenhoe Dam controls approximately half of the Brisbane River catchment above Brisbane City. Other factors such as storm surges, tides, creek flooding, flooding from Brisbane River below Wivenhoe Dam, including Lockyer Creek and the Bremer River, will influence inundation levels in Brisbane.

The operational strategy for water release from Wivenhoe and Somerset Dams is governed by the *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam*, henceforth referred to as the Flood Mitigation Manual.

The Flood Mitigation Manual is approved and gazetted by the Department of Environment and Resource Management (DERM), in accordance with the provisions of the *Water Supply (Safety and Reliability) Act 2008*.

The Flood Mitigation Manual was developed to ensure that operational decisions at Wivenhoe and Somerset Dams are based on sound engineering principles, which ensure the structural safety of the dam, while minimising downstream impacts.

In the event of a major impact on communities, Queensland disaster management arrangements, based on disaster management groups at local, district and state level, ensure the collaborative and effective coordination of information for all hazards.

Local, district and state disaster management and hazard-specific plans outline arrangements and structures for disaster management, or the hazard, and amongst other things, identify the need for coordination of public communications.

This protocol adds to such plans by outlining specific arrangements necessary when advice to the community needs to be based on technical assessments from hazard-specific primary agencies and other complementary stakeholders across federal, state and local governments.

## **GENERAL DECISION MAKING - GUIDING PRINCIPLES**

- Protection of public safety is paramount throughout both the Flood Mitigation Manual and this Protocol;
- The Flood Mitigation Manual is used to determine how Wivenhoe and Somerset Dams will be operated during flood events;
- Impact on the community upstream or downstream is a legitimate consideration of any risk assessment;
- Agreed regular and consistent communications within government and to the public, in relation to the impacts of floodwater releases from Wivenhoe Dam, are essential;
- Decision-making chains regarding the communications strategy and disaster management should remain flexible;

## **PROCESS OF COMMUNICATION**

There are three stages in the process of communication:

- Monitoring and Assessment
- Briefing and Activation
- Public Communications

### **Monitoring and Assessment**

The floodwater release strategy is a balance between releasing the water quickly enough so that the flood storage capacity is available if another major rain event occurs, versus minimising downstream flooding impacts (human safety and property damage) from the releases.

A fundamental principle is that all floodwater should be released from the dams within seven days of the flood event peaking in Wivenhoe or Somerset Dam. This ensures the dams can cope with closely spaced major rain events.

Communications with the public on floodwater releases are based on a continuous process of technical assessment. The process is dynamic and evolves according to the event, but will normally contain the following steps:

- Routine monitoring of weather events and dam levels by relevant agencies via established systems and procedures;
- The Bureau of Meteorology (BoM) provides weather forecasts and warnings (e.g. Tropical Cyclone, Severe Weather, Severe Thunderstorm, Flood). In the event of heavy rain and runoff in the Wivenhoe and/or Somerset Dam catchments, BoM and the Queensland Bulk Water Supply Authority (Seqwater) discuss modelled inflows to Wivenhoe and/or Somerset Dam, and downstream flood levels.
- Seqwater discusses and models implications of the inflows on the necessary floodwater release from Wivenhoe Dam and/or Somerset Dam.
- Seqwater calculates the releases according to dam levels and predicted weather events in accordance with the Flood Mitigation Manual. Seqwater shares predicted floodwater releases with BoM and with the Councils.
- BoM undertakes modelling of the Brisbane River catchment and its river systems using Seqwater advice of actual and projected Wivenhoe Dam and/or

Somerset Dam releases when these are, or are expected, to occur.

- BoM participates in technical discussions with Seqwater, Brisbane City Council, Ipswich City Council and Somerset Regional Council as necessary, to share modelling results. The discussions aim to establish an agreement on what to tell the public about predicted flood levels and timings.
- Councils identify flood inundation areas and assess impacts for their communities and regularly share this information with all relevant parties.
- Following a decision to release floodwater, or a significant change in the severity and scope of the event, Seqwater coordinates the completion of the *Flood Release Operations and Impact Report* (FROIR - Appendix C) and provides the Report to the SEQ Water Grid Manager according to their Emergency Response Plan, in order to inform the public communications process.

If, during this continuous process, it becomes apparent to either BoM, local governments or Seqwater that the situation is likely to result in significant public safety issues, the SEQ Water Grid Manager, based on the Report, will commence the public communications process and engage with the disaster management arrangements as appropriate.

### **Briefing and Activation**

Consideration will be given to the activation of the Disaster Management arrangements, if not already activated.

1. SEQ Water Grid Manager will alert the Director-General (DG) of the Department of Community Safety (DCS), DG DERM, and the local governments;
2. DG DCS will inform the DG of the Department of Premier and Cabinet (DPC) - the Chair of the State Disaster Management Group (SDMG), and will activate the State Disaster Coordination Centre (SDCC). DG DCS will also inform the Minister for Police, Corrective Services and Emergency Services;
3. Councils will consider activating their Local Disaster Management Groups (LDMGs);
4. The SDCC and LDMGs will inform the relevant District Disaster Coordinators (DDCs);
5. The Queensland Police Service (QPS) will consider initiating disaster management actions as provided for under the *Disaster Management Act 2003*;
6. DG DERM will inform the Minister for Natural Resources, Mines and Energy;
7. DG DPC will inform the Premier;
8. In the case of an extreme event, the Crisis Communications Network, chaired by the Department of Premier and Cabinet (DPC), may be activated at the direction of the SDMG Chair to coordinate public messaging agreed by BoM, Seqwater, SEQ Water Grid Manager, QPS, relevant Councils and DCS as per this protocol;
9. In the case of a non-disaster, public communications will be in accordance

with this protocol.

### **Public Communications Issues**

SEQ Water Grid Communications Unit will coordinate the input and liaise with the following or their representatives over public safety messages:

- BoM;
- Seqwater;
- Councils' Media Directors.
- QPS Media Director; and
- DCS Media Director.

The BoM, Seqwater and Local Governments are to maintain continual discussions, to ensure that conflicting information is not released to the public at any time. Where differences arise, officers of the agencies concerned will liaise and consult to ensure that the information released to the public by all agencies is consistent. Agencies must exchange public releases.

Harmonised public communications messages will be released from the following agencies:

- **Bureau of Meteorology** - concentrating on Flood Warnings which are widely disseminated to the BoM website, agencies and the media. BoM also participates in media (radio, television, newspaper) interviews to provide factual information regarding observed and forecast weather conditions, rainfalls and water levels;
- **SEQ Water Grid Manager** - concentrating on the technical aspects of release timings and duration of effects as lead technical agency on floodwater release. Seqwater operational staff are to ensure that technical information is communicated to the SEQ Water Grid Emergency Response Team (if activated) and the SEQ Water Grid Communications Unit;
- **Local Governments / Local Disaster Management Groups** - concentrating on the effects of release and safety for their local communities and residents.

If necessary these will be augmented by:

- **Queensland Police Service** - concentrating on specific community safety messaging during operations;
- **Department of Community Safety** - concentrating on general safety matters regarding flooding;
- **Department of Premier and Cabinet (extreme events only)** - concentrating on consistent messages to media and agencies concerned.

Event-specific information will be released to the public as frequently as required by the severity and scope of the event. Timings of media releases will be dependent on the event and may range from once a day to once an hour.

### **Questions from the Public**

All questions from the public should be directed to the relevant local government in the first instance. Any questions relating to the release of water should be directed to the SEQ Water Grid Manager Communications Unit. Any queries about disaster

management should be addressed by the relevant local and district disaster management groups.

### **Protocol Maintenance**

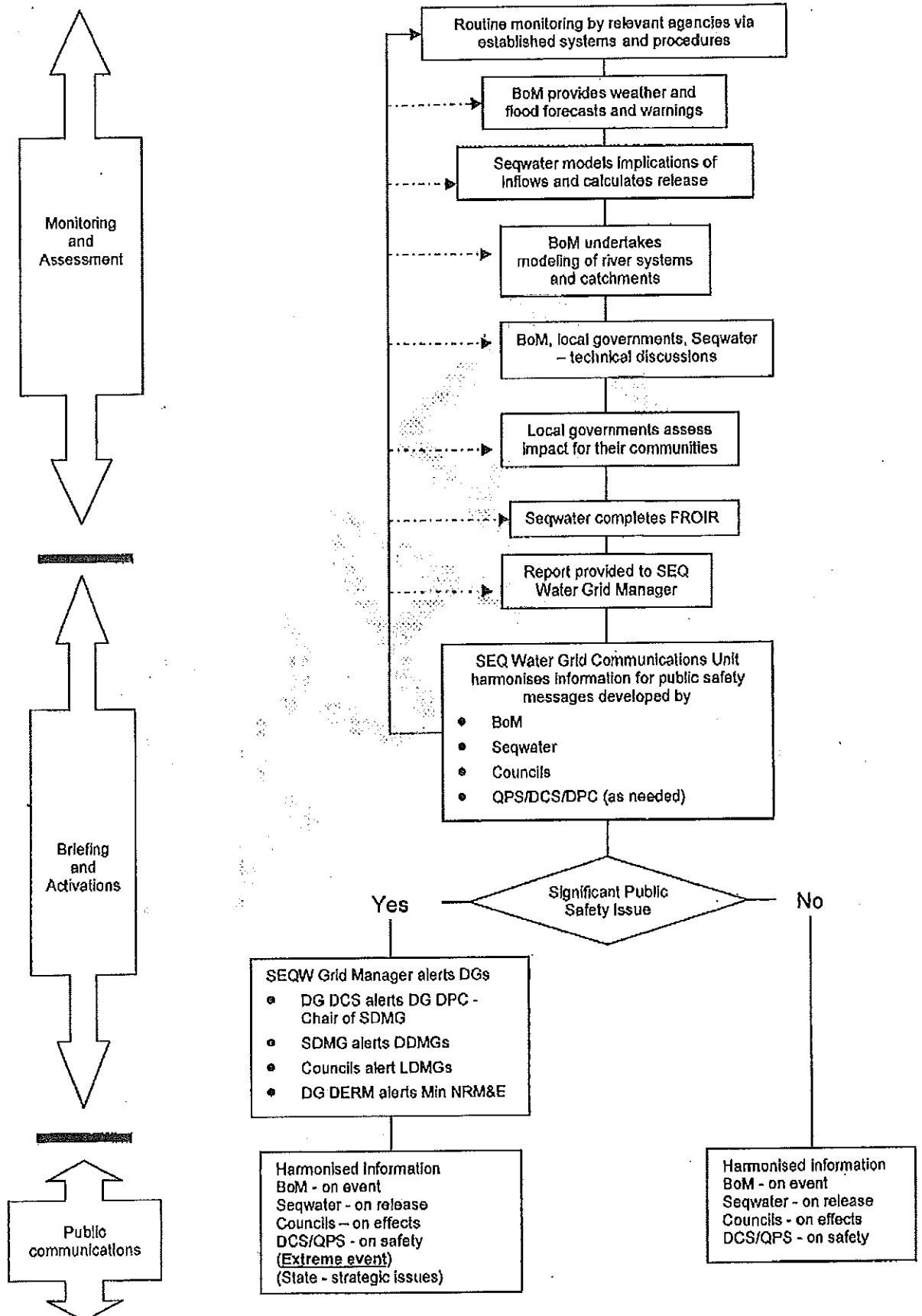
This protocol will be reviewed annually by agencies involved and exercised, during the years when operational floodwater release does not occur, under DDMG arrangements.

The protocol should provide for a review after each event of what worked and could be improved for management of future events, to be led by DCS.



## Appendix A

### Communications process for the release of floodwater from Wivenhoe and Somerset Dams



## Appendix B

### ROLES AND RESPONSIBILITIES

- The Bureau of Meteorology (BoM) is the agency responsible for issuing flood warnings for the Brisbane River and its major tributaries. These, when required, include rainfall forecasts for the Brisbane catchment and predicted river heights for Brisbane City, Ipswich, Jindalee and Moggill according to established procedures.

River height predictions are agreed in consultation with South East Queensland Water (Seqwater), Brisbane City Council (BCC), Ipswich City Council (ICC) and Somerset Regional Council (SRC), as required.

- Queensland Bulk Water Supply Authority (Seqwater) operates Wivenhoe and Somerset Dams in accordance with the Flood Mitigation Manual. It provides dam outflow information to BoM, to allow the development of Flood Warnings and to local authorities, to assist them in quantifying likely impacts within their areas.

It informs BoM and other agencies on the status of dams, and actual and projected releases from Wivenhoe Dam.

It consults BoM regarding inflows to Wivenhoe Dam and expected flood heights along the Brisbane River downstream of Wivenhoe Dam.

Seqwater initiates proposed changes to the Flood Mitigation Manual, undertaking consultation with Councils and other stakeholders.

Seqwater coordinates the production of the FROIRs.

- Brisbane City Council (BCC), Ipswich City Council (ICC) and Somerset Regional Council (SRC) distribute consistent, detailed local flood level information, both to their respective operational units, their senior management and their broader communities. This should include the interpretation of BoM flood warnings and river height forecasts into expected areas and depths of inundation. Councils are responsible for activating their respective Local Disaster Management Groups (LDMGs), which then undertake the disaster management responsibility for response in the community.
- DERM consults with the stakeholders prior to the approval of any updates to the Flood Mitigation Manual. DERM also approves any necessary variations to the strategies in the manual if required during the course of a flood event.
- Queensland Police Service (QPS) assumes a legislative role, as per the Disaster Management system, to provide disaster management at a district level during an event, including provision of necessary community advice for public safety.
- Emergency Management Queensland (EMQ) provides support and general community safety advice on flooding issues, during non-operational times.
- SEQ Water Grid Communications Unit coordinates the general harmonisation, but not specific detail of public messaging with BoM, SEQ Water Grid, BCC and DCS, as required. It does this by ensuring that each agency understands the extent of the release and that there is a general consensus as to the level of potential impacts.

## FLOOD RELEASE OPERATIONS AND IMPACT REPORT

<b>OPREP Number</b>		<b>Date of OPREP release</b>		<b>Time of OPREP release</b>	
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<b>Next OPREP due</b>	<b>Date</b>		<b>Time</b>		<b>or Event</b>	
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This report is as at the time of assessment, and may be out of date quickly, depending on current events. It relies on timely information provided by Seqwater, BoM and Councils. A reply will be required by a specified time and if not received by that time no information will be included. If any information is not provided, the section will remain blank. There will be no follow up requests.

Each Authority will provide an email and telephone contact for all communications. If an event escalates, there may be less time to respond or it may not be possible to respond to requests.

The initial step in the process is for Seqwater to email advices on releases to the organisations email address provided. Once a flood event is initiated, at any time a Council or agency can contact Seqwater to discuss if they have a serious concern regarding the information on releases provided, this would normally be by phone and followed by email. However the ability to respond to any queries depends on the event. The frequency of advices will depend on the severity of the event and the needs of each agency.

Seqwater will also request at that time, a situation Assessment from each agency as per details outlined in this document. Each agency will then email in return the requested information if possible or advice that it has not changed. If it is not received in the time specified, it is assumed it is not being provided.

## Seqwater status of inflows and dam operations

*(to include information on the current and/or predicted levels of Somerset and Wivenhoe Dams and the probable or planned release strategy with assessment as governed under the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam )*

This is Seqwaters status report on the dam levels, probable inflows and planned releases.

.....  
This has been supplied to

BCC on .....

ICC on .....

SRC on .....

Issues raised by Councils were .....

Actions taken were .....

Seqwater Technical Officer name

Seqwater Technical Officer position title

Seqwater Technical Officer contact details

## BoM assessment

*(consisting of references to latest Flood Warning for the Brisbane River and other relevant Bureau forecasts and warnings (eg weather/rain forecasts, Tropical Cyclone Warning etc) and other updates/comments if needed)*

BoM is to provide either a copy of, or links to, their current information and other updates or comments if needed. This will be their current set of warnings and may be updated or changed at any time.

BoM Technical Officer name

BoM Technical Officer position title

BoM Technical Officer contact details

**Brisbane City Council (BCC) assessment**

*(to include predicted local inundation areas and depths of inundation based on the information)*

This is an assessment as above provided by BCC. A request for this information will be sent to the email address provided by BCC.

BCC Technical Officer name

BCC Technical Officer position title

BCC Technical Officer contact details

**Ipswich City Council (ICC) assessment (if required)**

**Somerset Regional Council (SRC) assessment (if required)**

*(both ICC and SRC requirements are the same as for BCC)*

**Collated and distributed by Seqwater**

Seqwater Contact Officer signature

Seqwater Contact Officer name

Seqwater Contact Officer position title

Seqwater contact details



*Dedicated to a better Brisbane*

22 October 2010

Mr Bruce Grady  
Acting Chief Officer  
Emergency Management Queensland  
GPO Box 1425  
BRISBANE QLD 4001

Dear Mr Grady

Thank you for email of Thursday 21 October 2010 to Vicki Pethybridge, Divisional Manager, Families and Community Services Division regarding the draft protocol for the release of flood waters from Wivenhoe and Somerset Dams.

Information received on Friday 15 October 2010 by the Lord Mayor from the Premier indicated that a meeting would be held to discuss this topic. You have requested Council's response to the draft protocol be returned to you on Friday 22 October 2010. However, we have not been made aware of the meeting referred to by the Premier, and would have preferred to participate in a broader conversation regarding capabilities in monitoring flood impacts.

I do not have the response to send to you today. I will be in a position to provide that information to you early in the week commencing Monday 25 October 2010.

Please feel free to contact Vicki Pethybridge on 3403 8888 if you have any questions or concerns.

Yours sincerely

Colin Jensen  
CHIEF EXECUTIVE OFFICER

Brisbane City Council ABN 72 002 765 795

OFFICE OF THE LORD MAYOR AND CHIEF EXECUTIVE OFFICER

**Attachment 3**

Prepared by:	Bob Reilly	Approved by:	(Name of Dir/ED/GM/RSD)
Title:	General Manager	Title:	(Approving Officer's Position)
Division/Region:	Office of the Water Supply Regulator	Telephone:	(full number)
Telephone:	[REDACTED]	Date Approved:	(date)
Date Prepared:	22 October 2010		
Date Received in MO:	MO Clearance by:		Date Cleared:

Ref CTS 19311/10

Mr Gary Humphrys  
Chair  
SEQ Water Grid Manager  
PO Box 16205  
CITY EAST QLD 4002

Dear Mr Humphrys

I write in relation to seeking advice regarding options to and benefits of releasing water from key storages in anticipation of major inflows over the coming summer.

I understand that the key Water Grid storages are at 100 per cent of storage capacity going into the traditional wet season, with forecasts of higher than median rainfall and the prospect of multiple flood events.

I am also advised that our water supply is more secure than ever before, due to storages being full, key Water Grid projects completed and ongoing water efficiency.

I seek your urgent advice about whether this water security provides an opportunity to reduce the volume stored in key dams as a means of reducing the severity, frequency and duration of flooding in downstream areas.

In doing so, I note that recent releases from Wivenhoe Dam have resulted in significant inconvenience and isolation for residents in some downstream areas. With the catchments saturated, I understand that even quite minor rainfall events will result in further water releases and further inconvenience for these residents.

By end November 2010, I would appreciate your advice as to the available options and the likely benefits. At a minimum, you should review the operation of Wivenhoe, North Pine and Leslie Harrison dams. At least for Leslie Harrison Dam, this would be a return to standard operating procedures prior to the drought, when the dam was routinely drawn down to 95 per cent of capacity to minimise the impacts of storms on downstream residents.

I also seek your confirmation that these options would not significantly impact upon our current water security, measured as the probability of needing to reintroduce Medium Level Restrictions over the next five to ten years.

I emphasise that this is only a temporary measure, reflecting that dams are full prior to the commencement of the traditional wet season. I expect that your advice will include a clear date or trigger beyond which dams will be allowed to fill to their full supply level.

Thank you in advance for your assistance.

Should you have any further enquiries, please feel welcome to contact Mr John Bradley, Director General, Department of Environment and Resource Management on [REDACTED]

Yours sincerely

**STEPHEN ROBERTSON MP**



**Queensland Water Commission  
MINISTERIAL MEETING BRIEFING NOTE**

Thursday 11 November 2010

Mary Boydell, Commissioner

Karen Waldman, Chief Executive Officer

Advisor .....	Ok
Dated / /	
<input type="checkbox"/> Approved <input type="checkbox"/> Not Approved <input type="checkbox"/> Noted	
<input type="checkbox"/> Further information required	
Minister.....	
Dated / /	

TO: Minister for Natural Resources, Mines and  
Energy and Minister for Trade

**SUBJECT: Quarterly meeting with the Queensland Water Commission**

**BACKGROUND**

- The Queensland Water Commission (QWC) Commissioner and Chief Executive Officer (CEO) meet with the Minister on approximately a quarterly basis in order to discuss matters of strategic importance.
- The previous meeting was held on 10 August 2010.
- The objective of this meeting is to:
  - provide an opportunity for the Minister to raise issues with the Commissioner and the CEO; and
  - update the Minister on key result areas, issues and achievements for the QWC.

**CURRENT ISSUES**

- The QWC was established in 2006 under the *Water Act 2000* as part of a suite of measures to ensure the delivery of sustainable and secure water supply and demand management for the South East Queensland (SEQ) region and designated regions.
- Given the breathing space afforded by the short-medium term security of water supply and the announcement that the QWC will have additional responsibilities related to Coal Seam Gas water, a QWC strategic planning project was undertaken, with external consulting assistance.
- The purpose of this project was to review and refine the organisation's priorities and, if appropriate, the internal structure to best support delivery of outcomes. The Commissioner and the CEO briefed the Minister on the strategic direction and supporting organisational structure on 1 October 2010.
- As a result of this process, the QWC will focus its efforts and resources on the following key result areas:
  - planning for the provision of a safe, secure and reliable water supply for SEQ to achieve desired levels of service objectives;
  - improving the institutional and regulatory framework to enable efficient and cost effective service delivery to water customers in SEQ; and
  - providing sound, evidence-based advice to manage the cumulative impacts of Coal Seam Gas extraction on underground resources.
- **Attachment 1** provides a summary of issues and achievements under each of these key result areas.

<b>Author</b> Name: Karen Waldman Position: CEO QWC Tel No: [REDACTED] Date: 28 October 2010	<b>Cleared by</b> Name: Karen Waldman Position: CEO QWC Tel No: [REDACTED]	<b>Cleared by</b> Name: Chris Robson Position: ADG Tel No: [REDACTED]	<b>Recommended:</b> Name: John Bradley Director-General, DERM Tel No: [REDACTED] Date: [REDACTED]
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## MINISTER'S COMMENTS

### ATTACHMENTS

- Attachment 1 – Update on key result areas for the QWC
- Attachment 2 – CSG Water – QWC's Stakeholder Engagement

Author  
Name: Karen Waldman  
Position: CEO QWC  
Tel No: [REDACTED]  
Date: 28 October 2010

Cleared by  
Name: Karen Waldman  
Position: CEO QWC  
Tel No: [REDACTED]

Cleared by  
Name: Chris Robson  
Position: ADG  
Tel No: [REDACTED]

Recommended:  
Name: John Bradley  
Director-General, DERM  
Tel No: [REDACTED]  
Date:

**1. Planning for the provision of a safe, secure and reliable water supply for South East Queensland (SEQ) to achieve desired levels of service objectives.**

- The *South East Queensland Water Strategy* (Strategy) was released on 15 July 2010. Key features of the Strategy include:
  - Conserving water. Permanent Water Conservation Measures were introduced 11 months ago. The Queensland Water Commission (QWC) is revising its proposed communications campaign, to advise that even though dams are full, saving water remains an important issue for SEQ.
  - Being prepared and supply ready. In order to secure options for the future, the QWC is currently undertaking Phase 3 of the Desalination Siting Investigations to confirm the suitability of the priority sites and to develop an understanding of any outstanding investigations required prior to commencing the detailed feasibility studies.
  - Managing water efficiently. The QWC is working with the SEQ Water Grid Manager and WaterSecure to develop operating strategies that reduce capital and operating expenditure while managing security, technical, workforce and community risks. The Strategy also seeks to make additional water available for rural producers and irrigators, when it is not required for urban uses.
- The Strategy has identified the need to ensure stand-alone communities approach the same level of service as those communities connected to the Grid. The QWC, in collaboration with water entities and local governments, is developing a framework for assessing the water supply risk and developing a potential solution for stand-alone communities including Dayboro and Boonah and, in particular, Beaudesert and Canungra, which experienced shortages in 2009. A submission is being prepared for consideration in early 2011 about the future water supply options for stand-alone communities in the Scenic Rim.. In addition, the QWC is developing drought response plans for those communities assessed to be most at risk (such as Canungra) to ensure security of supply under existing supply arrangements.
- In line with the South East Queensland Regional Plan 2009-2031, the QWC has developed a draft Sub-regional total water cycle management planning framework. The framework has been provided to the key stakeholders for review prior to application as a pilot approach in late 2010. The QWC and Moreton Bay Regional Council have commenced planning to develop a sub-regional total water cycle management plan for the Caboolture West area by August 2011. Additionally, the QWC is engaging with the Urban Land Development Authority, Ipswich City Council and Sunshine Coast Regional Council to undertake a sub-regional total water cycle management plan for the priority areas of Ripley Valley and the Sunshine Coast (Palmview and Caloundra South).
- The QWC has commissioned Sunwater to investigate the potential for further water resource development of the Logan River Basin. Sunwater has submitted its draft report on the options for development. The Scenic Rim, Gold Coast and Logan Councils have been advised of the study and invited to participate in a workshop in November 2010 to consider the options. Further consideration is being given to smaller dams on the Albert River, including sites within the impoundment of the original Wolffdene Dam. Studies are on track for completion by mid 2011.
- On 7 September 2010, the QWC wrote to the Sunshine Coast and Gympie Regional Councils seeking their involvement in a project reference group (PRG) on the investigations of the upper Mary River water supply development options, including the Stage 3 raising of Borumba Dam. The PRG will include the QWC, the two councils, DERM, SunWater and key community groups. Gympie Regional Council proposed the Mary River Catchment Coordination Committee as a member of the PRG. The project now has formal endorsement by both Mayors. It is anticipated the study will be completed by mid 2011. A recent meeting

with the Mayor of Sunshine Coast Regional Council and Gympie Regional Council occurred on 22 October 2010. Both were supportive of the investigations proceeding in a collaborative and inclusive manner.

- As indicated in the Strategy, the QWC, in conjunction with Seqwater, will be investigating the maximum level to which the storage level of Wivenhoe Dam could be raised without raising the dam wall, while still remaining within acceptable risk levels. Preliminary investigations have indicated that only a one metre raising providing an additional 5000 megalitres may be possible while maintaining compliance with the environmental flow conditions under the Moreton Water Resource Plan. The investigations indicate that raising the level in excess of one metre actually results in less water being available due to greater losses from evaporation. Until the detailed investigations have been completed, flood waters will be cleared in accordance with the existing gazetted Flood Operations Manual developed by Seqwater and approved by the Dam Safety Regulator.
- The QWC is engaging with a number of stakeholders on resolving barriers to adopting local systems for water supply (such as stormwater harvesting and dual reticulation). In particular, the proposals at Fitzgibbon (stormwater harvesting) and Peregrine Springs (roof water harvesting and dual reticulation) are being used as case studies to address technical, regulatory and governance issues.

## **2. Improving the institutional and regulatory framework to enable efficient and cost effective service delivery to water customers in SEQ**

- The *Water and Other Legislation Amendment Bill 2010* introduced into the Legislative Assembly on Tuesday 26 October 2010 proposes amendments to:
  - provide additional customer protection provisions for water and wastewater customers in SEQ, including the establishment of the industry funded Energy and Water Ombudsman Queensland (EWOQ) to investigate disputes for residential and small business customers in line with the Customer Water and Wastewater Code (Customer Code) from 1 January 2011; and
  - provide greater transparency of SEQ Distributor-retailer operations including publishing of participant agreements (with their Council owners), and prices and charges.
- SEQ Council Mayors and chairs of the Distributor-retailers were advised of these amendments by the Minister on 26 October 2010.
- The Customer Code will set the disputes which are able to be investigated by the EWOQ. The Customer Code will be a dynamic document that will improve service standards over time. The first draft is to be released for stakeholder consultation in early November 2010. The jurisdiction and powers of the EWOQ are not dissimilar to the current Energy Ombudsman's powers and that of utility Ombudsmen in other States. The EWOQ can investigate billing issues – disputed usage; payment difficulties, including debt collection; delays in connection; meter reading or testing disputes; restricted supply; sewerage spills; and Distributor-retailer actions which may affect a customer's property. The EWOQ cannot investigate complaints about the fixing or setting of prices or eligibility for rebates or subsidies. While the Customer Code and the proposed EWOQ are to apply initially to small customers in SEQ, there is scope over time to review their suitability and application to other parts of Queensland.
- The QWC is continuing to implement the Water Reform program through the following actions:
  - developing a customer billing template to be implemented by the Distributor-retailers;
  - ongoing monitoring and administration of the South East Queensland Water Market Rules; and

- further developing the regulatory framework supporting infrastructure planning, in particular the development of the Water and Wastewater Network and Services Plans (NetServ Plans) by the three Distributor-retailers, to ensure infrastructure is upgraded in a timely and efficient way and that stakeholders have an opportunity to be consulted.
- The QWC is working collaboratively with industry stakeholders to achieve a common understanding of the water market regulatory framework. Under the Market Rules, the QWC has undertaken to grid participants to facilitate and progress a Guideline for Operating Protocols and to consider default Grid Contracts. Meetings of an Operating Protocol Guideline Working Group (Working Group) held throughout October 2010 have been highly productive, and have clarified a range of issues regarding the role of Operating Protocols for QWC and Grid Participants. Members of the Working Group have developed and reviewed a draft Guideline. The QWC is establishing a legal expert group to inform and test the commercial, regulatory and operational arrangements between Grid participants, with a view to informing the work of a Grid Contracts Working Group which will have its first meeting in late November 2010.
- The 2010-11 initial Grid Service Charges have been approved by the Minister for consultation with Grid Service Providers, Seqwater, WaterSecure and LinkWater. Comments have been received from Seqwater, LinkWater and WaterSecure. The QWC is aiming to finalise these charges for approval by the Minister by 30 November 2010. The QWC is in the process of transitioning the role of advising the Minister on the Grid Service Charges for 2010-11 to the Queensland Competition Authority.
- The QWC is preparing a Submission to brief Cabinet on the current bulk water prices (prepared in 2008) and the impacts of changed circumstances such as high water security and the potential to defer new supply infrastructure. The Submission will provide a number of options, in particular, an option to reduce bulk water price increases and the potential savings for households.

### **3. Providing sound, evidence-based advice to manage the cumulative impacts of Coal Seam Gas extraction on underground resources**

- The QWC will have a significant role in supporting management of cumulative impacts on groundwater from coal seam gas (CSG) activities. This will involve development and implementation of regional monitoring, groundwater modelling and assessment of groundwater impacts from CSG extraction in cumulative management areas. The functions of QWC are defined in proposed amendments to the *Water Act 2000*, which are currently before Parliament. The role of QWC will be funded by an industry levy on CSG tenure holders. QWC has commenced the regulatory assessment statement process as part of developing the industry charging levy regulation to commence from 1 July 2011.
- To define the roles and workstreams to be established within the QWC, an Implementation Plan has been prepared for the period through to June 2011, the period currently funded by government. In addition, the QWC has prepared a Preliminary Business Plan for 2011/12 - 2013/14, to be further developed in line with the budget cycle in February 2011, which includes an organisational structure, resourcing and preliminary budgets for the first three full years of operation.
- There are a number of key workstreams which the QWC has established to fulfil its statutory functions, which are each being closely monitored in accordance with the Implementation Plan program:
  - a consultant has been selected to establish a groundwater flow model for the Surat Basin which will be fundamental to QWC's assessment of cumulative impacts;
  - an Invitation to Tender to assist in establishing the funding model and fee structure for the Levy has closed and is currently being evaluated;

- the 'business-as-usual' organisation structure has been developed and priority positions for immediate recruitment have been identified. Key leadership positions of General Manager, CSG Water and Director, Policy and Projects have been filled and further recruitment is in progress to build the team;
  - the QWC has commenced the preparation of a communications document with a working title 'QWC Role in Coal Seam Gas Groundwater Management' which will be finalised and released in line with enactment of the proposed amendments to the *Water Act 2000*. This document will articulate QWC's role in the coal seam gas industry;
  - discussions have commenced with DERM to progress the definition and establishment of a groundwater information database; and
  - a panel of experts will be established from which QWC will be able to call and establish a Scientific Advisory Panel. QWC is working with DERM in defining the requirements of the panel.
- As requested by the Minister at the last quarterly meeting, a short presentation of the QWC's CSG water stakeholder engagement approach is attached (**Attachment 2**).



Secure and efficient water  
through partnership and innovation

TRIM ref: 0/10/7953

24 December 2010

Hon Stephen Robertson MP  
Minister for Natural Resources, Mines and Energy  
and Minister for Trade  
PO Box 15216  
Brisbane Qld 4001

10/11/93

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17/1/11

Dear Minister

I am pleased to respond to your letter of 25 October 2010 regarding options to and benefits of releasing water from key storages in anticipation of major inflows over the current wet season. Our advice follows, based on discussions with Seqwater.

Only four of the dams in South East Queensland region are gated, with the ability to release significant amounts of water in anticipation of major inflows. These are Wivenhoe, Somerset, North Pine and Leslie Harrison dams.

Detailed operational procedures have been approved for each of the gated dams. The dams will continue to be operated in accordance with these procedures. These procedures generally relate to the management of the dams and should be managed above Full Supply Level. This advice relates to the water security aspect of the management of the dams below Full Supply Level.

Based on information currently available, Seqwater has advised that releasing water to below Full Supply Level may provide some benefits in terms of reduced community and operational impacts during minor inflow events, such as has occurred over the past month. For medium and major flood events, it considers that pre-emptive releases will provide negligible benefits.

Informed by this advice, the SEQ Water Grid Manager has advised Seqwater that, from a water security perspective, it has no in-principle objection to minor releases from Wivenhoe, Somerset and North Pine dams to minimise the operational and community impacts of gate releases. Specifically, it has advised that it has no in-principle objection to:

- Wivenhoe and Somerset dams being drawn down to 95 per cent of their combined Full Supply Level
- North Pine Dam being drawn down to 97.5 per cent of its Full Supply Level.

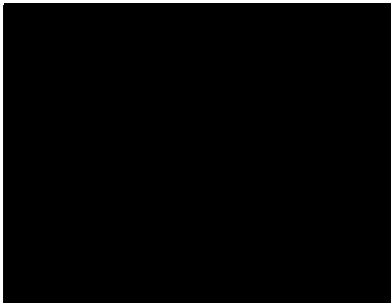
The SEQ Water Grid Manager has assessed the water security implications of the release to be negligible, having no impact on our ability to meet the risk criteria specified in the System Operating Plan or our ability to meet our supply obligations to Grid Customers. From a water security perspective, the Queensland Water Commission has also confirmed that it does not have any objections to the potential release.

Please note that these arrangements are intended to apply for the current wet season only, taking into account the level of storages and the rainfall forecasts over coming months.

For future wet seasons, the SEQ Water Grid Manager will continue to work with Seqwater to investigate the optimal arrangements. In particular, we propose to further investigate options that may reduce the frequency or duration of intermediate level flows (between 1,900 and 3,500 cubic metres per second). In addition, we recommend that the investigations with the Queensland Water Commission to examine the opportunity of raising the full supply level of Wivenhoe Dam for water supply be expanded to include options involving the release of the additional water once major inflows are forecast.

I trust that this advice is sufficient. If you have any questions, please do not hesitate to contact Mr Dan Spiller, Director Operations, by telephone on [REDACTED] or by email on [REDACTED]

Yours sincerely



Gary Humphrys  
Chair



## ATTACHMENT

### Wivenhoe and Somerset dams

Wivenhoe Dam can store up to 1.15 million litres (ML) of drinking water. In addition, it has the capacity to store an additional 1.45 ML of flood water.

While large, the flood compartment can be filled within days. For example, following heavy rainfall in October 2010 Wivenhoe Dam received inflows equivalent to almost half of the flood storage compartment capacity in just a few days.

Several factors influence flood release strategies for Wivenhoe and Somerset dams.

First, rain events that have caused flooding have historically been prolonged events over several days, often with a second event occurring several days to a week after the first. As a result, the operational procedures for the dam are designed to ensure that all water held in the flood compartments is released within seven days of a rain event, ensuring that the flood compartment is available for any future inflows.

Secondly, the dam only controls flood waters from part of the Brisbane River catchment area. About 50 per cent of the catchment area of the Brisbane River is upstream of the Wivenhoe Dam wall, and can be potentially controlled by it. No flood mitigation structures exist for most of the potential run-off from the other 50 per cent of the catchment area.

Third, the Bureau of Meteorology has had limited success in plotting rainfall distribution accurately to assess where most flooding risk lies above or below the dam wall. Historical floods have demonstrated that flooding can occur from both. For example, the 1974 flood flows primarily occurred below the dam wall whilst the 1890's event occurred above the dam wall. As a result, when releasing water from Wivenhoe Dam it is very important to predict and monitor below the dam wall flows so as to understand combined river flows that cause flood impacts.

Taking these factors into account, the flood release strategy for Wivenhoe and Somerset dams has a hierarchy of objectives:

- Ensure the structural safety of the dam
- Provide optimum protection of urbanised areas from inundation
- Minimise disruption to rural life
- Retain full supply level after a flood event
- Minimise impacts to flora and fauna during the drain down phase.

Within this framework, flood releases from Wivenhoe Dam typically fall into two categories of flood events based on the impact they cause when combined with below the dam wall catchment runoff:

- Larger events typically involving combined river flows greater than 3,500 cubic meters per second measured at Moggill. These events would have flood impacts on

urban areas in Brisbane. This scale of release has not been required since Wivenhoe Dam was completed.

- Smaller events with combined river flows of less than 1,900 cubic meters per second measured at the Mt Crosby weir which can inundate up to seven rural bridges isolating up to 50 households and causing inconvenience to many more. There has been six of these events since 1984, when Wivenhoe Dam was completed.

Our assessment of the benefits of lowering dam storage levels to reduce flooding impacts is below for these two event types.

#### *Large events*

Seqwater has advised that releases of greater than 3,500 cubic metres per second (m<sup>3</sup>/s) from Wivenhoe Dam are likely to impact on urban areas in Brisbane. Events of this nature have not been experienced since Wivenhoe Dam was completed in 1984.

Seqwater has advised that:

- pre-emptive releases are likely to have negligible impacts on the extent of these impacts
- any impacts would require releases of at least 250,000 ML. This is equivalent to a release of about 16 per cent of the combined storage capacity of Wivenhoe and Somerset dams.

A pre-emptive release of this scale is not recommended, based on information currently available. The potential water security impacts are considered to be more significant than the negligible benefits. These potential security impacts include costs associated with the earlier or avoidable operation of the desalination facility at capacity, as well as the increased probability of triggering the implementation of a drought response plan.

More detailed investigation of opportunities to actively manage flood storage is recommended, including options to increase flood supply level on a temporary basis. These investigations need to be led by Seqwater, and involve the Bureau of Meteorology, Councils and the SEQ Water Grid Manager.

In particular, it has been identified that it is worth investigating the impacts on downstream flooding for intermediate level flows (flows between 1900 and 3500 m<sup>3</sup>/s).

Seqwater will undertake extensive investigations for the Queensland Water Commission in early 2011 to examine the opportunity of raising the full supply level of Wivenhoe Dam for water supply. We will recommend that the scope of this work be widened to consider the benefits of pre-lowering storage levels based on mid range rainfall events and the reduced impacts to river levels and subsequent property impacts. It is noted that predicting rainfall intensity and location, even as events are about to occur has not been accurate, however the Bureau of Meteorology is improving its methods.

### *Smaller events*

Pre-emptive releases from Wivenhoe Dam may reduce the impacts of minor gate releases (strategies W1A to W1E in the operational procedures).

Minor gate releases may result in the closure of up to six bridges, isolating up to 50 dwellings and inconveniencing many more. As stated in existing flood management plans, releases should be managed to minimise the impacts on these residents. Over the immediate term, Councils have requested that bridge closures be avoided over the Christmas to New Year period, if at all possible. In addition:

- There are resource implications involved in the activation of the flood control centre. Under flood management plans, the centre must be staffed by suitably qualified officers at all times during gate releases. There are currently only four quality duty engineers, who have staffed the flood centre for much of period since the initial release in October.
- Gate releases during the Christmas holiday period would result in closure of dams to water based activities, impacting on up to 150,000 people who are expected to use the recreational facilities over the holiday period.

The Water Grid Manager has advised Seqwater that, from a water security perspective, it would not object to water being released from Wivenhoe and Somerset dams to 95 per cent of storage capacity at any time until end March 2010.

Under this recommendation, storage levels could potentially be reduced by up to about 77,250 ML. This is equivalent to the amount of water released between 13 and 16 December 2010, through a single gate.

Pre-emptive releases will be managed so as to minimise the likelihood of gate releases due to small storms and local rainfall. Storage capacity will usually be reduced through a combination of:

- Extended gate releases, especially for strategy W1C. For comparison, up to 130,000 ML/day was released during in November and mid December 2010. At this rate, the additional releases could occur in about half a day.
- Ongoing gate releases of up to 30,000 ML/day, which do not isolate any residents but can inundate some lower bridges that cause inconvenience.
- Ongoing valve release of up to about 4,300 ML/day, which can be maintained without inundate any bridges.

Actual releases would be decided by Seqwater based on operational considerations and in accordance with its statutory and regulatory obligations.

### *Water security impacts*

The water security impacts of releases will be zero if the dams fill over the remainder of the wet season. Current forecasts indicate that there is a high probability of this occurring:

- Heavy rainfall is forecast over the Christmas holiday period, as noted above.
- Over the remainder of the wet season, advice from the Bureau of Meteorology is that sea surface temperatures are likely to remain at levels typical of a La Niña event into the first quarter of 2011, with the majority of the models indicating the event will gradually weaken over the coming months.

The water security impacts will be minimal, even if there were no further inflows to the dams. Modelling indicates that the reduction would have a minimal impact on the probability of key water Grid storages falling to 40 per cent of capacity over the next five years.

### *North Pine and Leslie Harrison dams*

North Pine and Leslie Harrison dams do not have flood mitigation potential. Once the dams have reached Full Supply Level, all water flows into the dam must be released to protect the structural safety of the dam.

Seqwater has advised that, without major releases, there are negligible benefits to reducing volumes stored in North Pine or Leslie Harrison dams for the purposes of reducing the extent or duration of any downstream flooding impacts.

For North Pine Dam, there may be some operational and community benefits to minor releases to below Full Supply Level in some circumstances. Any gate operation at North Pine Dam results in inundation of Youngs Crossing Road, which isolates a number of residents. These impacts are currently being minimised by releasing from North Pine Dam at night. With further rainfall forecast, Seqwater may choose to reduce the level to below Full Supply Level in order to reduce the frequency of night releases or the likelihood of releases being required during the day.

For this dam, the SEQ Water Grid Manager has advised Seqwater that, from a water security perspective, it would not object to water being released to 97.5 per cent of storage capacity at any time until end March 2010.

For Leslie Harrison Dam, gate operations do not impact on public roads and generally only inconvenience the general public during large flood events. There is no scope to reduce this inconvenience through small pre-emptive releases. Accordingly, no in-principle approval be made for pre-emptive releases from this dam.




"SR12"

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**SEQ Water Grid Manager and Seqwater  
MINISTERIAL BRIEFING NOTE**

**TO:** Minister for Natural Resources, Mines  
and Energy and Minister for Trade

**SUBJECT:** January 2011 flood event and Wivenhoe Dam  
operations

Advisor .....	<input type="checkbox"/> Ok
Dated     /     /	
<input type="checkbox"/> Approved <input type="checkbox"/> Not Approved	<input checked="" type="checkbox"/> Noted
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Minister. 	
Dated     16 / 1 / 11	

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MINISTERIAL OFFICE  
17 JAN 2011

**REQUESTED BY**

- The Ministers Office requested this brief by 16 January 2011.

**TIMEFRAME**

- Noting of this brief is required prior to the Emergency Cabinet meeting to be held on  
17 January 2011.

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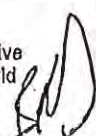
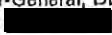
**RECOMMENDATION**

It is recommended that the Minister:

- note** Seqwater's Ministerial briefing note setting out background information on Wivenhoe Dam, the January 2011 flood event and Seqwater's Flood Mitigation Manual.
- note** the advice on the benefits of pre-emptive releases from Wivenhoe Dam in response to the Minister's request.
- note** Mr Brian Cooper's independent compliance review of the operation of Wivenhoe Dam against the Flood Mitigation Manual for the January 2011 flood event.
- approve** key media responses on the flood event and Wivenhoe Dam.
- approve** that Mr Barry Dennien, Chief Executive Officer, SEQ Water Grid Manager, speak to the media in accordance with the key media responses.

**BACKGROUND**

- From 13 December 2010 to 11 January 2011, South East Queensland experienced unprecedented rainfall, which resulted in the January 2011 flood event. Wivenhoe Dam played a significant role in mitigating the downstream flood peak.
- Attachment A** contains Seqwater's Ministerial briefing note setting out background information on Wivenhoe Dam, Wivenhoe Dam's flood mitigation and operations, Seqwater's Flood Mitigation Manual, the regulatory context of the Flood Mitigation Manual and Seqwater's proposed procedure for the preparation of its comprehensive Flood Mitigation Manual report to the Chief Executive, Department of Environment and Resource Management, on Wivenhoe Dam operations for the January 2011 flood event.
- After the Wivenhoe Dam release in October 2010, by way of a letter dated 25 October 2010 at **Attachment B**, the Minister requested the SEQ Water Grid Manager to procure urgent advice as to whether South East Queensland's water security situation would provide "*an opportunity to reduce the volume stored in key dams as a means of reducing the severity, frequency and duration of flooding in downstream areas.*"
- The Minister also sought the SEQ Water Grid Manager's "*confirmation that these options would not significantly impact upon our current water security, measured as the probability of needing to reintroduce Medium Level Restrictions over the next five to ten years.*"
- As a result, the SEQ Water Grid Manager requested that Seqwater provide a report assessing the options requested by the Minister.

<b>Author</b> Name: Barry Dennien Position: Chief Executive Officer, SEQ Water Grid Manager Tel No:  Date: 16 January 2011 	<b>Cleared by</b> Name: Position: Tel No: Name: Position: Tel No:	<b>Cleared by</b> Name: Position: Tel No: Name: Position: Tel No:	<b>Recommended:</b> Name: John Bradley Director-General, DERM Tel No:  Date:
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- **Attachment C** contains the SEQ Water Grid Manager's letter to the Minister dated 24 December 2010, in response to the pre-emptive Wivenhoe Dam release advice sought, based on Seqwater's advice. This letter stated that *"Seqwater has advised that releasing water to below Full Supply Level may provide some benefits in terms of reduced community and operational impacts during minor inflow events, such as has occurred over the past month. For medium and major flood events, it considers that pre-emptive releases will provide negligible benefits...Informed by this advice, the SEQ Water Grid Manager has advised Seqwater that, from a water security perspective, it has no in-principle objection to minor releases from Wivenhoe, Somerset and North Pine dams to minimise the operational and community impacts of gate releases."*
- It should be noted that while seeking advice from Seqwater on pre-emptive dam releases, the SEQ Water Grid Manager continued to provide the Department of Environment and Resource Management with progress reports.
- On 11 January 2011, the Minister requested the SEQ Water Grid Manager to procure an urgent independent review of Seqwater's operation of Somerset and Wivenhoe Dams in accordance with the Flood Mitigation Manual, for the period 13 December 2010 to 11 January 2011.
- Mr Brian Cooper was engaged to conduct the independent review and his report and curriculum vitae are contained in **Attachment D**.
- Mr Brian Cooper concludes that the *"strategies as set out in the Flood Mitigation Manual have been followed, allowing for the discretion given to making variations in order to maximise flood mitigation effects. The actions taken and decisions made during the Flood Event appear to have been prudent and appropriate in the context of the available knowledge available to those responsible for flood operations and the way events unfolded."*

## CURRENT ISSUES

- The purpose of this Ministerial brief is to provide the Minister with background information on the January 2011 flood event and the operation of Wivenhoe Dam, in preparation for an Emergency Cabinet meeting scheduled on 17 January 2011.
- This Ministerial brief provides information that may assist in responding to questions raised, or anticipated to be raised, by the public and media.
- **Attachment E** contains key media responses based on factual information from Seqwater's Ministerial briefing note.

## RESOURCE/IMPLEMENTATION IMPLICATIONS

- Any recommendations regarding the Flood Mitigation Manual, improvements to the structure or operation of Wivenhoe Dam, resourcing etc. will arise after any relevant flood event debriefs and Seqwater's Flood Mitigation Manual report to the Chief Executive, Department of Environment and Resource Management.

## PROPOSED ACTION

- In accordance with the Flood Mitigation Manual, Seqwater will submit a comprehensive report to the Chief Executive, Department of Environment and Resource Management, containing details of the procedures used, the reasons for such and other pertinent information for the operation of Wivenhoe Dam during the January 2011 flood event.
- This report is required to be submitted within six weeks of completion of the flood event.

<b>Author</b> Name: Barry Dennlen Position: Chief Executive Officer, SEQ Water Grid Manager Tel No: [REDACTED] Date: 16 January 2011	<b>Cleared by</b> Name: Position: Tel No:	<b>Cleared by</b> Name: Position: Tel No:	<b>Recommended:</b> Name: John Bradley Director-General, DERM Tel No: [REDACTED] Date:
	Name: Position: Tel No:	Name: Position: Tel No:	

## OTHER INFORMATION

- **Consultation:** In preparing the Ministerial briefing note at **Attachment A**, Seqwater consulted with Mr Peter Allen and Mr Bob Reilly from the Office of the Water Supply Regulator, Department of Environment and Resource Management. The SEQ Water Grid Manager provided information on the Minister's request for advice on pre-emptive releases from Wivenhoe Dam and the independent compliance review from Mr Brian Cooper.
- **Legislation:** The Flood Mitigation Manual is a requirement of, and approved by the Chief Executive, Department of Environment and Resource Management, under the *Water Supply (Safety and Reliability) Act 2008*.
- **Key Communication Messages:** The information contained in this Ministerial brief may be used to formulate public messaging regarding the flood event and the operation of Wivenhoe Dam. Communicating the benefits of Wivenhoe Dam for flood mitigation may present positive communication opportunities.

## MINISTER'S COMMENTS

## ATTACHMENTS

- **Attachment A:** Seqwater Ministerial briefing note
- **Attachment B:** Letter from Minister Robertson to the SEQ Water Grid Manager dated 25 October 2010
- **Attachment C:** Letter from the SEQ Water Grid Manager to Minister Robertson dated 24 December 2010
- **Attachment D:** Flood Mitigation Manual compliance review report by Mr Brian Cooper and curriculum vitae of Mr Brian Cooper
- **Attachment E:** Key media responses

Author Name: Barry Dennien Position: Chief Executive Officer, SEQ Water Grid Manager Tel No: [REDACTED] Date: 16 January 2011	Cleared by Name: Position: Tel No:	Cleared by Name: Position: Tel No:	Recommended: Name: John Bradley Director-General, DERM Tel No: [REDACTED] Date:
	Name: Position: Tel No:	Name: Position: Tel No:	

## **Ministerial Briefing Note**

**17 January 2010**

**Flood Event January 2011**

### **1. BACKGROUND INFORMATION ON WIVENHOE DAM**

#### **2. WIVENHOE DAM FLOOD MITIGATION AND FLOOD OPERATIONS**

- 2.1 What were the benefits provided by Wivenhoe Dam during the current event?
- 2.2 Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?
- 2.3 What is the role of the erodible fuse plug embankments?
- 2.4 Why weren't pre-emptive releases undertaken prior to the start of the flood event?
- 2.5 Is there a detailed record of the events associated with the current flood?

#### **3. THE MANUAL OF OPERATIONAL PROCEDURES FOR FLOOD MITIGATION AT WIVENHOE DAM AND SOMERSET DAM**

- 3.1 What is the Manual of Flood Mitigation and how was it developed?
- 3.2 What is contained in the Manual?

### **4. REGULATORY CONTEXT**

### **5. SEQWATER REPORT**



## **1 BACKGROUND INFORMATION ON WIVENHOE DAM**

Wivenhoe Dam was completed in 1984 and has two main functions;

- A 1,165,000 ML storage providing an urban water supply for Brisbane;
- Flood mitigation in the Brisbane River by providing a dedicated flood storage volume of 1,450,000 ML (this flood storage was increased in 2005 to 1,966,000 ML with the dam at the point of failure).

In accordance with the Queensland Regulatory program for dam spillway upgrades, a further upgrade of Wivenhoe Dam is scheduled to occur prior to 2035 but only for dam safety reasons in the event of a probable maximum flood and has no impact on the current event.

Wivenhoe Dam is in excellent condition with four Comprehensive Dam Safety reviews undertaken in the last 14 years, the latest in 2010.

## **2 WIVENHOE DAM FLOOD MITIGATION AND FLOOD OPERATIONS**

### **2.1 What were the benefits provided by Wivenhoe Dam during the current event?**

The following graphs demonstrate the significant benefits of Wivenhoe Dam in mitigating the current flood event, with reductions in flood peak from Wivenhoe Dam not existing of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

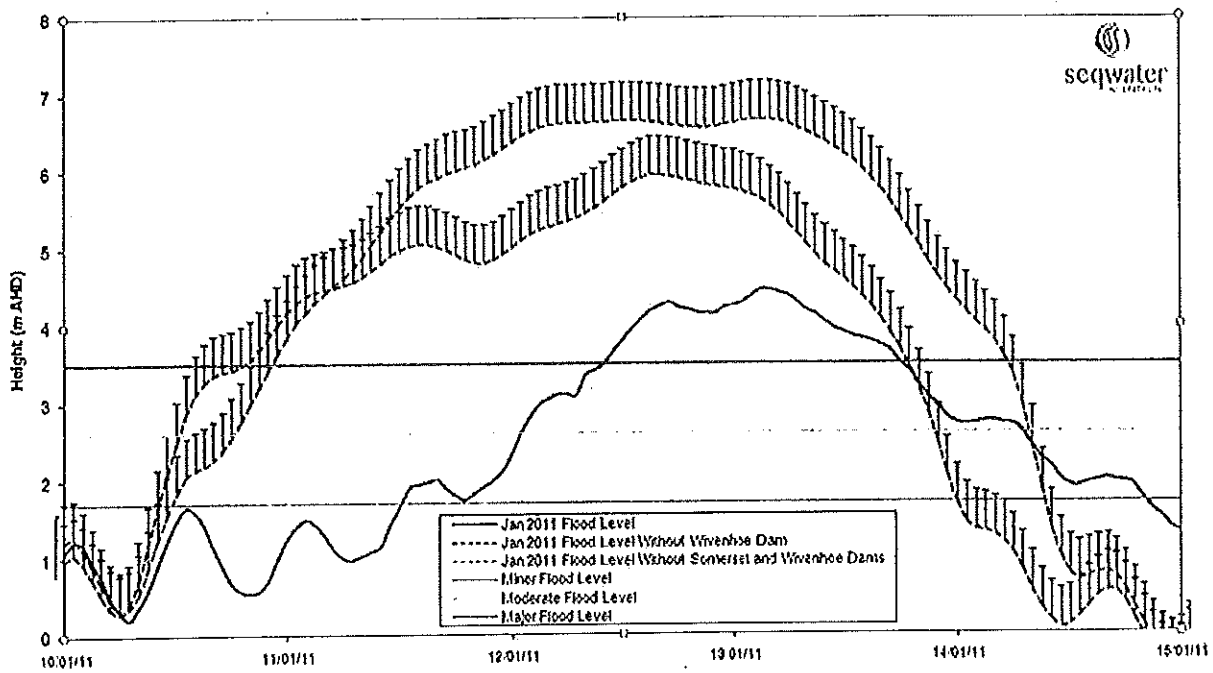
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater by the Brisbane City Council).

The time at which flood levels remained elevated above major levels has also been reduced by up to 3 days by the dam. This has significant benefits to impact on the population of the city, property damage and the recovery operation.

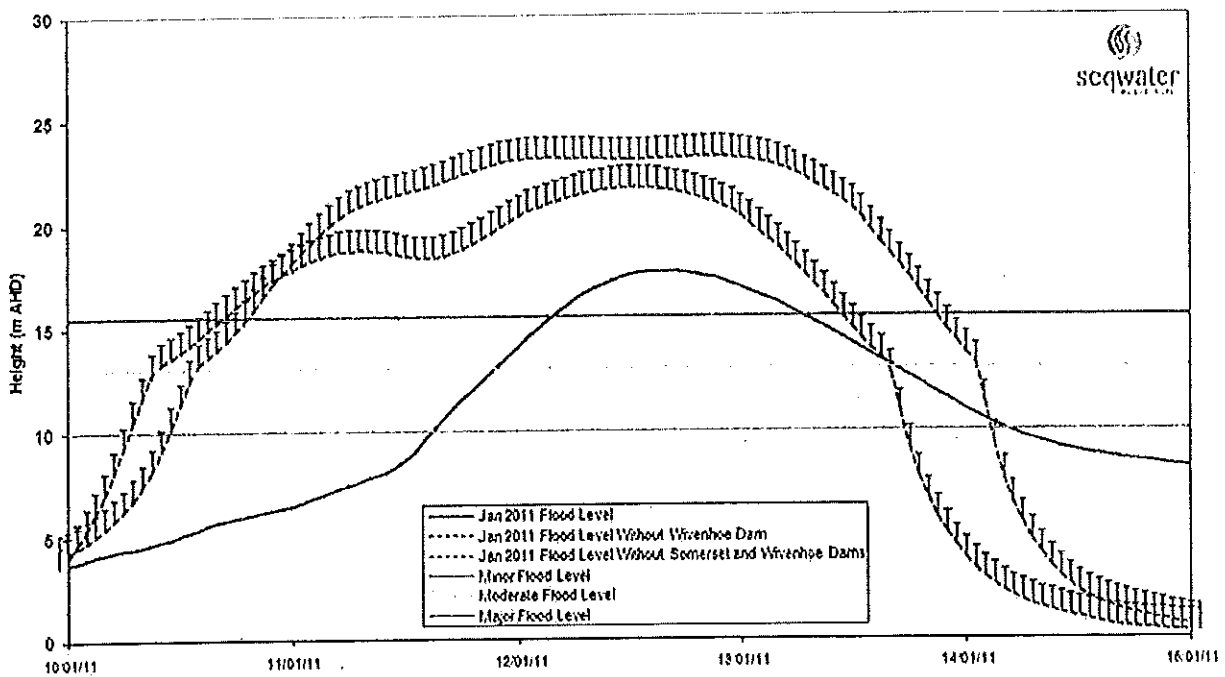
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later date.

In addition, the strategy adopted to quickly close off releases once the peak in the dam had been reached and rain stopped falling certainly reduced the predicted flood peak by at least one metre in the lower Brisbane River area. This was carried out because the releases had stopped the dam from rising and careful monitoring allowed rapid reduction of releases while ensuring fuse plug initiation did not occur.

# **JANUARY 2011 BRISBANE FLOOD** **Assessment of Flood Levels at Brisbane City**



# **JANUARY 2011 BRISBANE FLOOD** **Assessment of Flood Levels at Moggill**



## **2.2 Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?**

Wivenhoe Dam mitigates downstream flooding by storing incoming flood water during a rainfall event and releasing these waters at a reduced flow rate downstream to reduce flood impacts. The timing of the releases is also manipulated so that the aim is for outflows from the dams to impact on downstream areas only after the peak inflows from the downstream major tributaries have passed. However this aim cannot always be achieved in practice. This is because some large floods, such as the one currently being experienced, have the potential to overflow the dam's flood storage compartment. Should this occur, the dam would fail and the resulting damage and loss of life would be at least 100 to 1000 times greater than that currently being experienced.

Therefore the basis of all flood operation decision making is to ensure the dam never fails. This is the reason that the dam's flood storage compartment would never be intentionally fully filled as any additional inflows after this point would result in a dam failure. At any one time, there will always be uncertainty about what rain is going to occur. Hence, we cannot use all of the flood capacity as we would not be able to release sufficient water to cater for large inflows.

## **2.3 What is the role of the erodible fuse plug embankments?**

Another factor that impacts on flood release decision making in large events are the levels at which the erodible fuse plugs are triggered. The fuse plugs act as a safety valve to rapidly increase dam outflows if the structural safety of the dam is in danger. Loss of one or more fuse plugs severely limits the ability of the dam to mitigate the effects of future flood events that may occur prior to the fuse plug or plugs being reinstated. Reinstatement of a fuse plug following an event would take a minimum of 4 to 6 months and would require an extended period of relatively dry weather.

## **2.4 Why weren't pre-emptive releases undertaken prior to the start of the flood event?**

In the 25 days leading up to the current event, three flood events impacting on Wivenhoe Dam were experienced, with gate releases being made on all but five of those days. The total outflow from these events was around 700,000ML.

During these events, requests were received from Councils and residents impacted by bridge closures downstream of the dam to curtail releases as soon and as quickly as possible. Additionally the 2 January end date of the flood event prior to the current event meant that significant drain down of the dam prior to the onset of the current event that commenced on 6 January 2011, was not possible without major bridge inundation downstream of the dam and without exceeding minor flood levels in the lower Brisbane River.

Additionally, a flood event was also experienced in October 2010 that resulted in a release of 750,000ML from the dam. Accordingly drain down below the dam full supply level prior to the start of the first December event would not have been possible without significant bridge inundation and without exceeding minor flood levels (as defined by BOM and BCC) in the lower Brisbane River.

Regardless, significant drain down prior to the current event would have had little impact on the peak level in Wivenhoe Dam as shown in the table below. The reason for this is that this total event inflow volume of 2,600,000 ML is well in excess of the useable flood storage combined with the available water supply storages shown in the table.

The specific impact on the Lower Brisbane River of these reduced dam levels requires the use of a complex hydraulic model. The results of this modelling would still contain a degree of uncertainty as illustrated by the difficulties in estimating the final flood peak in Brisbane during the event. This is because the rapid closure of the gates after peak inflow was achieved resulted in significant water level reductions downstream and this is difficult to model accurately.

JANUARY 2011 FLOOD			
Starting Level		Peak Height	Capacity
%	m AHD	m AHD	%
100	67.0	74.97	191
95	66.5	74.93	191
90	65.8	74.88	190
75	64.0	74.63	187
50	60.0	74.11	180

# It should be noted that the possible reductions shown above are based up a unique dual peaked flood hydrograph with a volume of about 2,600,000-ML which occurred during this event. A hydrograph with the same volume but a different distribution could result in a significantly lower reduction in peak water levels.

Flood operations at the dam are also highly dependent upon the flood inflow volume and a slight variation in the flood volume could significantly reduce the benefits associated with draining down the dam prior to a flood event.

## 2.5 Is there a detailed record of the events associated with the current flood?

A preliminary report has been prepared and is attached to this briefing.

### **3 THE MANUAL OF FLOOD MITIGATION AT WIVENHOE DAM AND SOMERSET DAM**

#### **3.1 What is the Manual of Flood Mitigation and how was it developed?**

The Manual of Flood Mitigation for Wivenhoe and Somerset dams in its current form was developed in 1992 during an extensive hydrological study of the Brisbane and Pine Rivers catchments by DPI, Water Resources. The final reports were subject to extensive internal review by the Water Resources Group before being reviewed by an independent review panel comprising Professor Collin Apelt, Head of Department, Department of Civil Engineering, University of Queensland and Mr Eric Lesleighter, Principal Hydraulic Engineer and Chief Engineer Water Resources, Snowy Mountains Engineering Corporation. Subsequently, the Manual was extensively reviewed during the Brisbane Valley Flood Damages Minimisation Study in 2006, with the latest comprehensive review of the Manual undertaken in 2009. Both of these reviews have included expert review panels comprising key stakeholders, with the most recent review involving representatives from DERM, BOM, BCC and SunWater.

The Manual of Flood Mitigation is prepared by Seqwater as the owner of the dam and approved and gazetted by the Chief Executive of DERM in accordance with the Water Supply Act 2008. The manual defines flood objectives procedures; roles and responsibilities; and staffing and operational requirements for flood events impacting on Wivenhoe and Somerset dams.

#### **3.2 What is contained in the Manual?**

The primary objectives of the procedures contained in the Manual are, in order of importance;

- Ensure the structural safety of the dams;
- Provide optimum protection of urbanised areas from inundation;
- Minimise disruption to rural life in the valleys of the Brisbane and Stanley Rivers primarily, this involves minimising inundation of the seven bridges below the dam upstream of Moggill);
- Retain the storage at Full Supply Level at the conclusion of the Flood Event.

- Minimise impacts to riparian flora and fauna during the drain down phase of the Flood Event.

During an event, the operation of the dam transitions between the following four operating strategies depending of the circumstances at the time. These procedures associated with these strategies are explained in detail in the Manual.

- **Strategy W1** – Primary consideration is given to Minimising Disruption to Downstream Rural Life.
- **Strategy W2** – Transition Phase moving from Minimising Disruption to Protecting Downstream Urban Areas.
- **Strategy W3** – Primary consideration is to Protect of Urban Areas from Inundation.
- **Strategy W4** – Primary consideration is to protecting the structural safety of the Dam.

In addition to these strategies, historical records show that there is a significant probability of two or more flood producing storms occurring in the Brisbane River system within a short time of each other. Accordingly for each flood event, the aim is always to empty stored floodwaters within seven days after the flood peak has passed through the dams.



## 4 REGULATORY CONTEXT

Operational procedures for flood mitigation for a dam are contained in the Flood Mitigation Manual approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008* (Water Supply Act). Under section 370 of the Water Supply Act, Seqwater as the owner and operator of Wivenhoe and Somerset Dams is required to prepare a Flood Mitigation Manual. The Chief Executive (CE) of DERM (or his delegate) approves the Flood Mitigation Manual, and the approval is notified in the Queensland Government Gazette. Approval can be for a period of up to five years, after which the approval needs to be renewed. There are no decision-making criteria specified in the Water Supply Act for the CE to take into account when approving the Flood Mitigation Manual.

The Flood Mitigation Manual requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions, unless Seqwater considers that it is necessary to depart from the procedures of the Flood Mitigation Manual to meet the flood mitigation objectives of the Flood Mitigation Manual. The Flood Mitigation Manual sets out a consultation and approval process through Seqwater's Chair and the CE for departures from the Flood Mitigation Manual. This discretion was not exercised in the January 2011 flood event.
2. Flood operations to be under the control of CE-approved engineers (who are highly qualified and experienced)
3. Annual reporting on the preparedness and status of the flood control system for flood operations, and the training of the personnel who manage the flood events.
4. Reporting on the flood operations during flood events.
5. Reviews after flood events such as the January 2011 event, and a Seqwater report containing details of the procedures used, the reasons for such and other pertinent information. Seqwater must forward this report to the CE within six weeks of the completion of a flood event.

Section 374 of the Water Supply Act protects the CE and Seqwater from liability for complying with the Flood Mitigation Manual. It states:

- (1) *The chief executive or a member of the council does not incur civil liability for an act done, or omission made, honestly and without negligence under this part.*
- (2) *An owner of a dam who observes the operational procedures in a flood mitigation manual, approved by the chief executive, for the dam does not incur civil liability for an act done, or omission made, honestly and without negligence in observing the procedures.*

During November 2010, Commonwealth, State and local government agencies developed a *Protocol for Communication of Flooding Information for the Brisbane River Catchment – including Floodwater Releases from Wivenhoe and Somerset Dams* to "ensure the provision of consistent and robust information to the community". This is separate from the Flood Mitigation Manual, is not legally binding and is not subject to regulatory approval/review.

Some DERM staff, because of their specialist skills, work in the Flood Operations Centre that Seqwater activates to manage such events in accordance with the Flood Mitigation Manual. The Flood Operations Centre is not involved in any of the regulatory decisions concerning the dams or are members of the Office of the Water Supply Regulator,

Department of Environment and Resource Management, which undertakes the CE's regulatory functions.

## 5 SEQWATER REPORT

It is recommended that the process and content for reports required for this event be:

- In the short term, utilise this report attached to this briefing note as the basis for communications and discussion.
- Prepare any Interim Reports as agreed to provide information and input as required.
- Seqwater prepare a Comprehensive Report as per the existing regulatory requirements of the Act and the gazetted manual and any requirements of the Dam Safety Regulator. This would be done within 6 weeks of the closure of the current event as per the manual. This timeframe is subject to any new mobilisation of the Flood Operations Centre. The Table of Contents would include:
  - Introduction
  - Flood Event Summary
  - Mobilisation and Staffing
  - Event Rainfall
  - Inflow and Release Details
  - Data Collection System Performance
  - Data Analysis Performance
  - Communication
  - Flood Management Strategies and Manual Compliance
  - Improvements in data collection systems, practices and processes.
  - improvements by interacting agencies
  - Review of factors impacting on the protection of urban areas
  - Recommendations & Conclusions
- The report would then be reviewed by the Dam Safety Regulator in conjunction with any peer review they require. The review should cover:
  - Were the provisions of the manual complied with?
  - What improvements to either facilities e.g. stream gauges, or work practices, are desirable to improve Seqwater's ability to predict inflows into the dams.
  - Are improvements to either Seqwater's facilities or work practices desirable to improve Seqwater's ability to manage events? For example, investigations to raise the dam to improve its flood storage capacity, If so, what are they and their implications

## 5 SEQWATER REPORT

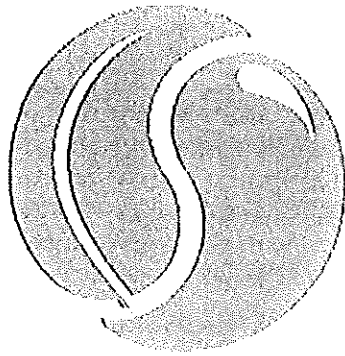
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  - Are improvements to either Seqwater's facilities or work practices desirable to improve Seqwater's ability to manage events? For example, investigations to raise the dam to improve its flood storage capacity, If so, what are they and their implications



- Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events?
  - whether it is worth investigating increasing the flood capacity of Wivenhoe
  - whether the Brisbane River crossings which act, under some situations as a constraint on the releases from Wivenhoe, should be replaced by bridges. For example if the smallest could pass , for example, 2,500 cumecs, then this could enable higher releases under some circumstances.
  - Whether the policy of draining the flood compartment within 7 days should be modified.
  - Given the manual's order of priorities i.e. protection of the dam etc, are any changes in the flood release strategies for either dam desirable? If so, what are they, and their implications
- Based on this review, a review of the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam would occur utilising an expert panel of review including representatives of DERM, Seqwater, BoM, affected Local Governments and other stakeholders as necessary.





seqwater  
WATER FOR LIFE

**JANUARY 2011 FLOOD  
EVENT**



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# 1 INTRODUCTION

Wivenhoe Dam was constructed by the Queensland Government between 1977 and 1984. The dam is a 56 m AHD high and 2.3 kilometre long earth and rock embankment separated into two parts by a concrete gravity spillway. The spillway is controlled by 5 radial gates, each 12.0 metres wide by 16.0 m AHD high. Two saddle dam embankments are located on the left side of the reservoir.

The dam spillway capacity was upgraded in 2005. This was done primarily through the construction of a 164 metre wide secondary spillway through the right abutment of the existing dam. This spillway contains three erodible earth fill fuse plug embankments that are initiated at different dam levels in excess of EL 75.6.

The dam has two main functions by providing:

- A 1,165,000 ML storage at full supply level (FSL EL 67.0) providing an urban water supply for Brisbane and surrounding areas;
- Flood mitigation in the Brisbane River by providing a dedicated flood storage volume of 1,450,000 ML up to EL77 (this flood level was increased as part the 2005 upgrade to allow a water level of EL80m and a temporary flood storage volume of 1,966,000 ML with all fuse plugs initiated and the dam at the point of failure).

The dam has an EXTREME hazard classification under ANCOLD guidelines because of the significant development downstream in the Brisbane and Ipswich metropolitan areas, with the population at risk in the event of a dam failure numbering in the hundreds of thousands.

In accordance with the Queensland Regulatory program for dam spillway upgrades, a further upgrade of Wivenhoe Dam for dam safety reasons only is scheduled to occur prior to 2035 to enable the dam to safely pass the Probable Maximum Flood. This work will involve the reconstruction of Saddle Dam 2 as a fuse plug spillway.

Wivenhoe Dam is in excellent condition. Comprehensive Dam Safety reviews undertaken in accordance with ANCOLD guidelines have been undertaken in 1997 (Gutteridge, Haskins & Davey Pty Ltd), 2003 (Wivenhoe Alliance), 2006 (NSW Department of Commerce), 2009 (GHD) and September 2010 (Seqwater). The reports concluded that the design of the dam is in accordance with modern day standards and that there are no significant outstanding design or construction issues that require investigation.

## **2 WIVENHOE DAM FLOOD MITIGATION AND FLOOD OPERATIONS**

### **2.1 Flood Mitigation**

The Brisbane River catchment covers an area of approximately 14,000 square kilometres of which about half is below Wivenhoe Dam. Maximum overall flood mitigation effect is achieved by operating Wivenhoe Dam in conjunction with Somerset Dam. Although Somerset and Wivenhoe Dam reduce flooding in Brisbane City, major flooding can still occur. The Lockyer-Laidley Valley drains into the Brisbane River through Lockyer Creek that enters the Brisbane River just downstream of Wivenhoe Dam near Lowood. Another major tributary, the Bremer River, flows into the Brisbane River at Moggill. Wivenhoe Dam has no control over inflows into the Brisbane River from both these major tributaries.

Wivenhoe Dam mitigates downstream flooding by storing incoming flood water during a rainfall event and releasing these waters at a reduced flow rate downstream to minimise flood impacts. The timing of the releases is also manipulated so that the aim is for outflows from the dams to impact on downstream areas only after the peak inflows from the downstream major tributaries have passed. However, this aim cannot always be achieved in practice. This is because some large floods, such as the one currently being experienced, have the potential to overflow the dam's flood storage compartment. Should this occur, the dam would fail and the resulting damage and loss of life would be at least 100 to 1000 times greater than that currently being experienced.

Therefore the basis of all flood operation decision making is to ensure the dam never fails. This is the reason that the dam's flood storage compartment would never be intentionally fully filled as additional inflows after this point would result in a dam failure. Similarly, there will be uncertainty on future rainfall that could occur which could not be releases if there was insufficient flood storage which could not be stored or released.

Another factor that impacts on flood release decision making in large events are the levels at which the erodible fuse plugs are triggered. Loss of one or more fuse plugs severely limits the ability of the dam to mitigate the effects of future flood events that may occur prior to the fuse plug or plugs being reinstated. Reinstatement of a fuse plug following an event would take a minimum of 4 to 6 months and would require an extended period of relatively dry weather.

## 2.2 Flood Operations

A real time flood monitoring and forecasting system has been established in the Wivenhoe and Somerset Dam catchments. This system employs radio telemetry to collect, transmit and receive rainfall and stream flow information. The system consists of around 230 field stations that automatically record rainfall and/or river heights at selected locations in the dam catchments. Most of these field stations are owned by Seqwater with the remainder belonging to other agencies.

The rainfall and river height data is transmitted to Seqwater's Flood Operations Centre in real time. Once received in the Flood Operations Centre, the data is processed using a Real Time Flood Model (RTFM) to estimate likely dam inflows and evaluate a range of possible inflow scenarios based on forecast and recorded rainfall in the dam catchments. The RTFM is a suite of hydrologic computer programs that utilise the real time data to assist in the operation of the dams during flood events.

Seqwater engineers use the RTFM for flood monitoring and forecasting during flood events to operate the dams in accordance with a Manual of Flood Mitigation (the origin of and objectives and procedures contained in the Manual of Flood Mitigation are explained in the following section of this document). Releases of water from the dams are optimised to minimise the impacts of flooding in accordance with the objectives and procedures contained in a Manual of Flood Mitigation.

The RTFM and data collection network performed well During the January 2011 event, with no failures experienced that compromised the ability of Seqwater to operate the dam.

### **3 MANUAL OF FLOOD MITIGATION FOR WIVENHOE AND SOMERSET DAMS**

The Manual of Flood Mitigation for Wivenhoe and Somerset Dams, in its current form, was developed in 1992 during an extensive hydrological study of the Brisbane and Pine Rivers catchments by DPI, Water Resources. The final reports were subject to extensive internal review by the Water Resources Group before being reviewed by an independent review panel comprising Professor Colin Apelt, Head of Department, Department of Civil Engineering, University of Queensland and Mr Eric Lesleighter, Principal Hydraulic Engineer and Chief Engineer Water Resources, Snowy Mountains Engineering Corporation.

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- Provide optimum protection of urbanised areas from inundation;
- Minimise disruption to rural life in the valleys of the Brisbane and Stanley Rivers primarily, this involves minimising inundation of the seven bridges below the dam upstream of Moggill);
- Retain the storage at Full Supply Level at the conclusion of the Flood Event.
- Minimise impacts to riparian flora and fauna during the drain down phase of the Flood Event.

During an event, the operation of the dam transitions between the following four operating strategies depending of the circumstances at the time. These procedures associated with these strategies are explained in detail in the Manual.

- **Strategy W1** – Primary consideration is given to Minimising Disruption to Downstream Rural Life. Under this strategy, the predicted water level is below 68.50 m AHD and the maximum release is 1,900m<sup>3</sup>/s.
- **Strategy W2** – Transition Phase moving from Minimising Disruption to Protecting Downstream Urban Areas. Under this strategy, the water level is predicted to be between 68.5 and 74.0 m AHD and the maximum release is less than 3,500m<sup>3</sup>/s.
- **Strategy W3** – Primary consideration is to Protect of Urban Areas from Inundation. Under this strategy, the water level is predicted to be between 68.5 and 74.0 m AHD but the maximum release is less than 4,000m<sup>3</sup>/s.
- **Strategy W4** – Primary consideration is to protecting the structural safety of the Dam. Under this strategy, the water level is predicted to exceed 74.0 m AHD and there is no limit to the maximum release. Consideration is given to managing flood releases to avoid fuse plug initiation if at all possible as this would compromise flood mitigation capacity in the short to medium term.

In addition to these strategies, historical records show that there is a significant probability of two or more flood producing storms occurring in the Brisbane River system within a short time of each other. Accordingly for each flood event, the aim is always to empty stored floodwaters within seven days after the flood peak has passed through the dams.

## 4 JANUARY 2011 FLOOD EVENT

### 4.1 Background

In the 25 days leading up to the current event, three flood events impacting on Wivenhoe Dam were experienced, with gate releases being made on all but five of those days. The total outflow from these events was around 700,000ML. The details of these events are as follows:

EVENT	EVENT START DATE	EVENT END DATE	VOLUME RELEASED (ML)
1	13/12/2010	16/12/2010	70,000
2	17/12/2010	24/12/2010	150,000
3	26/12/2010	02/01/2011	470,000

During these events, requests were received from Councils and residents impacted by bridge closures downstream of the dam to curtail releases as soon and as quickly as possible.

Additionally the 2 January end date of the flood event prior to the current event meant that significant drain down of the dam prior to the onset of the current event that commenced on 6 January 2011, was not possible without major bridge inundation downstream of the dam and without exceeding minor flood levels in the lower Brisbane River.

Additionally, a flood event was also experienced in October 2010 that resulted in a release of 750,000ML from the dam. Accordingly drain down below the dam full supply level prior to the start of the first December event would not have been possible without significant bridge inundation and without exceeding minor flood levels (as defined by BOM and BCC) in the lower Brisbane River.

Regardless, significant drain down prior to the current event would have had little impact on the peak level in Wivenhoe Dam as shown in the table below. The reason for this is that this total event inflow volume of 2,600,000 ML is well in excess of the useable flood storage combined with the available water supply storages shown in the table.

The specific impact on the Lower Brisbane River of these reduced dam levels requires the use of a complex hydraulic model. The results of this modelling would still contain a degree of uncertainty as illustrated by the difficulties in estimating the final flood peak in Brisbane during the event. This is because the rapid closure of the gates after peak inflow was achieved resulted in significant water level reductions downstream and this is difficult to model accurately.

JANUARY 2011 FLOOD			
Starting Level		Peak Height	Capacity
%	m AHD	m AHD	%
100	67.0	74.97	191
95	66.5	74.93	191
90	65.8	74.88	190
75	64.0	74.63	187
50	60.0	74.11	180

# It should be noted that the possible reductions shown above are based on a dual peaked flood hydrograph with a volume of about 2,600,000 ML which occurred during this event. A hydrograph with the same volume but a different distribution could result in a significantly lower reduction in peak water levels.

Flood operations at the dam are also highly dependent upon the flood inflow volume and a slight variation in the flood volume could significantly reduce the benefits associated with draining down the dam prior to a flood event.

## 4.2 Event Decision Making

The following table contains a summary of the key decisions points associated with the current event. As at 16 January 2011, the event remains in progress.

DATE AND TIME	FLOOD EVENT MILESTONE
07:00 06/01/2011 (Thursday)	Rainfall is experienced in the dam catchments that will result in flood releases, however Wivenhoe releases are delayed for 24 hours to allow Lockyer Creek flood flows to pass downstream and prevent the isolation of the community dependent of Burtons Bridge. The forecast is for 150mm over the next 24 hours.
15:00 07/01/2011 (Friday)	Wivenhoe releases commence, with operational strategy W1 in use. Rainfall for the next four days is estimated to be between 140mm and 300mm, with a forecast for rain easing on Tuesday 11 January 2011. All bridges downstream of the dam with the exception of Fernvale Bridge and Mt Crosby Weir Bridge are expected to be inundated for a number of days.



06:00 09/01/2011 (Sunday)	Moderate to heavy rain periods forecast until Tuesday, but both Wivenhoe and Somerset dam levels were falling slowly, with Somerset at 1.27 m AHD above FSL and Wivenhoe 1.58 m AHD above FSL.
15:30 09/01/2011 (Sunday)	Following significant rain during the day a meeting of Duty Engineers is held. The QPF issued at 16:00 indicates 50mm to 80mm over the next 24 hours. Based on this forecast, it is anticipated that dam levels can be held to a maximum of 3.50 m AHD above FSL in Somerset and 5.5 m AHD above FSL in Wivenhoe. However, by 19:00 it was apparent that both Fernvale Bridge and Mt Crosby Weir Bridge would be inundated by the combined dam releases and Lockyer Creek flows and that the operational strategy had progressed to W2.
06:30 10/01/2011 (Monday)	Rainfall continued during the night and based on rainfall on the ground it was apparent the operational strategy had progressed to W3.
06:30 10/01/2011 (Monday)	Rainfall continued during the day but based on rainfall on the ground, operational strategy W3 remained in use. However it was apparent that any further heavy rain would result in progression of the operational strategy to W4.
08:00 11/01/2011 (Tuesday)	Rainfall continued during the night with isolated heavy falls in the Wivenhoe Dam catchment area and based on rainfall on the ground it was apparent the operational strategy would soon progress to W4 with Wivenhoe Dam exceeding 8.00 m AHD above FSL. The objective now was to limit outflows and subsequent flood damage to urban areas, while ensuring the structural safety of the dam.
11:00 11/01/2011 (Tuesday)	Rapid inflows were experienced in Wivenhoe Dam, with the dam rising almost a metre in eight hours. Releases were increased until the dam level stabilised in accordance with Strategy W4. Computer models were not reflecting actual dam inflows due to intense point rainfalls in the immediate catchment around the dam. Falls are estimated to be similar to those experienced at both Toowoomba and Upper Lockyer the previous day and are falling outside and between existing rain gauges.
21:00 11/01/2011 (Tuesday)	Wivenhoe Dam peaked. Peak release of 7450 cumecs with a level of 0.7 metres below fuse plug trigger.
22:00 11/01/2011	Wivenhoe Dam releases were closed off as quickly as possible over the

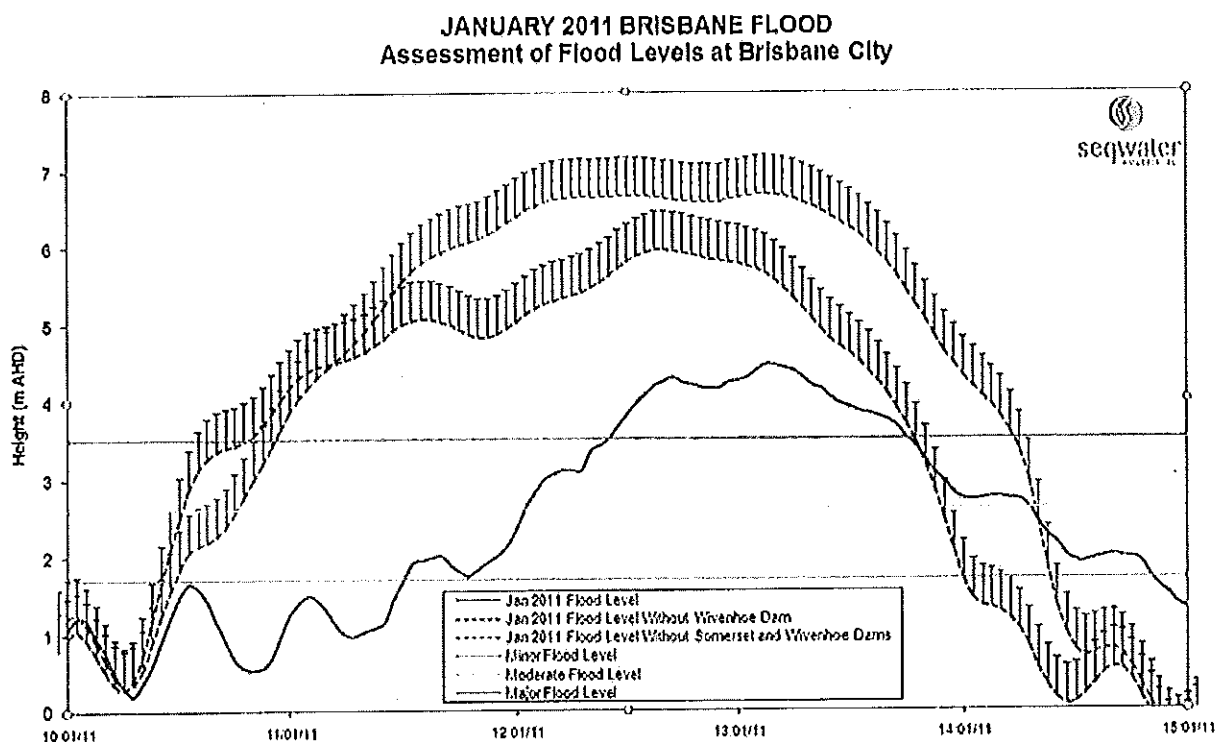
(Tuesday)	next 11 hours, while ensuring water levels in the dam did not rise further and initiate a fuse plug embankment.
08:00 12/01/2011 (Wednesday)	Minimum possible release level reached, with inflows matching outflows. Further reductions in release rate would likely cause the dam level to rise.
21:00 13/01/2011 (Thursday)	The 7 day dam drain down is commenced as Lockyer Creek and Bremer River peaks pass the Lower Brisbane area. Maximum release target is the limit of damaging floods in Brisbane being 3500 cumecs.
09:00 17/01/2011 (Monday)	Drain down continues, with release expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

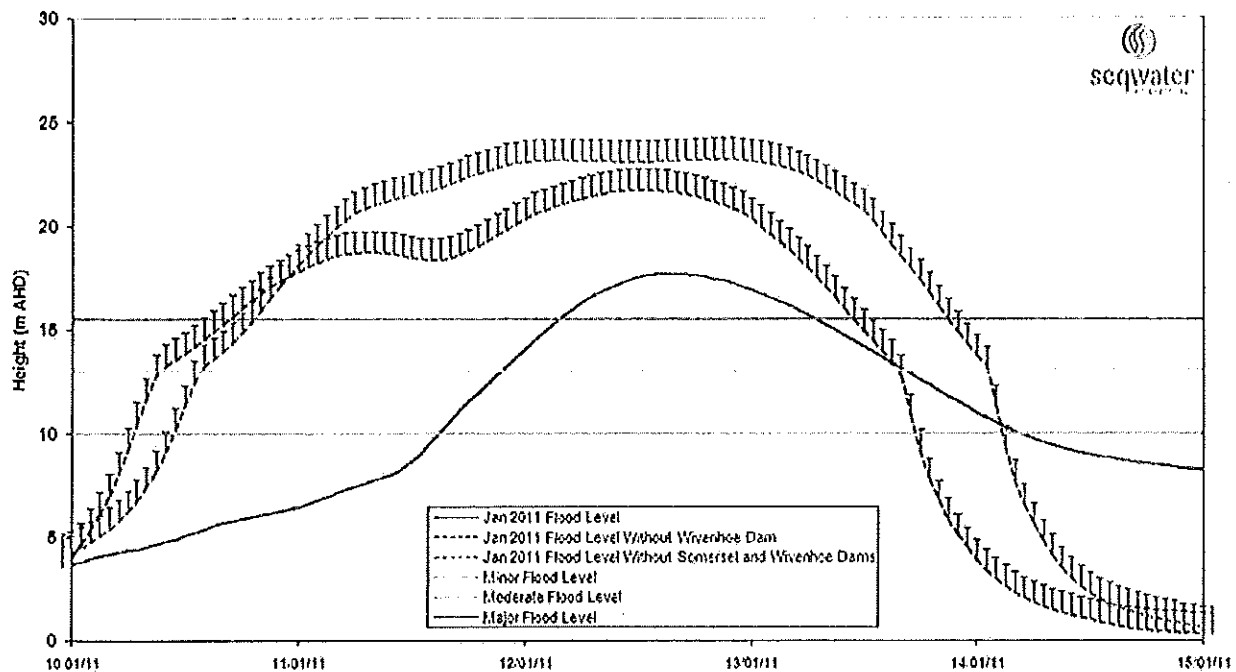
The following graphs demonstrate the significant benefits of Wivenhoe Dam in mitigating the current flood event, with reductions in flood peak of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

The time at which flood levels remained elevated above major levels has also been reduced by up to 3 days by the dam. This has significant benefits to impact on the population of the city, property damage and the recovery operation.



### JANUARY 2011 BRISBANE FLOOD Assessment of Flood Levels at Moggill



The strategy adopted to quickly close off releases once the peak in the dam had been reached and rain stopped falling certainly reduced the predicted flood peak by at least one metre in the lower Brisbane River area. This was carried out because the releases had stopped the dam from rising and careful monitoring allowed rapid reduction of releases while ensuring fuse plug initiation did not occur.

This notion is supported by BOM.

## 5 EVENT REVIEW

Under the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam that are approved and gazetted by the Department of Environment and Resource Management, there is a regulatory requirement that a report must be prepared as per the below wording:

*"Seqwater must prepare a report after each Flood Event. The report must contain details of the procedures used, the reasons therefore and other pertinent information. Seqwater must forward the report to the Chief Executive within six weeks of the completion of the Flood Event."*

Such a report was prepared for the flood events of February and March 2010 and copies are available. A copy of the Table of Contents of that report is included as Appendix 1. For this event, the report would be a comprehensive summary of all procedures, actions, outcomes and processes during the event.

It is recommended that the process and content for reports required for this event be:

- In the short term, utilise this report attached to this briefing note as the basis for communications and discussion.
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  - Improvements in data collection systems, practices and processes.
  - improvements by interacting agencies

- Review of factors impacting on the protection of urban areas
  - Recommendations & Conclusions
- The report would then be reviewed by the Dam Safety Regulator in conjunction with any peer review they require. The review should cover:
  - Were the provisions of the manual complied with?
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  - Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events?
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  - whether the Brisbane River crossings which act, under some situations as a constraint on the releases from Wivenhoe, should be replaced by bridges. For example if the smallest could pass , for example, 2,500 cumecs, then this could enable higher releases under some circumstances.
  - Whether the policy of draining the flood compartment within 7 days should be modified.
  - Given the manual's order of priorities i.e. protection of the dam etc, are any changes in the flood release strategies for either dam desirable? If so, what are they, and their implications
- Based on this review, a review of the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam would occur utilising an expert panel of review including representatives of DERM, Seqwater, BoM, affected Local Governments and other stakeholders as necessary.

# *Appendix A*

## FINAL REPORT – FLOOD EVENTS AT WIVENHOE, SOMERSET AND NORTH PINE DAMS FOR FEBRUARY AND MARCH 2010

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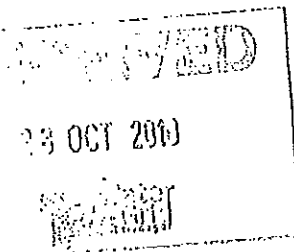


**Queensland  
Government**

Ref CTS 19311/10

**25 OCT 2010**

Mr Gary Humphrys  
Chair  
SEQ Water Grid Manager  
PO Box 16205  
CITY EAST QLD 4002



Office of the  
Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade

Dear Mr Humphrys

I write in relation to seeking advice regarding options to and benefits of releasing water from key storages in anticipation of major inflows over the coming summer.

I understand that the key Water Grid storages are at 100 per cent of storage capacity going into the traditional wet season, with forecasts of higher than median rainfall and the prospect of multiple flood events.

I am also advised that our water supply is more secure than ever before, due to storages being full, key Water Grid projects completed and ongoing water efficiency.

I seek your urgent advice about whether this water security provides an opportunity to reduce the volume stored in key dams as a means of reducing the severity, frequency and duration of flooding in downstream areas.

In doing so, I note that recent releases from Wivenhoe Dam have resulted in significant inconvenience and isolation for residents in some downstream areas. With the catchments saturated, I understand that even quite minor rainfall events will result in further water releases and further inconvenience for these residents.

By end November 2010, I would appreciate your advice as to the available options and the likely benefits. At a minimum, you should review the operation of Wivenhoe, North Pine and Leslie Harrison dams. At least for Leslie Harrison Dam, this would be a return to standard operating procedures prior to the drought, when the dam was routinely drawn down to 95 per cent of capacity to minimise the impacts of storms on downstream residents.

I also seek your confirmation that these options would not significantly impact upon our current water security, measured as the probability of needing to reintroduce Medium Level Restrictions over the next five to ten years.

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**Queensland  
Government**

Office of the  
Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade

I emphasise that this is only a temporary measure, reflecting that dams are full prior to the commencement of the traditional wet season. I expect that your advice will include a clear date or trigger beyond which dams will be allowed to fill to their full supply level.

Thank you in advance for your assistance.

Should you have any further enquiries, please feel welcome to contact Mr John Bradley, Director General, Department of Environment and Resource Management on 3330 6298.

Yours sincerely

**STEPHEN ROBERTSON MP**

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24 December 2010

Hon Stephen Robertson MP  
Minister for Natural Resources, Mines and Energy  
and Minister for Trade  
PO Box 15216  
Brisbane Qld 4001

Dear Minister

I am pleased to respond to your letter of 25 October 2010 regarding options to and benefits of releasing water from key storages in anticipation of major inflows over the current wet season. Our advice follows, based on discussions with Seqwater.

Only four of the dams in South East Queensland region are gated, with the ability to release significant amounts of water in anticipation of major inflows. These are Wivenhoe, Somerset, North Pine and Leslie Harrison dams.

Detailed operational procedures have been approved for each of the gated dams. The dams will continue to be operated in accordance with these procedures. These procedures generally relate to the management of the dams and should be managed above Full Supply Level. This advice relates to the water security aspect of the management of the dams below Full Supply Level.

Based on information currently available, Seqwater has advised that releasing water to below Full Supply Level may provide some benefits in terms of reduced community and operational impacts during minor inflow events, such as has occurred over the past month. For medium and major flood events, it considers that pre-emptive releases will provide negligible benefits.

Informed by this advice, the SEQ Water Grid Manager has advised Seqwater that, from a water security perspective, it has no in-principle objection to minor releases from Wivenhoe, Somerset and North Pine dams to minimise the operational and community impacts of gate releases. Specifically, it has advised that it has no in-principle objection to:

- Wivenhoe and Somerset dams being drawn down to 95 per cent of their combined Full Supply Level
- North Pine Dam being drawn down to 97.5 per cent of its Full Supply Level.

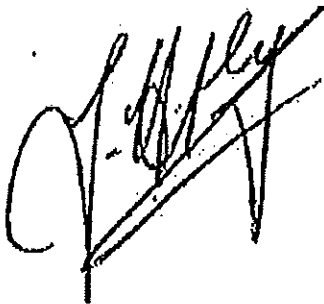
The SEQ Water Grid Manager has assessed the water security implications of the release to be negligible, having no impact on our ability to meet the risk criteria specified in the System Operating Plan or our ability to meet our supply obligations to Grid Customers. From a water security perspective, the Queensland Water Commission has also confirmed that it does not have any objections to the potential release.

Please note that these arrangements are intended to apply for the current wet season only, taking into account the level of storages and the rainfall forecasts over coming months.

For future wet seasons, the SEQ Water Grid Manager will continue to work with Seqwater to investigate the optimal arrangements. In particular, we propose to further investigate options that may reduce the frequency or duration of intermediate level flows (between 1,900 and 3,500 cubic metres per second). In addition, we recommend that the investigations with the Queensland Water Commission to examine the opportunity of raising the full supply level of Wivenhoe Dam for water supply be expanded to include options involving the release of the additional water once major inflows are forecast.

I trust that this advice is sufficient. If you have any questions, please do not hesitate to contact Mr Dan Spiller, Director Operations, by telephone on 3405 0364 or by email on [dan.spiller@seqwgm.com.au](mailto:dan.spiller@seqwgm.com.au).

Yours sincerely

A handwritten signature in black ink, appearing to read 'Gary Humphrys', with a large, sweeping flourish at the end.

Gary Humphrys  
Chair

## ATTACHMENT

### Wivenhoe and Somerset dams

Wivenhoe Dam can store up to 1.15 million litres (ML) of drinking water. In addition, it has the capacity to store an additional 1.45 ML of flood water.

While large, the flood compartment can be filled within days. For example, following heavy rainfall in October 2010 Wivenhoe Dam received inflows equivalent to almost half of the flood storage compartment capacity in just a few days.

Several factors influence flood release strategies for Wivenhoe and Somerset dams.

First, rain events that have caused flooding have historically been prolonged events over several days, often with a second event occurring several days to a week after the first. As a result, the operational procedures for the dam are designed to ensure that all water held in the flood compartments is released within seven days of a rain event, ensuring that the flood compartment is available for any future inflows.

Secondly, the dam only controls flood waters from part of the Brisbane River catchment area. About 50 per cent of the catchment area of the Brisbane River is upstream of the Wivenhoe Dam wall, and can be potentially controlled by it. No flood mitigation structures exist for most of the potential run-off from the other 50 per cent of the catchment area.

Third, the Bureau of Meteorology has had limited success in plotting rainfall distribution accurately to assess where most flooding risk lies above or below the dam wall. Historical floods have demonstrated that flooding can occur from both. For example, the 1974 flood flows primarily occurred below the dam wall whilst the 1890's event occurred above the dam wall. As a result, when releasing water from Wivenhoe Dam it is very important to predict and monitor below the dam wall flows so as to understand combined river flows that cause flood impacts.

Taking these factors into account, the flood release strategy for Wivenhoe and Somerset dams has a hierarchy of objectives:

- Ensure the structural safety of the dam
- Provide optimum protection of urbanised areas from inundation
- Minimise disruption to rural life
- Retain full supply level after a flood event
- Minimise impacts to flora and fauna during the drain down phase.

Within this framework, flood releases from Wivenhoe Dam typically fall into two categories of flood events based on the impact they cause when combined with below the dam wall catchment runoff:

- Larger events typically involving combined river flows greater than 3,500 cubic meters per second measured at Moggill. These events would have flood impacts on



urban areas in Brisbane. This scale of release has not been required since Wivenhoe Dam was completed.

- Smaller events with combined river flows of less than 1,900 cubic meters per second measured at the Mt Crosby weir which can inundate up to seven rural bridges isolating up to 50 households and causing inconvenience to many more. There has been six of these events since 1984, when Wivenhoe Dam was completed.

Our assessment of the benefits of lowering dam storage levels to reduce flooding impacts is below for these two event types.

#### *Large events*

Seqwater has advised that releases of greater than 3,500 cubic metres per second (m<sup>3</sup>/s) from Wivenhoe Dam are likely to impact on urban areas in Brisbane. Events of this nature have not been experienced since Wivenhoe Dam was completed in 1984.

Seqwater has advised that:

- pre-emptive releases are likely to have negligible impacts on the extent of these impacts
- any impacts would require releases of at least 250,000 ML. This is equivalent to a release of about 16 per cent of the combined storage capacity of Wivenhoe and Somerset dams.

A pre-emptive release of this scale is not recommended, based on information currently available. The potential water security impacts are considered to be more significant than the negligible benefits. These potential security impacts include costs associated with the earlier or avoidable operation of the desalination facility at capacity, as well as the increased probability of triggering the implementation of a drought response plan.

More detailed investigation of opportunities to actively manage flood storage is recommended, including options to increase flood supply level on a temporary basis. These investigations need to be led by Seqwater, and involve the Bureau of Meteorology, Councils and the SEQ Water Grid Manager.

In particular, it has been identified that it is worth investigating the impacts on downstream flooding for intermediate level flows (flows between 1900 and 3500 m<sup>3</sup>/s).

Seqwater will undertake extensive investigations for the Queensland Water Commission in early 2011 to examine the opportunity of raising the full supply level of Wivenhoe Dam for water supply. We will recommend that the scope of this work be widened to consider the benefits of pre-lowering storage levels based on mid range rainfall events and the reduced impacts to river levels and subsequent property impacts. It is noted that predicting rainfall intensity and location, even as events are about to occur has not been accurate, however the Bureau of Meteorology is improving its methods.

### *Smaller events*

Pre-emptive releases from Wivenhoe Dam may reduce the impacts of minor gate releases (strategies W1A to W1E in the operational procedures).

Minor gate releases may result in the closure of up to six bridges, isolating up to 50 dwellings and inconveniencing many more. As stated in existing flood management plans, releases should be managed to minimise the impacts on these residents. Over the immediate term, Councils have requested that bridge closures be avoided over the Christmas to New Year period, if at all possible. In addition:

- There are resource implications involved in the activation of the flood control centre. Under flood management plans, the centre must be staffed by suitably qualified officers at all times during gate releases. There are currently only four quality duty engineers, who have staffed the flood centre for much of period since the initial release in October.
- Gate releases during the Christmas holiday period would result in closure of dams to water based activities, impacting on up to 150,000 people who are expected to use the recreational facilities over the holiday period.

The Water Grid Manager has advised Seqwater that, from a water security perspective, it would not object to water being released from Wivenhoe and Somerset dams to 95 per cent of storage capacity at any time until end March 2010.

Under this recommendation, storage levels could potentially be reduced by up to about 77,250 ML. This is equivalent to the amount of water released between 13 and 16 December 2010, through a single gate.

Pre-emptive releases will be managed so as to minimise the likelihood of gate releases due to small storms and local rainfall. Storage capacity will usually be reduced through a combination of:

- Extended gate releases, especially for strategy W1C. For comparison, up to 130,000 ML/day was released during in November and mid December 2010. At this rate, the additional releases could occur in about half a day.
- Ongoing gate releases of up to 30,000 ML/day, which do not isolate any residents but can inundate some lower bridges that cause inconvenience.
- Ongoing valve release of up to about 4,300 ML/day, which can be maintained without inundate any bridges.

Actual releases would be decided by Seqwater based on operational considerations and in accordance with its statutory and regulatory obligations.

### *Water security Impacts*

The water security impacts of releases will be zero if the dams fill over the remainder of the wet season. Current forecasts indicate that there is a high probability of this occurring:

- Heavy rainfall is forecast over the Christmas holiday period, as noted above.
- Over the remainder of the wet season, advice from the Bureau of Meteorology is that sea surface temperatures are likely to remain at levels typical of a La Niña event into the first quarter of 2011, with the majority of the models indicating the event will gradually weaken over the coming months.

The water security impacts will be minimal, even if there were no further inflows to the dams. Modelling indicates that the reduction would have a minimal impact on the probability of key water Grid storages falling to 40 per cent of capacity over the next five years.

### **North Pine and Leslie Harrison dams**

North Pine and Leslie Harrison dams do not have flood mitigation potential. Once the dams have reached Full Supply Level, all water flows into the dam must be released to protect the structural safety of the dam.

Seqwater has advised that, without major releases, there are negligible benefits to reducing volumes stored in North Pine or Leslie Harrison dams for the purposes of reducing the extent or duration of any downstream flooding impacts.

For North Pine Dam, there may be some operational and community benefits to minor releases to below Full Supply Level in some circumstances. Any gate operation at North Pine Dam results in inundation of Youngs Crossing Road, which isolates a number of residents. These impacts are currently being minimised by releasing from North Pine Dam at night. With further rainfall forecast, Seqwater may choose to reduce the level to below Full Supply Level in order to reduce the frequency of night releases or the likelihood of releases being required during the day.

For this dam, the SEQ Water Grid Manager has advised Seqwater that, from a water security perspective, it would not object to water being released to 97.5 per cent of storage capacity at any time until end March 2010.

For Leslie Harrison Dam, gate operations do not impact on public roads and generally only inconvenience the general public during large flood events. There is no scope to reduce this inconvenience through small pre-emptive releases. Accordingly, no in-principle approval be made for pre-emptive releases from this dam.

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12 January 2011

Mr. Barry Dennien  
CEO, SEQ Water Grid Manager  
PO Box 16205  
City East QLD 4002

Dear Barry,

This letter report:

- presents my final findings on a review of the operation of Wivenhoe Dam (including controlled releases) for compliance against the Flood Mitigation Manual for the period 12 December 2010 to date (Flood Event), and;
- provides advice on the prudence and appropriateness of the decisions and actions taken during the Flood Event regarding the operation of Wivenhoe Dam in light of the Flood Mitigation Manual's requirements and the circumstances of the Flood Event.

The report follows on from my preliminary report sent to you earlier today. The findings and advice are provided on the basis of information provided by SEQ Water Grid Manager which comprised the Flood Mitigation Manual and Technical Situation Reports. The latter were daily (sometimes twice daily) reports for the subject period. They gave a log of rainfall over the dam catchments and the downstream river (Lockyer Ck. and Bremer R.) catchments; inflows to Somerset and Wivenhoe Dams; storage levels; releases from the dams; details of the operation of gates and other outlets (gate openings/discharges); proposed changes in operating strategies and impacts on the various access crossings downstream of Wivenhoe Dam. In reviewing the Technical Situation Reports, I prepared a spreadsheet (see separate attachment of Excel spreadsheet *Tech Reports – Summary*, summarising the reports so that a timeline of the Flood Event could be seen at a glance. This provided a good overview of the Flood Event as it unfolded and showed what information may or may not have been included in a particular report. The Queensland Director Dam Safety (Water Supply) informed me that the Flood Operation Logs contain much more detailed information including details of the communications that were carried out and some of the more detailed information that is not necessarily included in the Technical Situation Reports. I have been provided with a draft of the "Protocol for the Communication of Flooding Information for the Brisbane River Catchment – Including Floodwater Releases from Wivenhoe and Somerset Dams" developed in October/November last year and currently being used. The Technical Situation Reports appear to have been an outcome of that Protocol.

The various requirements and required actions detailed in the Flood Mitigation Manual are summarised in the Table given in Attachment A. The Table also gives my comments (where appropriate) on whether there is evidence from the information presented to me, that there is satisfactory compliance with these requirements and actions.

The main aspects of the Flood Mitigation Manual are the various strategies for operating Wivenhoe Dam and Somerset Dam as well as a number of requirements relating to flood operations personnel, flood preparedness and flood training.

At Wivenhoe Dam there are four main strategies for operating the dam (W1 to W4) and at Dam there are three (S1 to S3). These strategies are hierarchical and are based on a number of flood objectives. These in descending order of importance, are:

- Ensure the structural safety of the dams;
- Provide optimum protection of urbanised areas from inundation;
- Minimise disruption to rural life in the valleys of the Brisbane and Stanley Rivers;
- Retain the storage at Full Supply Level (FSL) at the conclusion of the Flood Event, and;
- Minimise impacts to riparian flora and fauna during the drain down phase of the Flood Event.

Normal procedures require a return to FSL within 7 days of the flood event peak passing through the dams so that the potential effects of closely spaced Flood Events can be allowed for.

It is apparent from the Technical Situation Reports that emphasis has been given to communicating changes in flood operations strategies with local authorities and the Bureau of Meteorology (BOM).

Until the last day or so, Wivenhoe Dam has been below EL74.0 and accordingly, would be operating under Strategy W1 i.e. make releases such that bridges downstream of the dam do not have to be closed prematurely. For a few days at the end of December and for the last day or so before yesterday's big rise, Strategy W2 would be in place (restrain releases from Wivenhoe Dam such that Brisbane River flows are maintained within the upper limit of non-damaging floods at Lowood (3,500 m<sup>3</sup>/s)). At various times during the Flood Event some of the downstream bridges have been closed. However, it is evident that action has been taken to vary dam releases such that various bridges could be re-opened as soon as possible. This appears to have been done in accordance with the flood operating strategies. The operations then moved onto Strategy W4 when the storage in Wivenhoe Dam reached about EL 73.5 (before the W4 trigger level of EL 74) when yesterday's heavy rain came on and it was assessed that there was a chance that the first (central) fuse plug could be triggered. It was then a matter of juggling the radial gate openings in an attempt to circumvent any fuse plug triggering. A graph of storage levels for Wivenhoe and Somerset Dams (from information taken from the Technical Situation Reports) showing the limits for the various Wivenhoe Dam flood strategies is given in Attachment A. It is apparent from this graph, that the appropriate flood operation strategies were adopted. The Technical Situation Reports indicate that proposed changes in strategy were appropriately communicated with appropriate authorities in accordance with the new Communication Protocol.

#### *Summary:*

The Technical Situation Reports comply with the requirements of the new Communication Protocol. However, I feel that there could be more consistency in the information presented. There seem to be gaps in information presented such as storage levels (see spreadsheet and graph in Attachment A). It would be useful to specify the minimum information required to be presented in the Technical Situation Reports (storage levels, inflows, recent/current rainfall, forecast rainfall, releases from dams, estimated flows from downstream tributaries, current flood operating strategy for each dam and proposed change in strategy, gate and regulator operations, state of downstream road crossings etc). Most of the minimum information is already given, but not in a consistent manner. As a means of reviewing processes followed during a flood, it would be useful to present a timeline of the flood event showing graphs of storage levels and other data that can be easily presented in a graphical manner.

I am informed by the Queensland Director Dam Safety (Water Supply) that the various requirements of the Flood Mitigation Manual relating to requirements for flood operations personnel, flood preparedness and flood training have been adhered to. There are a number of other requirements however, that I am not able to say whether they were satisfied as I had insufficient information. These requirements (see Table in Attachment A) should be subject to a separate audit.

It appears to me that the decision to implement Strategy W4 was a prudent one. While it would cause some damage in the Brisbane River downstream, its implementation, considering forecast rainfalls and projected flows in Lockyer Ck. And the Bremer River, would allow reduction of the storage level in

brian cooper consulting

Wivenhoe Dam. This reduction in storage level would hopefully provide a sufficient buffer that would minimise the chance of a fuse plug triggering in the auxiliary spillway. Triggering of the first (central) fuse plug would cause a sudden increase of flow of some 2,000m<sup>3</sup>/s from Wivenhoe Dam. This increase in flow would cause significantly more flooding in the lower Brisbane River than that caused by early implementation of Strategy W4.

*Conclusions:*

The strategies as set out in the Flood Mitigation Manual have been followed, allowing for the discretion given to making variations in order to maximise flood mitigation effects. The actions taken and decisions made during the Flood Event appear to have been prudent and appropriate in the context of the available knowledge available to those responsible for flood operations and the way events unfolded.

There are a number of requirements where there was insufficient time given the urgency of this review, to source the necessary information for me to demonstrate compliance. However, satisfaction or otherwise of these requirements would have had little impact on the operation of the two dams during this particular Flood Event. It is intended that they be audited when time permits, after the Flood Event.

There are aspects of the Technical Situation Reports that could be improved and these have been discussed above.

Regards,



Brian Cooper

# ATTACHMENT A

## Action Requirements extracted from the Flood Mitigation Manual:

Action	Comment
The Flood Mitigation Manual contains the operational procedures for Wivenhoe Dam and Somerset Dam for the purposes of flood mitigation and must be used for the operation of the dams during flood events.	Appears to have been done
Sufficient numbers of suitably qualified personnel are available to operate the dams if a Flood Event occurs.	Director of Dam Safety is satisfied
The level of flooding as a result of emptying stored floodwaters after the peak has passed is to be less than the flood peak unless accelerated release is necessary to reduce the risk of overtopping.	See Note 1
A regular process of internal audit and management review must be maintained by Seqwater to achieve improvements in the operation of the RTFM.	See Note 1
Seqwater must maintain a log of the performance of the data collection network. The log must include all revised field calibrations and changes to the number, type and locations of gauges. Senior Flood Operations and Flood Operations Engineers are to be notified of all significant changes to the Log.	See Note 1
Seqwater must maintain a log of the performance of the RTFM. Any faults to the computer hardware or software are to be noted and promptly and appropriately attend to.	See Note 1
Seqwater must ensure that all available data and other documentation is appropriately collected and catalogued for future use.	See Note 1
Seqwater must ensure that information relevant to the calibration of its field stations is shared with appropriate agencies.	See Note 1
Seqwater must liaise and consult with these agencies with a view to ensuring all information relative to the flood event is consistent and used in accordance with agreed responsibilities: <ul style="list-style-type: none"> <li>Bureau of Meteorology (issue of flood warnings for Brisbane River basin);</li> <li>Department of Environment and Resource Management (review of flood and discretionary powers);</li> <li>Somerset Regional Council (flood level information for upstream of Somerset Dam and upstream and downstream of Wivenhoe Dam);</li> <li>Ipswich City Council (flood level information for Ipswich), and;</li> <li>Brisbane City Council (flood level information for Brisbane City).</li> </ul>	Required also by draft of Communications Protocol. Technical Situation Reports infer compliance
Seqwater must report to the Chief Executive by 30 September each year on the training and state of preparedness of operations personnel.	See Note 1
Seqwater must provide a report to the Chief Executive by 30 September each year on the state of the Flood Monitoring and Forecasting System and Communication Networks.	See Note 1

Action	Comment
After each significant flood event, Seqwater must report to the Chief Executive on the effectiveness of the operational procedures contained in this manual.	It is too early for this action to be implemented. Will be implemented when the Flood Event is finished
Prior to the expiry of the approval period, Seqwater must review the Manual pursuant to provisions of the Act.	It is too early for this action to be implemented
Strategies are changed in response to changing rainfall forecasts and stream flow conditions to maximise the flood mitigation benefits of the dams.	Technical Situation Reports Indicate that this is done
When determining dam outflows within all strategies, peak outflow should generally not exceed peak inflow.	Information from Seqwater indicates that the requirement was satisfied
Protocol for use of discretionary powers (i.e. who gets told)	Director of Dam Safety is satisfied – I don't know whether Seqwater CEO or Chairperson approved – See Note 1

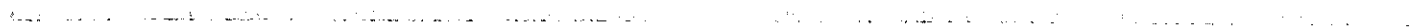
*Note1: For a number of the above actions, given the short time frame for the review on compliance of actual flood operations with the Flood Mitigation Manual, it was not possible to source some of the information required to confirm that requirements had been fulfilled. These actions will be audited separately, when time permits.*



Action	Comment
<b><i>Flood Strategies for Wivenhoe Dam:</i></b>	
<p>The intent of Strategy W1 is to not to submerge the bridges downstream of the dam prematurely (see Appendix I). The limiting condition for Strategy W1 is the submergence of Mt Crosby Weir Bridge that occurs at approximately 1,900 m<sup>3</sup>/s.</p> <p>For situations where flood rains are occurring on the catchment upstream of Wivenhoe Dam and only minor rainfall is occurring downstream of the dam, releases are to be regulated to limit, as much as appropriate in the circumstances, downstream flooding.</p>	Technical Situation Reports indicate that every attempt was made to keep the specified road crossings open
<p>The intent of Strategy W2 is limit the flow in the Brisbane River to less than the naturally occurring peaks at Lowood and Moggill, while remaining within the upper limit of non-damaging floods at Lowood (3,500 m<sup>3</sup>/s). In these instances, the combined peak river flows should not exceed those shown in the following table:</p>	Technical Situation Reports indicate that Wivenhoe Dam releases were made considering concurrent flows in the Bremer River & Lockyer Ck. To delay damaging floods as long as possible
<p>The intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 m<sup>3</sup>/s, noting that 4000 m<sup>3</sup>/s at Moggill is the upper limit of non-damaging floods downstream. The combined peak river flow targets for Strategy W3 are shown in the following table. In relation to these targets, it should be noted that depending on natural flows from the Lockyer and Bremer catchments, it may not be possible to limit the flow at Moggill to below 4000 m<sup>3</sup>/s. In these instances, the flow at Moggill is to be kept as low as possible.</p>	
<p>The intent of Strategy W4 is to ensure the safety of the dam while limiting downstream impacts as much as possible.</p> <p>This strategy normally comes into effect when the water level in Wivenhoe Dam reaches EL74.0 m AHD. However the Senior Flood Operations Engineer may seek to invoke the discretionary powers of Section 2.8 if earlier commencement is able to prevent triggering of a fuse plug.</p> <p>There are no restrictions on gate opening increments or gate operating frequency once the storage level exceeds EL74.0 AHD, as the safety of the dam is of primary concern at these storage levels.</p>	Technical Situation Reports indicate that Wivenhoe Dam releases were such as to delay adopting this strategy as long as possible
Where possible, total releases during closure should not produce greater flood levels downstream than occurred during the flood event.	Technical Situation Reports indicate that this requirement was satisfied
The aim should always be to empty stored floodwaters stored above EL 67.0m within seven days after the flood peak has passed through the dams.	Technical Situation Reports indicate that

Action	Comment
	emphasis was given to satisfying this requirement
Flow in the spillway to be as symmetrical as possible with the centre gates opened first.	Technical Situation Reports indicate that this was done
The bottom edge of the radial gates must always be at least 500mm below the release flow surface.	See Note 1 above

Action	Comment
<b><i>Flood Strategies for Somerset Dam:</i></b>	
The intent of Strategy S1 (Somerset Dam Level expected to exceed EL 99.0 and Wivenhoe Dam not expected to reach EL 67.0 (FSL) during the course of the Flood Event) is to return the dam to full supply level while minimising the impact on rural life upstream of the dam. Consideration is also given to minimising the downstream environmental impacts from the release.	Technical Situation Reports indicate that this was done
The intent of Strategy S2 (Somerset Dam Level expected to exceed EL 99.0 and Wivenhoe Dam level expected to exceed EL 67.0 (FSL) but not exceed EL 75.5 (fuse plug initiation) during the course of the Flood Event). This to maximise the benefits of the flood storage capabilities of the dam while protecting the structural safety of both dams. The Flood Mitigation Manual contains a graph that shows the intended interaction of the Wivenhoe Dam and Somerset Dam storage levels.	Technical Situation Reports indicate that this was done – little information on the operation of the radial gates at Somerset Dam. How the graph was followed not really demonstrated
The intent of Strategy S3 (Somerset Dam Level expected to exceed EL 99.0 and Wivenhoe Dam level expected to exceed EL 75.5 (fuse plug initiation) during the course of the Flood Event) is to maximise the benefits of the flood storage capabilities of the dam while protecting the structural safety of both dams.	Not relevant at this stage
The safety of Somerset Dam is the primary consideration and cannot be compromised and its peak level cannot exceed EL 109.7.	Maximum level only EL103.3

[illegible]





# Brian Cooper

Dams Engineer

## Qualifications & Affiliations

Short courses on finite element analysis, embankment dam engineering, earthquake engineering. Published technical papers – ICOLD, ANCOLD and I.E. Aust. Attended dam safety course at USBR (Denver, USA) in 2002

Bachelor of Engineering (B.E. Hons), 1968 and Master of Engineering Science (M.Eng.Sc.), 1971

University of New South Wales

Graduate Diploma of Engineering Management, 1994 Deakin University

F.I.E. Aust., C.P.Eng. RPEQ

## Expertise

Brian has approximately 40 years experience in investigation and design of major dams, weirs and hydraulic structures, having started his career designing farm dams and small irrigation schemes. He retired from NSW Department of Commerce in 2005. Brian now works as a private consultant specialising in dams engineering and fish passage at dams and weirs. He has a special interest in risk assessment and computer modelling in general and the seismic analysis of dams in particular. Engineering software (concrete dam stability analysis and flood routing) written by Brian is still used extensively in the Dams & Civil Group of the Department of Commerce. He also has particular experience with concrete dams and the use of post tensioned ground anchors for strengthening those dams. He was a member of the Australian National Committee on Large Dams (ANCOLD) Working Group that developed guidelines for 'Design of Dams for Earthquakes' and a member of the Working Group that revised the guidelines for 'Risk Assessment for Dams'. He has been a guest lecturer for a number of years (most recently in 2009) on concrete dam engineering for the University of NSW post graduate Embankment Dam Engineering Course, and on the history of dams in NSW at Sydney University.

He has been the project director and project manager for a number of feasibility studies, design reviews, site investigations and detail design consultancies for major dams and weirs including the direction and co-ordination of all specialist services including dambreak studies, preparation of dam safety emergency plans and risk assessments. He is currently an expert reviewer for a number of Australian water authorities and consultants (State Water Corporation (NSW), Hydro Tasmania, SunWater (Queensland), Brisbane City Council, Goulburn-Murray Water, Goulburn Valley Water, WA Water Corporation, Southern Rural Water (Victoria), URS, GHD, Hobart Water, NT PowerWater, and TrustPower (NZ)). He has also worked as a sub-consultant for a number of consulting firms (URS, MWH, GHD).

Brian is the Engineers Australia representative for the NSW Dams Safety Committee (the dam safety regulator in NSW) and is currently the Chairman of that organisation. He has been a member of the Murray Darling Basin Authority's Fish Passage Task Force which advises inter alia on the installation of fishways on the Murray River as part of the Living Murray Program.

Brian is a registered engineer in Queensland (RPEQ No. 6819). He started his own consulting business in 2008, advising on dam safety, dam design and analysis, dam risk assessments and dam upgrades as well as fish passage for dams. He is providing specialist advice through *Brian Cooper Consulting* as a sole trader.

## Professional Experience

### 2008 to Present: Principal of Brian Cooper Consulting

- 2010 Five yearly comprehensive dam safety inspection of Carcoar Dam (double curvature arch dam).  
Internal reviewer to URS (Melbourne) on concept design of regulator structures and associated fishways for the Hipwell Road project for watering the Gunbower Forest  
Specialist adviser to Melbourne Water – valve behaviour on Sugarloaf Dam pipeline, structural behaviour of pumping station floor slab and pump bases at Cardinia Dam Pumping Station  
Commenced work as member of ANCOLD working group re-writing the Earthquake Guidelines – responsible for re-writing sections relating to concrete dams.  
Continuing involvement with Alluvium in the design of the weir upgrade and the new fishway for Booligal Weir.  
Continuing external peer review services to State Water Corporation for the detail design of new auxiliary fuse plug spillways for Copeton and Chaffey Dams, detail design of raising and post tensioned strengthening of Keepit Dam, detail design of upgrade works for Wyangala Dam, finite element analysis of Carcoar Dam (double curvature arch dam).  
Further work with GHD (Perth) on risk assessment for Serpentine Dam.  
Continuing involvement with Hydro Tasmania, as Chair of external review panel for Catagunya Dam.
- 2009 Part of URS' comprehensive inspection team for Melbourne Water's Maroondah Dam.  
Part of URS' business risk assessment team for Southern Rural Water's Cowwarr and Maffra Weirs.  
Part of Alluvium's design team upgrading Booligal Weir and providing a fishway at the weir, for State Water Corporation.  
Part of GHD's design team for Lower Fitzroy River Infrastructure Project designing fishways for Rookwood and Eden Bann Weirs near Rockhampton in Queensland.  
Project Manager on behalf of SA Water and reviewer for study into vibration of a crane rail beam at Lock 5 on the River Murray.  
Expert reviewer for State Water Corporation for 3D finite element analysis of Carcoar Dam (double curvature arch dam).  
Internal reviewer for URS on Laanecoorie Dam Upgrade.  
Expert reviewer for State Water Corporation for risk assessments for Oberon and Rydal Dams.  
Member of GHD's Serpentine Dam risk assessment team for WA WaterCorp.  
Expert reviewer for SunWater in Queensland for the comprehensive risk assessment undertaken for Fairbairn Dam and Coolmunda Dam.  
Expert reviewer for State Water Corporation for major upgrade works at Keepit, Copeton, Chaffey and Wyangala Dams.  
Appointed as Chairman of the NSW Dams Safety Committee (the dam safety regulator in NSW).  
Provided external peer review for Goulburn Valley Water, on Nine Mile Creek Dam Upgrade.  
Internal reviewer for URS (Adelaide) for Lake Victoria Outlet Regulator options studies.  
Provided advice to URS (Melbourne) on the Mildura Weir Fishway design.  
Member of expert panel advising State Water Corporation on revised dam surveillance regime.  
Part of Ecosmart bid team - prepared concept designs for fish passage facility at proposed Wyaralong Dam in Queensland.  
Continuing expert review role for Catagunya Dam upgrade.
- 2008 Started as a private specialist dams consultant - *Brian Cooper Consulting*.  
Worked through the URS Corporation for the USBR and the USACE in developing a risk toolbox for lined spillways.  
Advised TrustPower in New Zealand on replacement of post tensioned anchors at Mahinerangi No. 1 Dam.  
Adviser to State Water Corporation and to URS on further upgrade works for Hume Dam.  
Provided specialist advice to WA Water Corporation on Wellington Dam post tensioning.  
Peer reviewer on behalf of URS for Warren Dam in South Australia.  
Part of URS team carrying out portfolio risk assessment of Melbourne Water's dams.  
Member of Expert Review Panel for Darwin River and Manton Dams for NT PowerWater.

*1987 to 2008: Dams & Civil Section of NSW Department of Public Works and Services/NSW Department of Commerce.*

- 2008 Carried out detailed 3D finite element analysis of radial gate at Wyangala Dam spillway for State Water Corporation.  
Continuing review role for Tillegra Dam.  
Continuing review role for Hinze and Lake Manchester Dams in Queensland and Catagunya Dam in Tasmania.  
Prepared options report on Burrendong Dam spillway modifications for State Water Corporation.
- 2007 Continuing roles on Lake Manchester, Hinze, Catagunya and Redbank Ck. Dams.  
Internal peer reviewer for NSW Dept. of Commerce regarding design of Tillegra Dam.  
Advised State Water on feasibility of fish passage facilities at a number of their major irrigation dams.  
Expert reviewer for GHD on a flood retarding basin in south west Sydney.  
Part of expert panel for River Murray Water risk assessments for Hume and Dartmouth Dams, Torrumbarry and Yarrowonga Weirs and Lake Victoria.  
Re-elected as Deputy Chairman of the Dams Safety Committee
- 2006 Project director for 3D finite element analysis of Bendora Dam (double curvature arch dam)  
Chair of external peer review panel for upgrading of Lake Manchester Dam (concrete gravity dam) in Queensland  
Internal peer reviewer and senior consultant for the raising of Hinze Dam (earth and rockfill embankment) in Queensland  
Project director for preliminary and detailed design of Redbank Creek Dam (single curvature arch dam) upgrading  
Project director for Keepit Dam fish passage investigations  
Part of expert panel for URS undertaking portfolio risk assessment for dams owned by River Murray Water  
External peer reviewer for Hydro Tasmania for Catagunya Dam (concrete gravity dam) upgrading;  
Project director for 3D finite element analysis of Upper Cordeaux No. 2 Dam (single curvature arch dam owned by SCA) for BHP Billiton
- 2005 Project design engineer for dam related aspects of Nepean Dam Deepwater Access Project:  
Pipeline crossing end of spillway; outlet works for end of pipeline  
Project design engineer for Avon Dam Deepwater Access Project: tunnel design through rockfill buttressing; new low level outlet works
- 2004 Internal reviewer to URS Australia for Pykes Ck Dam Investigations (Southern Rural Water, Victoria)  
Internal reviewer to URS Australia for Lower Reservoir Dam (Hobart Water, Tasmania)  
Member of expert review panel for the Melton Dam upgrade design (Southern Rural Water, Victoria)
- 2003/04 Designer for retrofitting multi-level offtake for Tallowa Dam (Sydney Catchment Authority).  
Member of the Independent Technical Expert Panel for the Eildon Dam Upgrading in Victoria for Goulburn-Murray Water.  
Currently the design director for the Wivenhoe Dam Alliance carrying out the flood capacity upgrading for Wivenhoe Dam in Queensland – included directing major computational fluid dynamics modelling investigations of existing spillway
- 2003 Carried out options study for environmental upgrading works at Keepit Dam (selective withdrawal facility, additional outlet works and fish passage)  
Carried out assessment of spillway capacity for Hume Dam using computational fluid dynamics modelling (by a sub-consultant)  
Carried out detail design for anchoring Bellfield Dam (Victoria) Intake Tower  
Carried out detailed finite element analysis of Keepit Dam radial gates
- 2002 Carried out review of large farm dam with seepage problems. Directed computational fluid dynamics modelling of drum gate and radial gates at Warragamba Dam together with structural analysis of gates (modelling carried out by sub-consultant) to ensure gates can handle more



rigorous operating conditions

Adviser to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) on civil engineering matters related to the replacement reactor project at Lucas Heights

Expert reviewer for Goulburn-Murray Water for remedial works at Cairn Curran Dam in Victoria

Project Director for Lerderderg Weir safety review and risk assessment for Southern Rural Water (Victoria). Carried out finite element analysis of radial gate

2001

Project Director for design of further remedial works at Hume Dam.

Technical director on behalf of NPWS for quantitative risk assessment for Snowy Mountains roads

Chairman of the committee producing a geotechnical response plan for the Alpine Way in the

Snowy Region for NPWS

Carried out non-linear finite element analysis (earthquake loading) for outlet tower at Bellfield Dam for Wimmera-Mallee Water (Victoria)

Joined the MDBC's Fish Passage Reference Group and reviewed fishway designs

Consultant to DLWC for their portfolio risk assessment of thirty dams

Provided advice on the post tensioning system at Waitakere Dam in New Zealand.

Director of Dam Surveillance Group responsible for the surveillance of DLWC dams and participant of a number of 5 yearly surveillance inspections

Project Director of review of DLWC Intake Towers Earthquake Stability Review

Directed DPWS input into the Earthquake Stability of the structural elements of Yarrawonga Weir as sub-consultant to URS Australia – included detail design of anchoring system for the weir.

Also provided design advice on design of stone columns to provide protection against liquefaction of alluvial foundations.

Member of the expert panel for the risk assessment studies being undertaken for Goulburn-Murray Water

Project Director for safety review and preliminary design of remedial options for Blowering Dam (DLWC)

Acted as reviewer for a number of projects carried out by URS (incl. Cardinia Dam outlet tower, Bellfield Dam embankment/spillway)

Directed functionality study (including business risk assessment) for Yallourn Weir for Southern Rural Water (Victoria)

2000

Project Director for design of further investigations and remedial works at Hume Dam.

Safety reviews for Bamarang and Flat Rock Dams

Director of Dam Surveillance Group responsible for the surveillance of DLWC dams and

participant of a number of 5 yearly surveillance inspections

Project Director for earthquake studies on intake towers and appurtenant works at DLWC dams

Consultant to DLWC to manage their portfolio risk assessment

Project Director for a number of dambreak studies and preparation of dam safety emergency plans

Member of the consulting team carrying out risk assessments for Goulburn-Murray Water (Victoria) for Eppalock Dam

Carried out review of Earthquake Stability Review of the Outlet Tower at Eppalock Dam in Victoria for G-MW.

Reviewed URS Australia designs for Alpine Way remedial works

1999

Project Director of earthquake studies on Wyangala Dam

Project Director for design of further remedial works at Hume Dam. Included design of ground improvement works (stone columns) for protecting alluvial foundations against liquefaction

Peer reviewer of Leslie Dam (Queensland) Safety Report.

Peer reviewer of DLWC's Screening Level Risk Assessment

1998

Project Director for portfolio risk assessment for six dams owned by a Southern Rural Water in Victoria.

Directed structural analysis of spillway gates on Narracan Dam for Southern Rural Water

Project Director for concept design and DD&C contract documentation for Warragamba Dam auxiliary spillway. Dam to be upgraded the dam to cater for increased inflow flood estimates.

Upgrading works estimated to cost \$135M. An auxiliary spillway is to be constructed adjacent to the existing dam - involves excavating some 2,000,000m<sup>3</sup> of rock and constructing concrete lining, training walls, fuse plug embankments, large scale cement stabilised sandstone fill, a multi

span bridge across the spillway, post tensioned ground anchors for dissipator/training walls, modifications of existing spillway gates. Design involved extensive physical hydraulic model testing.

- 1997 Feasibility options study for remediation of Redbank Ck. Dam near Mudgee (NSW) Karapiro Dam, New Zealand - Part of international consulting team reviewing this concrete arch dam's security and determining appropriate remedial options (mass concrete buttressing). Director of risk assessment studies for Tenterfield Dam
- 1993-1997 Hume Dam Investigations - Project Manager of Investigation and Design Studies for the embankments at the dam. Work involves:
- review of the stability of the embankments under static and earthquake loadings
  - investigation of liquefaction
  - potential of embankments' foundations
  - development of stabilising options
  - development of options to provide increased flood security including provision of new auxiliary spillways and modifications to existing works
- detail design and documentation of stabilising works for the embankments including a key trench into the dam's foundations, stabilising berms, slurry wall cut-offs, drainage/filter curtains and strengthening of critical gravity training walls with both horizontal and vertical post tensioning.
- part of advisory and review team for the risk assessment of the dam and its components.
- 1990-1996 Warragamba Dam Upgrading for Sydney Water Corporation - Project Manager of Investigation Concept Design Studies for upgrading the dam to cater for increased inflow flood estimates and provide substantial flood mitigation. Upgrading works estimated to cost \$280M. The existing dam was to be strengthened with mass concrete buttressing - some 600,000m<sup>3</sup>.
- 1996 Project Director for Safety Review (including Finite Element Analysis) of Wellington Dam
- 1993-1996 Hume Dam Gates for Department of Water Resources - Project Manager for the design of new maintenance baulks and emergency closure gates. Involves development of proposals for underwater installation.
- 1995 Redbank Creek Dam and Lithgow No. 2 Dam for NSW Public Works Dams Surveillance - Project Manager for safety reviews and finite element analysis of two 15m high arch dams. Clarrie Hall Dam for NSW Public Works Dams Surveillance - Project Manager for dambreak studies.
- 1994 Burrinjuck Dam Gates for NSW Department of Water Resources - Project Manager for the design of new control and emergency closure gates. Involves underwater installation. Karangi Dam for Coffs Harbour City Water Project - Project Manager for dambreak studies.
- 1993 Mardl Dam for Wyong Council - Project Manager for safety review of earth embankment.
- 1988-1990 Nepean Dam Remedial Works for Sydney Water Corporation - Project Manager for investigation studies, design development and detail design. Work involved:
- Initial flood security studies and development of options
  - co-ordination of hydraulic model studies
  - detail design and contract documentation for modified spillway, large size post-tensioned ground anchors and rockfill buttressing.
- 1987-1989 Boggabilla Weir for NSW Department of Water Resources - Project Manager for detail design and contract documentation of a large gated re-regulation weir with fishway. Involved liaison with fisheries expert in developing optimum geometry for fish ladder.

Chaffey Dam for NSW Department of Water Resources - Project Manager for upgrading of dam.  
Work involved:

- development of options and preliminary design
- finite element analyses for raised morning glory spillway
- stability analyses for raised earth/rockfill embankment
- co-ordination of hydraulic model studies for raised spillway.

**1969-1987:** *Water Resources Commission of NSW (WRC) (now Department of Land and Water Conservation).*

**1986-1987** Flood Security studies for WRC - Project Design Engineer for investigation into flood security of Chaffey and Glennies Creek Dams. Involved co-ordinating dambreak studies, development of remedial options, economic risk studies.

1985-1987

Hume Dam Strengthening for WRC - Project Design Engineer for detail design and contract documentation. Work included:

- design of large size post-tensioned ground anchors including development of appropriate grouting procedures
- design of structural modifications to the concrete gravity dam
- design of a new road bridge over the dam.
- establishing the rationale for replacing the existing post tensioning system

#### Contact



TRIM reference: D/11/

Enquiry received:

Purpose: Wivenhoe Dam release

***Impacts of Wivenhoe and Somerset dams***

- Wivenhoe and Somerset dams reduced the flood peak by 2.5 metres in the City and 5.5 metres at Moggill.
- Without the dams, up to 13,000 more houses would have been flooded. They prevented up to \$1.6 billion of damages.
- Without the dams, major flooding would have lasted for three days.
- Wivenhoe and Somerset dams controlled 2.6 million megalitres of floodwater. This is 1.1 million megalitres more than in 1974.
- The dams controlled these floodwaters, providing time for peak flows from the Lockyer and Bremer to pass.
- Total flow in the Brisbane River in 1974 was 9,500 cubic metres per second. The estimated flow from this event would have been 13,000 cubic metres per second if Wivenhoe did not exist.

***Operation of Wivenhoe and Somerset dams***

- The dams were operated strictly in accordance with the approved Operational Procedures.
- The Operational Procedures were developed by Australia's best hydrologists, including:
  - Professor Colin Apelt, Head of Department, Department of Civil Engineering, University of Queensland
  - Mr Eric Lesleighter, Principal Hydraulic Engineer and Chief Engineer Water Resources, Snowy Mountains Engineering Corporation.
- Professor Apelt is Chair of the Brisbane City Council flood taskforce.

***Flood report***

- There is a regulatory requirement that Seqwater prepare a flood report.
- By regulation, the report will be submitted within six weeks of the gates closing.

- The report will be a comprehensive summary of all procedures, actions, outcomes and processes during the event. It will consider factors impacting on the protection of urban areas.
- The report will be reviewed by the Dam Safety Regulator and independent experts.
- The report and its review will be submitted to the Government and inform a review of the Operational Procedures.
- The review of Operational Procedures will utilise an expert panel, including representatives of the Bureau of Meteorology and Councils.

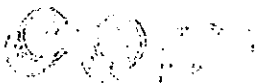
***Rainfall forecasts***

- Dam operations were based on forecasts provided by the Bureau of Meteorology.
- The rainfall during the event exceeded all forecasts.
- Rainfall was local and intense, as demonstrated by the tragic events in Toowoomba.



Hon Stephen Robertson MP  
Member for Stretton

"SR 13"



QWC-5



Queensland  
Government

Minister for Natural Resources,  
Mines and Energy and  
Minister for Trade

20 JAN 2011

Ref CTS 00433/11

Mr Phil Hennessy  
Chair  
Seqwater  
PO Box 16146  
City East QLD 4002

CC: Mr Peter Borrows  
Chief Executive Officer  
Seqwater  
PO Box 16146  
CITY EAST QLD 4002

CC: Ms Mary Boydell  
Commissioner  
Queensland Water Commission  
PO Box 15087  
CITY EAST QLD 4002

CC: Mr Gary Humphrys  
Chair  
SEQ Water Grid Manager  
PO Box 16205  
CITY EAST QLD 4002

Dear Mr Hennessy

You will be aware that the Premier recently announced a Commission of Inquiry into Queensland Floods which will consider among other things, compliance with, and the suitability of the operational procedures relating to flood mitigation and dam safety.

The Commission is required to deliver an interim report by 1 August 2011 (on matters associated with flood preparedness to enable early recommendations to be implemented before next summer's wet season); and its final report by 17 January 2012.

However, I am also aware that Seqwater is currently managing the releases from the flood compartment of Wivenhoe and Somerset Dams in South East Queensland, in the context of the company's current Flood Mitigation Manual for those dams. There are three matters I wish to raise with you in this letter:

(1) I note that under the Flood Mitigation Manual for Wivenhoe and Somerset Dams, Seqwater is required to prepare a report on the recent flood event (see clauses 2.9 and 7.4 of the Manual). It is essential that a report (covering the requirements of both clauses 2.9 and 7.4 of the Manual) to the Department of Environment and Resource Management (DERM) is completed within the required timeframe of six weeks from the date of the incident. However in view of the fact that we remain in the middle of the wet season and further significant inflows are possible, I would urge you to complete this review, which should include consideration of the appropriate Full Supply Levels, as a matter of priority and urgency.

Any other changes you propose to the Flood Mitigation Manual, or related matters, eg improved data collection, should be clearly identified in the Review report, along with a timetable to implement them.

Level 17  
61 Mary Street Brisbane Qld 4000  
PO Box 15216 City East  
Queensland 4002 Australia  
Telephone +61 7 3225 1861  
Facsimile +61 7 3225 1828  
Email nrmet@ministerial.qld.gov.au

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(2) Furthermore, while this review of factors relevant to the operating release strategy and the Full Supply Levels is underway, I would request that you develop a contingency protocol which would ensure that if rainfall, that is likely to result in a flood release from Wivenhoe Dam, is forecast for the catchment then Seqwater will immediately convene a discussion with the Chief Executive Officer of DERM, his dam safety regulatory staff, and other appropriate parties.

(3) I note that the recent preliminary report by Mr Cooper identified a number of improvements that Seqwater could implement to achieve a better outcome in the application of the Draft Communication Protocol between government agencies and local governments. I request that you contact Mr Bob Reilly, General Manager, Office of the Water Regulator of the department on [REDACTED] to progress these as a matter of urgency.

I have also written to the Chair of the Water Grid Manager and the Water Commissioner requesting all necessary assistance be afforded to SEQ Water to ensure the matters raised in this letter are responded to as a matter of priority and with urgency.

Should you have any further enquiries, please do not hesitate to contact Mr John Bradley, Chief Executive of the Department, on [REDACTED]

Yours sincerely



STEPHEN ROBERTSON MP





Hon Stephen Robertson MP  
Member for Stretton

"SR14"  
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COPY



Queensland  
Government

QWC-5

20 JAN 2011

Minister for Natural Resources,  
Minas and Energy and  
Minister for Trade

RECEIVED  
21 JANUARY 2011

Ms Mary Boydell  
Commissioner  
Queensland Water Commission  
PO Box 15087  
CITY EAST QLD 4002

CC: Ms Karen Waldman  
Chief Executive Officer  
Queensland Water Commission  
PO Box 15087  
CITY EAST QLD 4002

Dear Ms Boydell

Please find attached correspondence to Mr Phil Hennessey, Chair, SEQ Water.

I would appreciate you providing all necessary assistance to SEQ Water to ensure that the requests in the attached correspondence can be responded to as a matter of priority and with urgency.

Should you have any further enquiries, please do not hesitate to contact Lance McCallum, Principal Advisor, on telephone [REDACTED]

Yours Sincerely

STEPHEN ROBERTSON MP

" SR 15 "



Securing our water, together.

Our ref: ME/11/0017

25 January 2011

The Honourable Stephen Robertson MP  
Minister for Natural Resources, Mines and Energy and  
Minister for Trade  
PO Box 15215  
City East QLD 4002

Dear Minister Robertson

Thank you for your letter of 21 January 2011 requesting that the Queensland Water Commission (QWC) provide assistance to Seqwater to ensure that your requests to Mr Phil Hennessy, Chair, Seqwater as raised in your letter of 20 January 2011 are able to be responded to as a matter of priority and with urgency.

Please be assured that QWC will support this work with the priority and urgency required.

QWC is liaising with Seqwater and undertaking preliminary work to support the matters you have raised with Seqwater. We will be in a position to provide advice as and when required by you and/or Seqwater.

If you require any further information, please do not hesitate to contact Karen Waldman on [REDACTED]

Yours Sincerely

[REDACTED]

Mary Boydell  
Commissioner

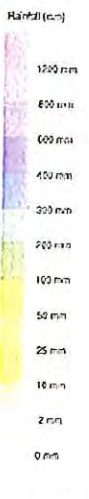
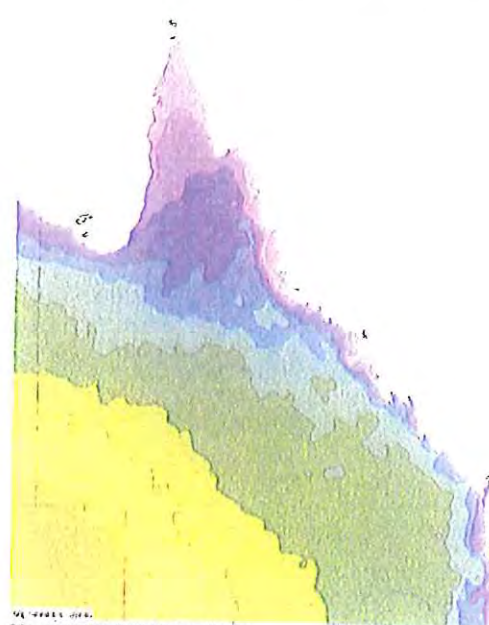
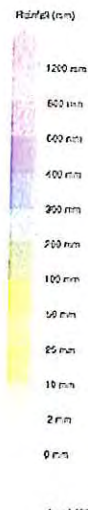
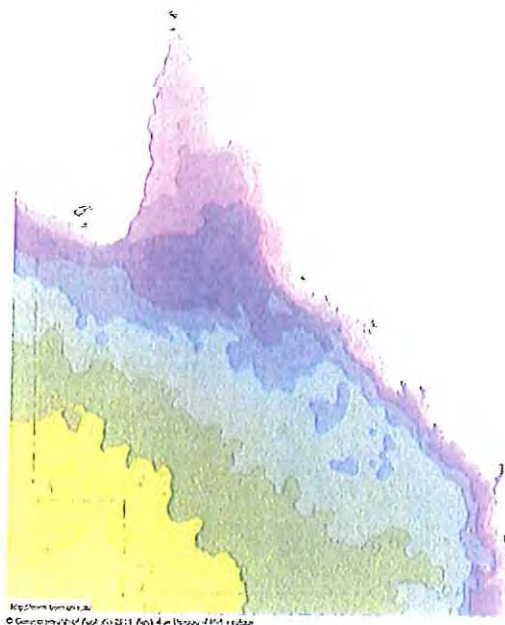
" SR 16 "

# Bureau of Meteorology

## Probable rainfall through to April (as of 12/02/11)

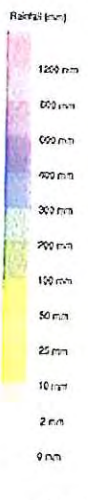
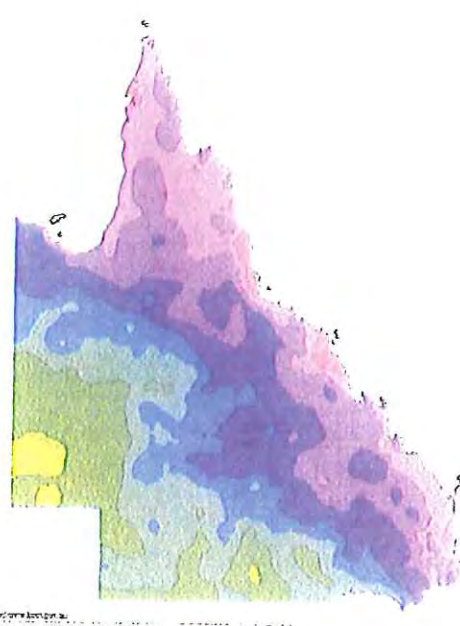
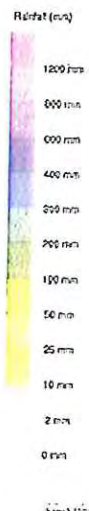
25 per cent chance of exceeding

50 per cent chance of exceeding



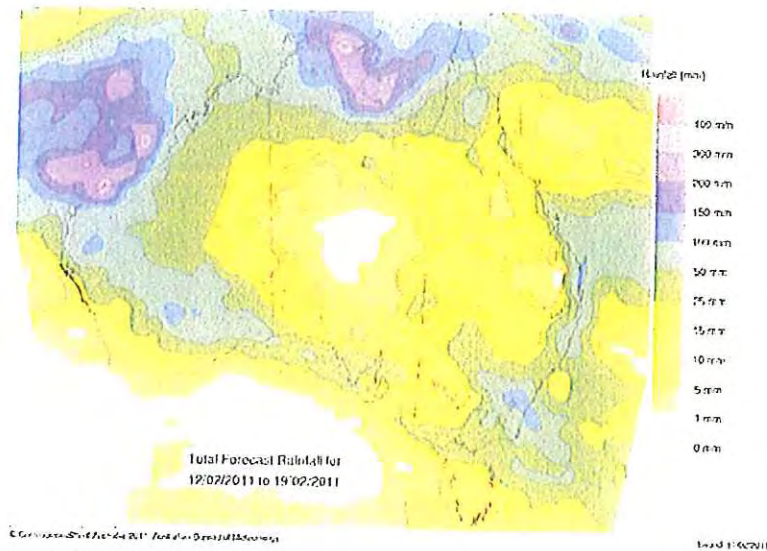
75 per cent chance of exceeding

Rainfall last 3 months

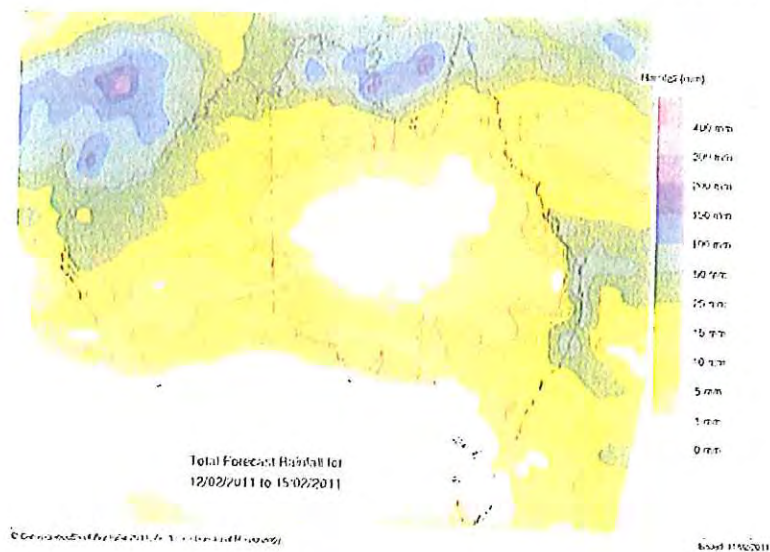




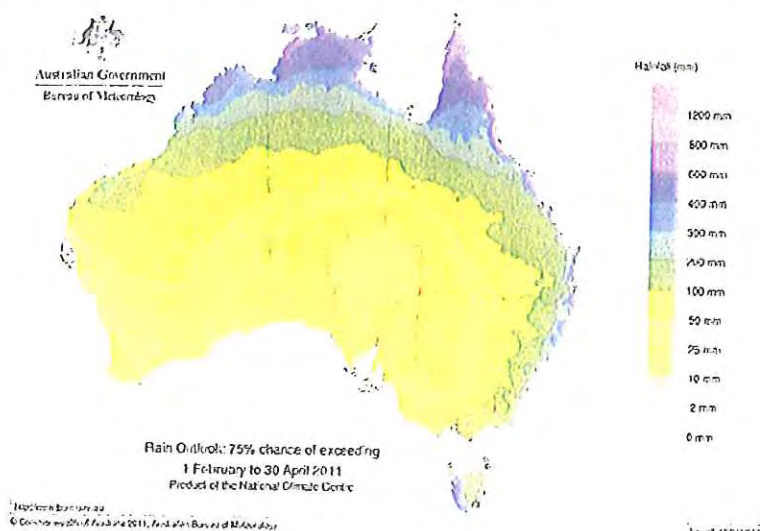
## TODAY'S 8 DAY FORECAST (AS AT 12/2/11)



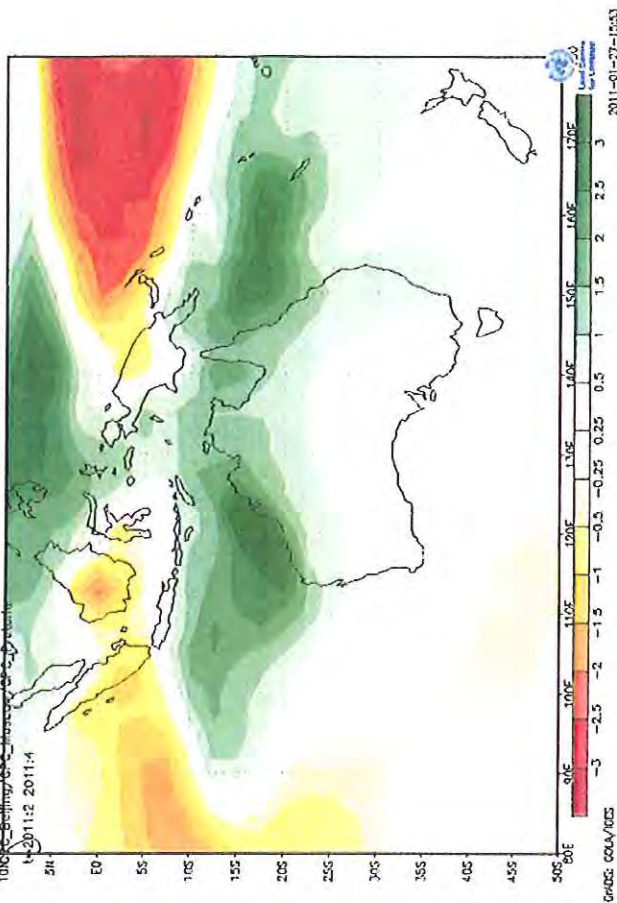
## TODAY'S 3 DAY FORECAST (AS AT 12/2/11)



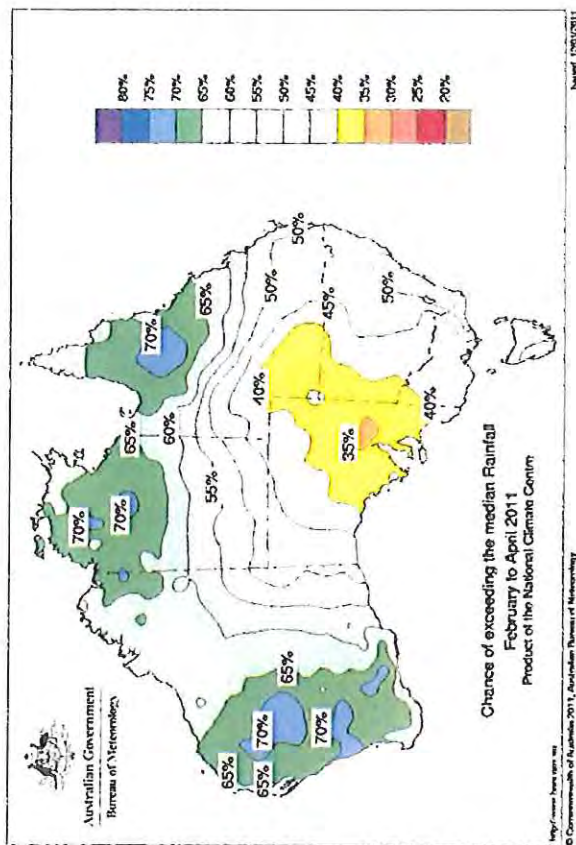
## RAINFALL OUTLOOK FEBRUARY-APRIL



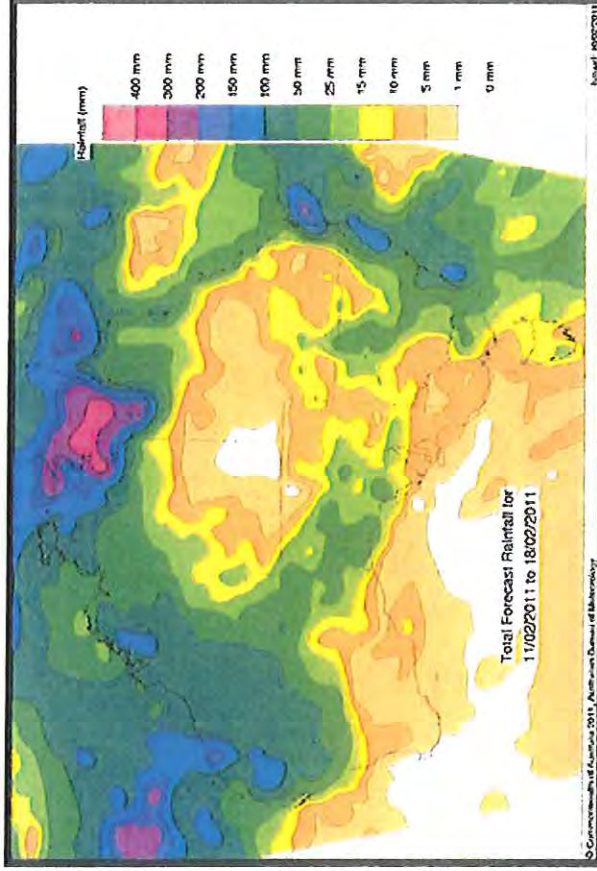
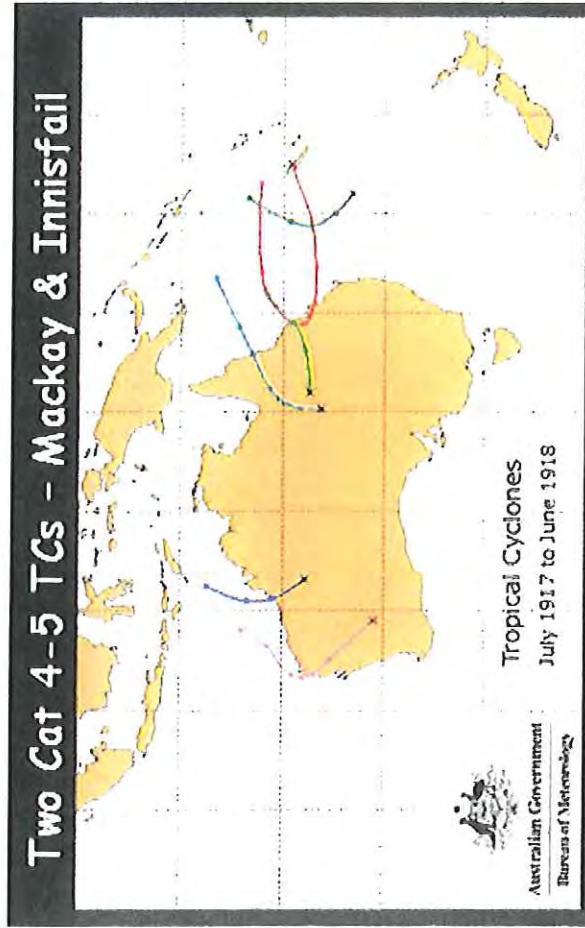
from a combination of 12 leading global climate models



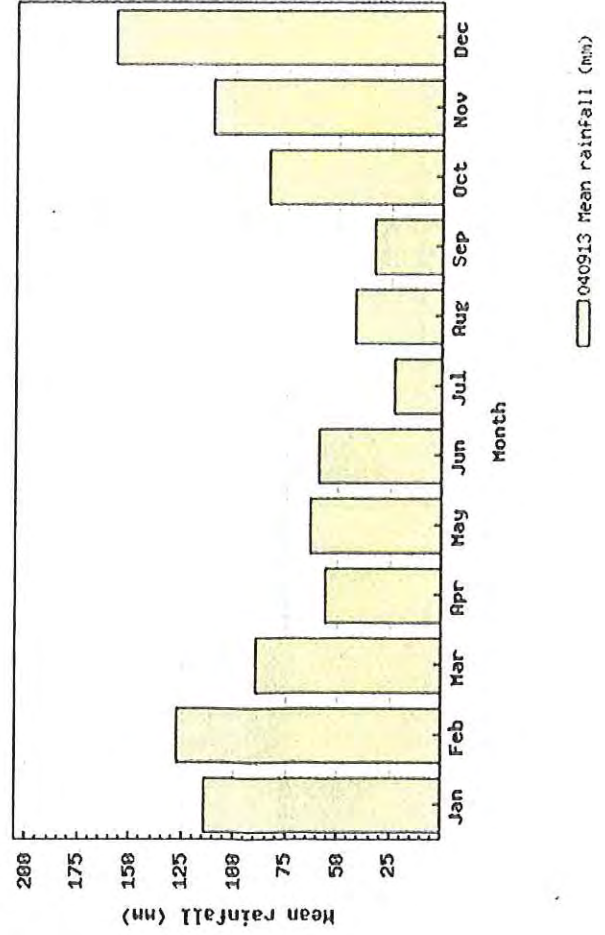
## Bureau Rainfall Outlook for the 3 months February-April 2011







Location: 040913 BRISBANE



1. Clear signs that La Nina has passed its peak
2. 2<sup>nd</sup> strongest La Nina on record after 1917-18
3. MJO/Monsoonal signal is relatively weak
4. Sometimes La Ninas weaken quickly in Autumn
5. On average SEQ has much less rainfall from March onwards than during the Summer months
6. Potential for a significant rain event over SEQ from next Monday onwards

~ SR 17 ~

7 February 2011



Mr John Bradley  
Director General  
Department of Environment and Resource Management  
Level 13  
400 George Street  
BRISBANE QLD 4000

Dear John,

**Impact of Reducing the Full Supply Level of Wivenhoe Dam on Flood Discharges**

I refer to correspondence from The Honourable Stephen Robertson MP, Minister for Natural Resources, Mines and Energy, and Minister for Trade, dated 20 January 2011. I confirm that, as requested, Seqwater has undertaken further simulation modelling to assist DERM in its consideration of the appropriate Full Supply Level (*FSL*) for Wivenhoe Dam. The purpose of the modelling is to provide information to assist DERM in formulating a policy position by providing an indicative assessment of a range of FSLs and pre-release strategies to pre-emptively reduce the FSL of Wivenhoe Dam.

I enclose a memorandum *Impact of Reducing the Full Supply Level of Wivenhoe Dam on Flood Discharges*, which provides a summary of Seqwater's preliminary assessment into the impact of reducing the initial storage level of Wivenhoe Dam on the downstream discharges for major flood events. A number of scenarios are presented in the memorandum for consideration by DERM in determining, from a policy perspective, whether the FSLs for Wivenhoe Dam should be changed.

The scenarios presented in the memorandum provide an approximate analysis to help inform discussion and for further consideration by DERM. The review is intended only to provide an order of magnitude assessment of impacts and the results should not be utilised beyond that purpose. More accurate estimates would require a detailed investigation and analysis of the entire river system utilising multiple flood events and a combination of hydrologic, hydraulic, and routing models.

The analysis is based upon computer modelling of simulated gate opening sequences specified in the Flood Mitigation Manual during a "loss of communications" scenario. For the reasons noted in section 2 of the enclosed memorandum, while this scenario provides a consistent means of comparing the efficacy of different mitigation options, the actual degree of flood reduction achievable is dependent on the characteristics of the specific event. The model utilised adopts flood inflows that have been derived from an analysis of past historic events, in combination with design hydrographs developed previously for design and planning purposes by the Wivenhoe Alliance (2005).

The applicable assumptions for the modelled options, presented in section 2 of the memorandum, apply equally to the scenario set out in the correspondence from Seqwater's Chairman, Phil Hennessy, to Minister Robertson, dated 4 February 2011.

Yours sincerely,

**Peter Borrows**  
Chief Executive Officer

Encl.





## Impact of Reducing the Full Supply Level of Wivenhoe Dam on Flood Discharges



## 1 Introduction

This memo provides a summary of a preliminary assessment into the impact of reducing the initial storage level of Wivenhoe Dam on the downstream discharges for major flood events. Information is provided on the impacts of reducing the Wivenhoe Dam initial storage level to 95%, 90%, 85%, 75% and 50% of the normal full supply level (EL67.0M AHD).

## 2 Assumptions and Caveats

The analysis was undertaken using a computer model to simulate the gate opening sequence as provided in the Flood Manual during a "loss of communications" situation. During a loss of communications between the dam operators and the Flood Control Centre, operators would use predefined gate openings based solely on the Lake Level information available to them at the dams. It should be noted that in practice gate operations would normally seek to take advantage of additional information related to rainfall forecasts and tributary flows to ensure that flood peaks are reduced as far as possible without causing coincident flooding with downstream tributaries. Thus, while using the "loss of communications" flood operation rules provides a consistent means of comparing the efficacy of different mitigation options, the actual degree of flood reduction achievable is dependent on the characteristics of the specific event.

Flood inflows to the model were derived from an analysis of past historic events (1974, 1999, and 2011), in combination with "design hydrographs" developed previously for design and planning purposes (Wivenhoe Alliance, 2005<sup>1</sup>). These "design hydrographs" are obtained from models of both the rainfall and flood generation process, whereby floods of a given magnitude are assigned a specified probability of exceedance (eg a "1 in 200" event).

It should be stressed that the information presented here is based on approximate analyses to help inform discussion. More accurate estimates would require a detailed investigation and analysis of the whole river system utilising multiple flood events and a combination of hydrologic, hydraulic, and routing models. This review should thus be seen as providing an order of magnitude assessment of impacts and the results should not be utilised beyond that purpose.

---

<sup>1</sup> Wivenhoe Alliance, "Design Discharges and Downstream Impacts of the Wivenhoe Dam Upgrade, Q1091, September 2005

### 3 Options Considered

Five options are explored in this paper, as summarised in the following table:

There are five options considered going forward.

Option	Description	Comments
0 "Do nothing"	Continue with the current approved flood operation rules – that is, maintain the status quo and continue to utilise the dam as originally designed.	This option has utilised the existing strategies that have been implemented and refined over several flood events and the manual was developed by a comprehensive study.
1 "Early release"	Change the flood operating rules to ignore the early strategies designed to minimise disruption to the rural communities	Increase the release from the dam up to 1600 m <sup>3</sup> /s as soon as practicable after gate operations commence; it is assumed that no attempt would be made to maintain bridge access downstream of the dam other than Mt Crosby Weir Bridge and the Brisbane Valley Highway Bridge.
2 "Pre-release"	Implementing a significant release of water once the notification of a major rainfall event has been received.	The reliability of forecasts by the Bureau of Meteorology are such that they do not allow the reservoir to be drawn down in a timely manner without potentially causing appreciable "artificial" flooding downstream.
3 "75% FSL"	Lower the storage level in Wivenhoe Dam to 75% of the current full supply level, and operate the dam under the current operating rules.	To safely lower the storage it is proposed that this option would be implemented by "Sunny Day" releases at a rate low enough to minimise disruption to the rural areas. This would be difficult to implement during a wet year where the risk of major flooding is greater. Once the storage level reached EL67 gate operations would commence as per the current flood manual.
4 "85% FSL amended"	Lower the storage level in Wivenhoe Dam to 85% of the current full supply level and amend the current flood manual to commence releases once the storage level exceeds EL65.25	The amended flood operating rules would retain the key level in the manual of EL74m, where the gates are opened until the flood level stops rising. This would require a change by the Queensland Government to the regulatory requirements and levels of service that the storage is operated under.
5 "75% FSL amended"	Lower the storage level in Wivenhoe Dam to 75% of the current full supply level and amend the current flood manual to commence releases once the storage level exceeds EL64.00	Same comment as for Option 4.

## 4 Results

The results of this analysis is summarised in Table 1 and Table 2.

Flood Event		Option 0 - Existing Rules			Option 1			Option 4			Option 5		
Event description	Maximum Inflow (m <sup>3</sup> /s)	Flood Volume (ML)	Maximum Outflow (m <sup>3</sup> /s)	Maximum Lake Level (m AHD)	Maximum Outflow (m <sup>3</sup> /s)	Maximum Lake Level (m AHD)	Flow Reduction %	Maximum Outflow (m <sup>3</sup> /s)	Maximum Lake Level (m AHD)	Flow Reduction %	Maximum Outflow (m <sup>3</sup> /s)	Maximum Lake Level (m AHD)	Flow Reduction %
36 hour 1 in 200 design*	8,214	1,544,119	3,861	71.43	3,613	71.27	6%	2,639	70.66	32%	1,971	70.24	49%
36 hours 1 in 500 design	10,455	1,624,119	5,125	72.22	4,915	72.09	4%	4,028	71.53	21%	3,446	71.17	33%
36 hours 1 in 1000 design	12,031	1,772,752	6,049	72.8	5,854	72.68	3%	5,031	72.16	17%	4,504	71.83	26%
48 hours 1 in 5000 design	14,278	2,562,553	9,083	74.71	8,994	74.66	1%	8,535	74.37	6%	8,217	74.17	10%
72 hours 1 in 5000 design	13,181	2,880,602	8,204	74.16	8,101	74.1	1%	7,821	73.92	5%	7,609	73.79	7%
96 hours 1 in 5000 design	11,870	2,948,032	7,550	73.75	7,426	73.67	2%	7,135	73.49	5%	6,916	73.35	8%
120 hours 1 in 5000 design	12,727	3,005,136	7,265	73.57	6,986	73.39	4%	6,751	73.25	7%	6,635	73.17	9%
January 2011 historic	10,470	2,650,000	7,528	74.98	7,452	74.95	1%	5,746	74.62	24%	4,512	74.25	40%
1974 historic	5,953	1,410,000	3,275	73.31	3,159	73.26	4%	2,737	72.91	16%	2,493	72.71	24%
1999 historic	6,358	1,220,000	2,312	72.23	2,251	72.504	3%	1,814	71.89	22%	1,561	71.48	32%

Table 1 – Option Results

\* Design events taken from the Wivenhoe Alliance (2005)

Flood Event			Option 0 - Existing Rules (Storage Level 100%)		Storage Level 95%		Storage Level 90%		Storage Level 85%		Storage Level 75% (Option 3)		Storage Level 50%	
Event description	Maximum Inflow (m <sup>3</sup> /s)	Flood Volume (ML)	Maximum Outflow (m <sup>3</sup> /s)	Maximum Lake Level (m AHD)	Maximum Outflow (m <sup>3</sup> /s)	Flow Reduction %	Maximum Outflow (m <sup>3</sup> /s)	Flow Reduction %	Maximum Outflow (m <sup>3</sup> /s)	Flow Reduction %	Maximum Outflow (m <sup>3</sup> /s)	Flow Reduction %	Maximum Outflow (m <sup>3</sup> /s)	Flow Reduction %
36 hour 1 in 200 design*	8,214	1,544,119	3,861	71.43	3,579	7%	3,237	16%	2,965	23%	2,356	39%	1,134	71%
36 hours 1 in 500 design	10,455	1,624,119	5,125	72.22	4,863	5%	4,531	12%	4,271	17%	3,693	28%	2,213	57%
36 hours 1 in 1000 design	12,031	1,772,752	6,049	72.8	5,795	4%	5,478	9%	5,235	13%	4,705	22%	3,329	45%
48 hours 1 in 5000 design	14,278	2,562,553	9,083	74.71	8,949	1%	8,779	3%	8,645	5%	8,339	8%	7,397	19%
72 hours 1 in 5000 design	13,181	2,880,602	8,204	74.16	8,111	1%	7,995	3%	7,902	4%	7,689	6%	7,071	14%
96 hours 1 in 5000 design	11,870	2,948,032	7,550	73.75	7,447	1%	7,325	3%	7,233	4%	7,017	7%	6,404	15%
120 hours 1 in 5000 design	12,727	3,005,136	7,265	73.57	7,098	2%	6,911	5%	6,829	6%	6,702	8%	6,360	12%
January 2011 historic	10,470	2,650,000	7,528	74.98	7,453	1%	6,756	10%	5,876	22%	5,748	24%	4,209	44%
1974 historic	5,953	1,410,000	3,275	73.31	3,153	4%	2,974	9%	2,810	14%	2,618	20%	2,067	37%
1999 historic	6,358	1,220,000	2,312	72.23	2,132	8%	2,003	13%	1,920	17%	1,687	27%	1,007	56%

Table 2 – Routing Results for Storage Levels using the current Flood Manual Rules

## 5 Conclusions

Reductions in outflow flood can be achieved by the adoption of different storage levels and release strategies. However, due to the large volumes of water associated with major flood events, it is necessary to consider large changes to the full supply level to achieve appreciable reductions in flood magnitude. The impact of different initial storage levels reduces as the magnitude of the event increases.

"SR18"

10 February 2011



Mr John Bradley  
Director-General  
Department of Environment and Resource Management  
Level 13, 400 George Street  
BRISBANE QLD 4000

Dear John,

Further to our Chairman's letter to the Honourable Stephen Robertson MP, Minister for Natural Resources, Mines and Energy, and Minister for Trade, of 4 February 2011, I advise that the SEQ Water Grid Manager informed Seqwater by the attached letter, received yesterday, 9 February 2011, that it has no objection, from a water security perspective, to Wivenhoe Dam being drawn down to 75% of its Full Supply Level (*FSL*) and that such a draw down, if temporary, would be unlikely to impact its obligations.

You will recall that, pursuant to Minister Robertson's earlier request, Seqwater undertook modelling of various potential flood events (which included approximately 90 permutations in respect of 3 previous flood events and 6 design flood events) and confirmed to you that a reduction in Wivenhoe Dam's storage level to 75% of its FSL will provide appreciable flood mitigation benefits. Reducing storage to this level will effectively increase the capability of the dam to further mitigate flood events (depending on rainfall conditions downstream of the dam).

By way of example, the simulation modelling undertaken by Seqwater, which was peer reviewed by independent experts and submitted to you with Seqwater's letter dated 7 February 2011, demonstrated, subject to the qualifications referred to in that letter, that the reduction in storage level of the Wivenhoe Dam to 75% of its FSL achieved (approximately):

- (a) a flow reduction from 3900 cumecs to 2400 cumecs (being a 39% reduction) in the case of a 36 hour 1 in 200 design flood event; and
- (b) a flow reduction from 5100 cumecs to 3700 cumecs (being a 28% reduction) in the case of a 36 hour 1 in 500 design flood event.

Seqwater notes the extreme January 2011 flood event resulted in 2,650,000 ML of flood water passing through Somerset and Wivenhoe Dams, which was 1,240,000 ML more than the 1974 floods.

In light of the SEQ Water Grid Manager's abovementioned advice to Seqwater, the extreme nature of the January 2011 event and the abovementioned modelling results, Seqwater recommends that Wivenhoe Dam's storage level be temporarily reduced to 75% of its FSL in order to temporarily increase its flood mitigation capacity. Should the State agree with this recommendation, Seqwater will then confer with your Departmental officers to explore the various options by which this outcome can most promptly be achieved.

I look forward to receiving your response.

Yours sincerely,

Peter Borrows  
Chief Executive Officer

Attach.





11 FEB 2011

Department of  
Environment and Resource  
Management

Mr Peter Borrows  
Chief Executive Officer  
Queensland Bulk Water Supply Authority  
PO Box 16146  
CITY EAST QLD 4002

Dear Mr. Borrows

Thank you for your letter of 10 February 2011, in which you provided further advice regarding Seqwater's consideration of potential reductions in the Full Supply Level of Wivenhoe Dam.

Since receiving this correspondence on Thursday evening, we have held a number of discussions directly and with our officers to facilitate the early implementation of Seqwater's recommendation to reduce the storage level of Wivenhoe Dam to 75% of its Full Supply Level in order to temporarily increase its flood mitigation capacity.

It was also useful to receive the briefing yesterday afternoon on the outlook for the current wet season, with particular reference to South East Queensland, by the Queensland Regional Director of the Bureau of Meteorology, Mr Jim Davidson. We have discussed the immediate and 3 month weather outlook further today.

In our discussions today, you have indicated that the earliest timeframe by which Seqwater would seek to implement the reduction in the storage level of the dam would be late in the coming week, recognising the need to consider rainfall conditions and notification timeframes before such a release. You have indicated Seqwater remains confident in its ability to operationally respond to rainfall in the Bureau's current 8-day forecast within the provisions of the current Flood Mitigation Manual.

We have agreed to implement the recommendations of Seqwater in the following manner –

- I intend to propose an amendment to the Moreton Resource Operating Plan (ROP) for the consideration of Governor in Council. I am currently investigating the earliest possible date for such consideration but anticipate it will be no later than Thursday 17 February 2011.
- This ROP amendment would permit the subsequent submission by Seqwater to me of an Interim Program, for operations consistent with the recommendations of your letter of 10 February 2011. This Interim Program should be received immediately after the formal amendment of the ROP.
- I would then consider the interim program and respond directly.
- The State is currently considering the request for a Deed of Indemnity for the Corporation, its Board and officers, recognising that such releases below 100% Full Supply Level will occur outside the current provisions of the Flood Mitigation Manual

and the ROP. If granted, such an indemnity would be expected to be required for a limited duration until Seqwater arranges appropriate insurance relevant to the proposed new operating mode.

- Seqwater would then commence its recommended releases in accordance with the approved Interim Program.

Should you have any enquiries concerning the information in this letter, please do not hesitate to contact me on [REDACTED]

Yours sincerely

[REDACTED]

John Bradley  
Director General



"SR 20"



Queensland  
Government

Ref CTS 02576/11

Department of  
Environment and Resource  
Management

Mr Peter Borrows  
Chief Executive Officer  
Seqwater  
PO Box 16146  
CITY EAST QLD 4002

*Peter*  
Dear Mr Borrows

Thank you for submitting a revised interim program under section 13(6A) of the Moreton Resource Operations Plan (the ROP) outlining a proposal to make releases from Wivenhoe Dam (the dam) to maintain a 75% full supply level for the remainder of the 2011 summer season (between 20 February 2011 and 31 March 2011).

I advise that I have approved the submitted program under Section 13 (7) (a) of the ROP. I acknowledge that Seqwater will put suitable communications arrangements in place prior to and during the period when releases are being made under the interim program. I also note that the releases will be monitored and managed by Seqwater through suitably qualified personnel.

I also remind you that releases made under the interim program must be in accordance with other provisions of the Moreton ROP, including section 74, which states that the rate of release of water from the dam must occur to minimise the occurrence of adverse environmental impacts, such as bank slumping.

Should you have any further enquiries, please do not hesitate to contact me on telephone [REDACTED]

Yours sincerely

[REDACTED]  
John Bradley  
Director-General

Level 13  
400 George Street Brisbane Qld 4000  
GPO Box 2454 Brisbane  
Queensland 4001 Australia  
Telephone + 61 7 3330 6301  
Facsimile + 61 7 3330 6306  
Website [www.derm.qld.gov.au](http://www.derm.qld.gov.au)  
ABN 46 640 294 485

"SR21"



30 March 2011

Mr John Bradley  
Director-General  
Department of Environment & Resource Management  
Level 13  
400 George Street  
Brisbane QLD 4000

Dear John,

**Wivenhoe Dam - Interim Supply Security Level**

Seqwater's approved interim program under the Moreton Resource Operations Plan obliges Seqwater to maintain the water storage level in Wivenhoe Dam at the Interim Supply Security Level (which is 75% of Full Supply Level) until 31 March 2011.

In view of the impending expiry of this part of Seqwater's interim program, Seqwater has recently sought advice from the Queensland Water Commission and the Water Grid Manager as to whether either agency has any objection from a water supply security perspective to an extension of the above temporary arrangements to 30 June 2011.

The advice received from the Queensland Water Commission and the Water Grid Manager (copies attached) is qualified in this regard.

Accordingly, Seqwater does not propose to submit a revised interim program.

Yours sincerely,

Peter Borrows  
Chief Executive Officer

*Attach.*



Our ref: ME/11/ 0179

**RECEIVED**

29 MAR 2011

25 MAR 2011

Mr Peter Borrows  
Chief Executive Officer  
Seqwater  
PO Box 16146  
City East QLD 4002

By email to: pborrows@seqwater.com.au

  
Dear Mr Borrows


Thank you for your letter of 22 March 2011 including your request for advice on a proposed extension to the period that Wivenhoe Dam be kept at the Interim Security Supply Level from 1 April 2011 to 30 June 2011.

The Queensland Water Commission has no objection to this proposal as a temporary measure. Our analysis of the total grid capacity shows that the impact on water security by the extension of time is compliant with the South East Queensland System Operating Plan Risk Criteria.

It should be noted that operational and regulatory impacts such as potential increased pumping costs have not been assessed. Advice from the responsible agency or entity would need to also be considered.

If you would like to further discuss these matters or require any information, please contact Mr Tad Bagdon, Acting General Manager, Regional Planning and Policy on [REDACTED]

Yours sincerely

  
Ms Karen Waldman  
Chief Executive Officer




Secure and efficient water  
through partnership and innovation

TRIM ref: D/11/2127

25 March 2011

Mr Peter Borrows  
Chief Executive Officer  
Seqwater  
PO Box 16146  
City East QLD 4002

  
Dear Mr Borrows

**Maintenance of Wivenhoe Dam at 75% full supply level up to 30 June 2011**

I refer to your letter dated 22 March 2011 regarding Seqwater's consideration of extending the period in which Wivenhoe Dam is maintained at 75%, from 31 March 2011 to 30 June 2011.

As requested in your letter, to assist Seqwater in deciding whether it makes a recommendation to the Chief Executive of the Department of Environment and Resource Management, we confirm that temporarily maintaining Wivenhoe Dam at 75% up to 30 June 2011, is unlikely to impact on our ability to manage the Water Grid to achieve the desired levels of service and the System Operating Plan's risk criteria. Please note that this is based on information currently available and may be subject to change.

If you have any questions, please contact me on [REDACTED] or via email at [REDACTED]

Yours sincerely

  
Barry Dennien  
Chief Executive Officer