

**MCCULLOUGH ROBERTSON**  
**(SEQ WATER GRID MANAGER – Barry Dennien**  
**Response to Requirement #1837284**  
**SM #1841728 Index #1841829**  
**Annexure A #1841733& Annexure B #1841737**  
**File 536786/1 Volume 1 of 2 ORIGINAL**

## Second Statement of Barry Dennien

1 February 2012

*In the matter of the Commissions of Inquiry Act 1950, Commissions of  
Inquiry Order (No 1) 2011*

Queensland Floods Commission of Inquiry

Volume 1 of 2

**QFCI**

Date:

8/2/12 <sup>jm</sup>  
1097

Exhibit Number:

**Statement by Barry Kevin Dennien, sworn on 1 February 2012**

I, Barry Kevin Dennien of Level 15, 53 Albert Street, Brisbane, Queensland, the Chief Executive Officer of the South East Queensland Water Grid Manager (**Water Grid Manager**) state the following on oath.

1. In this statement to the Queensland Floods Commission of Inquiry (**Commission**), as required in the letter to me dated 30 January 2012 (**Letter**), I:
  - a. have provided all the information in my possession and identified the source or sources of that information; and
  - b. make commentary and provide opinions I am qualified to give as to the appropriateness of particular actions or decisions on the basis of that commentary or opinion,in relation to the matters outlined in Topics 1 to 6 in the Letter.
2. I provide this statement only in respect of the topics listed in the Letter. I address each of those topics separately below.
3. In this statement, I have also been asked to provide details of various discussions, meetings, briefings and other communications. I have done so to the best of my recollection. Where I do not have an exact or verbatim recollection of the words used in any of the discussions, meetings or briefings, I have recorded my recollection about the effect of those discussions as best I can, where possible indicating who said what in any discussions.
4. I have previously given a statement to the Commission, which was sworn on 5 April 2011 (**First Statement**). That statement annexed a large volume of material. To the extent that any of that material is particularly relevant to the Topics outlined in the

Signed: ..

Barry Kevin Dennien

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Letter, I have, for the Commission's convenience and ease of reference, also annexed them to this statement.

**TOPIC 1: MY UNDERSTANDING, IN THE PERIOD BETWEEN 7 JANUARY 2011 TO 12 JANUARY 2011, OF WHICH FLOOD OPERATIONS STRATEGIES, REFERRED TO IN THE 'MANUAL OF OPERATIONAL PROCEDURES FOR FLOOD MITIGATION AT WIVENHOE DAM AND SOMERSET DAM', WERE USED IN THE OPERATION OF WIVENHOE DAM BETWEEN 7 JANUARY 2011 AND 12 JANUARY 2011 AND THE TIMES AT WHICH EACH STRATEGY WAS IN USE.**

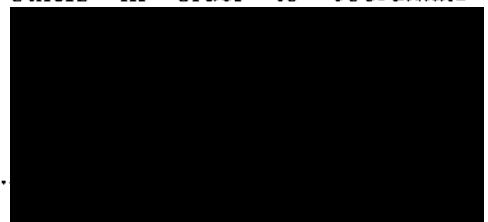
5. Prior to addressing Topic 1, I should state that I was on annual leave from 25 December 2010 until Sunday, 9 January 2011. I returned from annual leave earlier than planned as a result of the January 2011 Flood Event. Mr Daniel Spiller, the Water Grid Manager's Director of Operations was the Acting Chief Executive Officer in my absence. Accordingly, I cannot provide much in the way of direct comment or opinion for 7 January 2011 and 8 January 2011, being the first two days of the period specified in Topic 1.
6. As outlined in my First Statement, the Water Grid Manager is not responsible for dam operations or decisions regarding flood operations strategy.
7. The draft *Protocol for the Communication of Flooding Information for the Brisbane River Catchment – Including Floodwater Releases from Wivenhoe and Somerset Dams (Protocol)*, in operation during the January 2011 Floods, mandated that the Water Grid Manager was the State's leading communication agency in relation to flood water releases. Specifically, the Water Grid Manager was required to centrally track all communications dealing with flood water releases. The Water Grid Manager was also responsible for liaising with Seqwater and others in order to coordinate communications related to flood water releases.

Signed



Barry Kevin Dennien

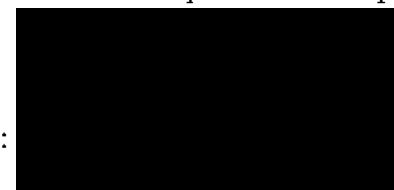
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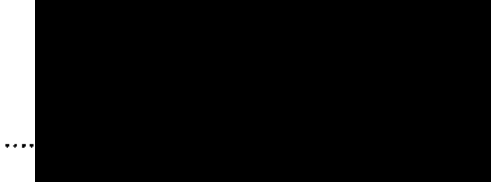
8. Seqwater was required, under the Protocol, to provide technical situation reports (**TSR**) to the Water Grid Manager insofar as any releases were proposed or undertaken. Although a copy of the Protocol was attached to my First Statement, for ease of reference, a further copy of the Protocol is attached as **Annexure A** to this statement.
9. During the period 7 January 2011 to 12 January 2011, Mr Spiller, was responsible for coordinating the communication in accordance with the Protocol.
10. Mr Spiller informs me and I believe that throughout the period 7 January 2011 to 12 January 2011 he received TSRs from the Flood Operations Centre (**FOC**) operated by Seqwater and distributed them in accordance with the Protocol. My understanding is that the distribution of information occurred largely via email.
11. I did not communicate directly with the FOC during the period 7 January 2011 to 12 January 2011. The information I received regarding the flood operations strategy adopted during that period was via the information received and disseminated via both TSRs and occasional FOC situation reports.
12. Before explaining my understanding of the flood operations strategies that were in use at the relevant times, it is important to outline my understanding of how the Manual of Operational Procedures for Flood Mitigation at Wivenhoe and Somerset Dams (**Flood Mitigation Manual**) requires the strategies to be determined.
13. Section 8 of the Flood Mitigation Manual describes how Wivenhoe Dam is to be operated to reduce flooding in the Brisbane River downstream of the dam. In its simplest form the methodology describes a two part process. First, models are used to predict both lake level and river flow rates at Lowood and Moggill gauges that are then compared to pre-set lake trigger levels in order to determine the applicable operating strategy (ranging from W1 to W4). The second part of the process describes the conditions to operate while operating under a particular strategy (primarily maximum

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Barry Kevin Dennien

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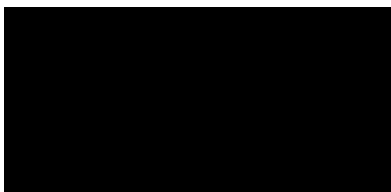


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release rates from the dam and maximum river flows measured at various gauging points). Both the pre-set lake trigger levels and the maximum release rates are designed to optimise the dam's flood operation to a pre determined design flood.

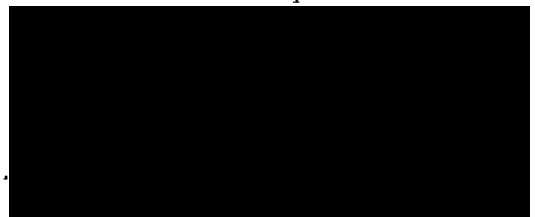
14. To form a considered view on which strategy should be implemented in particular circumstances, it is necessary to have regard to the following information:
  - a. predictions of Wivenhoe and Somerset Lake levels;
  - b. predictions of peak flow rates at the Lowood gauge excluding Wivenhoe Dam releases;
  - c. prediction of the peak flow rates at the Moggill gauge excluding Wivenhoe Dam releases; and
  - d. an understanding of how the term 'likely' is interpreted.
15. At no stage during the relevant period did I have, or have cause to have, access to this information. Nor do I have access to it now. Therefore, my understanding of the strategies that were in place at the relevant times is necessarily based on the limited information then available to me. That information was primarily in the form of a description of the objective of the current strategy contained in the TSRs.
16. Further, for the reasons outlined in paragraph 14 above, I cannot give an informed view of the relevant strategy based solely on dam release rates contained in the TSRs. My understanding is that release rates from the dam are capped by a relevant strategy, not set it.
17. The Protocol sets out the requirements for the contents of the TSRs, which included descriptions of the outcome to be achieved by each strategy, actual release rates and actual and predicted lake levels. When reporting via the TSRs, Seqwater would not usually refer to the status of flood releases by reference to the W1 to W4 classifications. The Water Grid Manager was reliant on the information contained in Seqwater's TSRs

Signed



Barry Kevin Dennien

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to fulfil its communications role. As a result, the Water Grid Manager's reports would not usually make reference to the W1 to W4 classifications.

18. My understanding of the strategies adopted at the relevant time is therefore qualified by the matters described above. Notwithstanding that, from emails (including reference to the TSRs) and the information I received at the various meetings I attended at the time of the January 2011 Flood Event, my understanding of the strategies adopted and their timing is as follows:

a. the transition from strategy W1 to strategy W2 occurred during the evening of Sunday, 9 January 2011 when the language used in the TSRs changed from descriptions of impacts to down stream bridges to:

*'The objective for Dam operations will be to minimise the impact of urban flooding in areas downstream of the dam and, at this stage, releases will be kept below 3500m<sup>3</sup>/s and the combined flows in the lower Brisbane will be limited to 4000m<sup>3</sup>/s' (TSR34);*

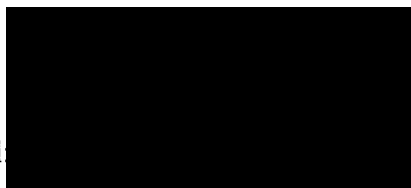
b. during the morning of Monday, 10 January 2011, the flood operation strategy in use was strategy W2;

c. the transition from strategy W2 to strategy W3 occurred sometime later in the day on 10 January 2011 when the language in the TSR changed to:

*'The objective for dam operations is currently to minimise the impact of urban flooding in areas downstream of the dam and to keep river flows in the lower Brisbane River below 4000m<sup>3</sup>/s if possible...' (TSR37); and*

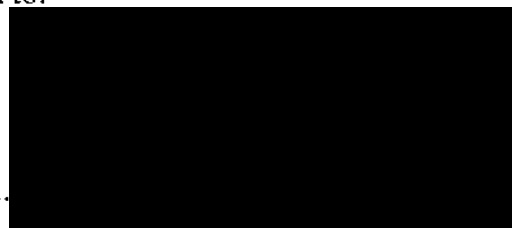
d. the transition to strategy W4 occurred on the morning of Tuesday, 11 January 2011 when the language in the TSR changed to:

Signed



Barry Kevin Dennien

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*‘Maintain releases to keep Wivenhoe below RL 74 at which significant releases need to be made to ensure dam security and minimise flood impacts downstream if possible...’ (TSR38)*

19. The following outlines the key emails I received during the relevant period:

- a. On Sunday, 9 January 2011 at 9.27pm, I received an email from Mr Spiller attaching a copy of TSR W34. TSR W34 stated that the current strategy was to:

*‘Continue current releases until tomorrow noon when re4leases [sic] will be increased to impact Mt Crosby and Fernvale Bridges’*

...

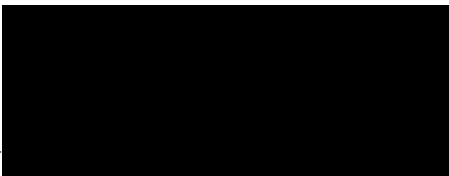
*‘The current release rate from Wivenhoe Dam is 1,400m<sup>3</sup>/s (120,000ML/day). Gate opening will start to be increased from noon Monday and the release is expected to increase to at least 2,600m<sup>3</sup>/s during Tuesday morning.’*

- b. On Sunday, 9 January 2011 at 11.23pm, I was copied into an email from Mr Spiller to Mr Colin Jensen, Chief Executive Officer of the Brisbane City Council (**Mr Jensen**) which stated:

*‘Urban inundation in the City reaches generally commences at total river flows of about 3,500 cubic metres per second (dam releases plus Lockyer and Bremer). At this time, depending upon overnight rainfall, the Flood Control Centre, is proposing to increase releases from around 1,200 to 2,500 cubic metres per second from midday tomorrow. This provides allowance for other flows.’*

- c. On Monday, 10 January 2011 at 7.53am, I received an email from Mr Spiller attaching a copy of TSR W35. TSR W35 stated that the current strategy was to:

Signed



Barry Kevin Dennien

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*'Continue increasing releases to discharge flood waters but keep impact downstream to a minimum.*

*All bridges are now inundated.'*

...

*Wivenhoe Dam (Fully Supply Level 67.00 m AHD*

...

*'Given the rapid increase in inflow volumes, it will be necessary to increase the release from Wivenhoe on Monday morning.*

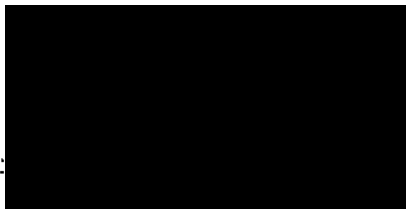
*The objective for dam operations will be to minimise the impact of urban flooding in areas downstream of the dam and, at this stage, releases will be kept below 3,500m<sup>3</sup>/s and the combined flows is [SIC] the lower Brisbane will be limited to 4,000m<sup>3</sup>/s. This is below the limit of urban damages in the City reaches.*

*'The current release rate from Wivenhoe Dam is 1,400m<sup>3</sup>/s (120,000ML/day). Gate opening will start to be increased from noon Monday and the release is expected to increase to at least 2,600m<sup>3</sup>/s during Tuesday morning.'*

- d. On Monday, 10 January 2011 at 10.02am, I received an email from Mr Rob Drury (**Mr Drury**), the Dam Operations Manager for Seqwater, which stated:

*'The current operational strategy is to aim for a flow of no greater than 3,500cumecs in the lower Brisbane River. Accordingly, the current outflow from Wivenhoe Dam will be held at its current level of 2,000cumecs for the next 12 to 24 hours to allow for potential high flows from the Lockyer, Bremer*

Signed:



Barry Kevin Dennien

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*and local area catchments to pass downstream. However, this strategy may need to be revised at short notice if further significant rainfall occurs.'*

- e. On Monday, 10 January 2011 at 10.09am, I was copied into an email from Mr Spiller to Mr Jensen which stated:

*'As specified in the approved Operational Procedures, the primary objective is now to minimizing the risk of urban inundation (release strategy W2). This involves larger releases now, minimizing the risk of even larger releases later (were the flood compartments to reach high levels).*

*Consistent with this release strategy, dam releases have increased to 2,000 cubic metres per second...It is expected to increase to 2,600 cubic metres per second by midday tomorrow.'*

- f. On Monday, 10 January 2011 at 3.11pm, Jade Simmons, a Senior Correspondence Officer for the Water Grid Manager forwarded me an email entitled 'FOC Situation Report at 12.00 on Monday 10 January 2011'. This contained a report prepared by the Duty Engineer, Terry Malone. With respect to Wivenhoe Dam the report stated:

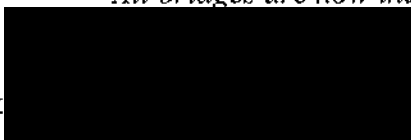
*'Five radial gates are currently open at the damn releasing about 2,000m<sup>3</sup>/s into the Brisbane River and at this stage will need to be increased steadily to an outflow of 2,800m<sup>3</sup>/s over the next 9 hours (commencing at 1500).'*

- g. On Monday, 10 January 2011 at 6.45pm, I emailed TSR W37 to members of the Queensland Police Service. TSR W37 stated that the current strategy was to:

*'Continue increasing releases to discharge flood waters but keep impact downstream to a minimum.*

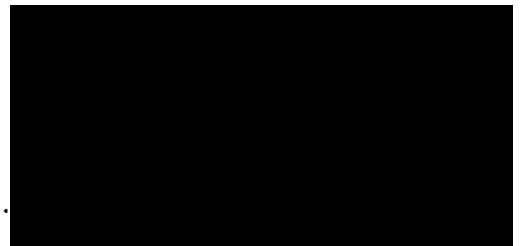
*All bridges are now inundated.*

Signed



Barry Kevin Dennien

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*Ramp up to 2800cumecs which will give a flow in the lower Brisbane River of around 4,000cumecs.'*

- h. On Tuesday, 11 January 2011 at 7.17am I received an email from Mr Spiller attaching a copy of TSR W38.
- i. On Tuesday 11 January 2011 at 1.18pm I received an email from Mr Spiller attaching a copy of TSR W39. TSR W39 stated with respect to the current strategy:

*'Further rainfall in the next 3 hours will require releases to be increased in accordance with Strategy W4, page 29 of the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam (Flood Operations Manual).'*

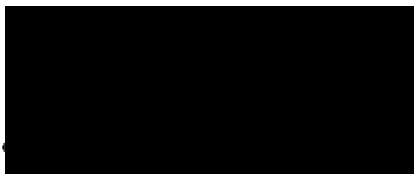
- j. On Tuesday, 11 January 2011 at 6.29pm, I received an email from Mr Spiller, forwarding a copy of an email from Mr Drury which stated:

*'Basically the FOC was going to try to slow our releases last night to give a small window for the Lockyer flood to go through however we again received and are still receiving heavy rain in the catchments.*

*Currently the FOC has shut some sluices at Somerset to store more water to keep Wivenhoe below RL74 at which we need to start increasing releases. The first fuse plug goes at about RL 75.7m.*

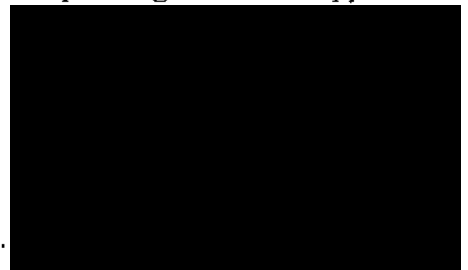
*The strategy is now to keep releases as is to not worsen the situation downstream as the Lockyer recorded levels higher than any on record. However we may still need to increase releases depending on what happens through the day'*

Signed:



Barry Kevin Dennien

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- k. On Tuesday, 11 January 2011 at 10.19pm I received an email from Mr Spiller attaching a copy of TSR W44. The covering email from Mr Spiller stated:

*‘Note that Wivenhoe Dam levels have stabilised and are now falling slowly. Without further rainfall, release rates will be reduced progressively. The first reduction will be to 7,100 cubic metres per second.’*

- l. On Tuesday, 11 January 2011 at 11.49pm I received an email from Mr Spiller attaching a copy of TSR W46. The covering email from Mr Spiller stated:

*‘At 2300, Wivenhoe Dam was at 74.92m AHD (190%) and holding.*

*The Flood Operations Centre has commenced a closure sequence. At 2330, releases will be reduced to 6,100 cubic metres per second.’*

Copies of the emails referred to in paragraphs 19(a) to 19(l) are contained as part of **Annexure B** to this statement.

20. Water Grid Manager personnel participated in numerous conferences during the week beginning 10 January 2011 in order to assist in disseminating information regarding the impact of the flooding in South East Queensland. At these meetings I also received information from different stakeholders involved in the January 2011 Flood Event. Specifically, I attended the following meetings:

- a. at 8.30am on Monday, 10 January 2011, I participated in a telephone conference with Peter Borrows (**Mr Borrows**), the CEO of Seqwater and other key staff from Seqwater and the Water Grid Manager (including Mr Spiller) regarding the current status of Flood operations,
- b. at 10.30am on Monday, 10 January 2011, Mr Borrows and I briefed Minister Robertson regarding the water releases from Wivenhoe Dam and the communications being managed by the Water Grid Manager as at that stage:

Signed

[Redacted Signature]

Barry Kevin Dennien

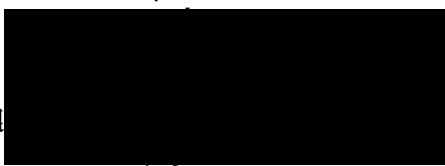
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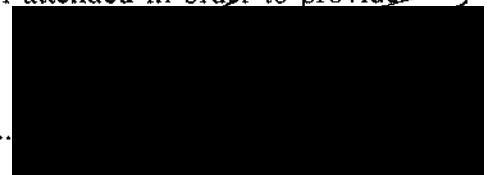
- c. at 12.30pm on Monday, 10 January 2011, I participated in a telephone conference, also attended by the Hon Stephen Robertson MP, Mr Ken Smith, the then Director General of the Department of Premier and Cabinet, Mr Borrows, Mr Jensen, representatives of the Ipswich City Council, Somerset Regional Council, the Bureau of Meteorology, and others. The purpose of the meeting was to ensure the latest information was being communicated to the key stakeholders due to the accelerating change in situation. At that meeting, Mr Borrows advised that the strategy would need to change to increase releases from Wivenhoe Dam. Mr Borrows indicated that there was a risk of the dam reaching a level in which the dam integrity would become the primary concern. It was agreed during that teleconference that Seqwater would update its release strategy by 2.30pm. I understand that that teleconference was recorded by Mr Scott Denner, the Director Risk and Technology of the Water Grid Manager, for the purposes of later producing minutes. Although no formal minutes were subsequently produced, the recording has been retained electronically by the Water Grid Manager. During the course of preparing this statement, that recording was transcribed by the Water Grid Manager's lawyers. A true copy of that transcript contained in **Annexure B**. I have read that transcript and, to the best of my recollection, believe it contains an accurate account of the teleconference.
- d. a meeting with the Premier and staff from the Premier's office at approximately 3:00pm on Monday, 10 January 2011 in order to provide the Premier with an update as to the water releases from Wivenhoe Dam and the communications being managed by the Water Grid Manager as at that stage. Information passed to the Premier was sourced from the latest situation report received at 3.11pm;
- e. at the request of the Premier's office, meetings of the Emergency Management Queensland committee at 5:00pm on Monday, 10 January 2011, Tuesday, 11 January 2011 and Wednesday, 12 January 2011. I attended in order to provide

Signed



Barry Kevin Dennien

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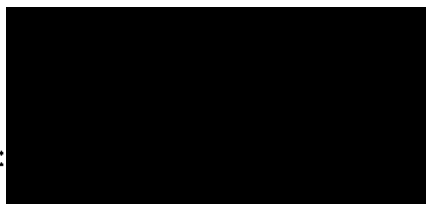
updates as to dam releases (based on the information supplied by Seqwater in its TSRs);

- f. at or about 3:00pm on 11 January 2011, I received a telephone call from Mr Borrows. During that telephone call, Mr Borrows advised, for the first time, that releases of up to 10,000 cubic metres per second may be possible in light of developing weather conditions. Immediately after that phone call concluded, at approximately 3:12pm, I telephoned the Premier's office to relay this news and, at approximately 3:24pm, I was placed on a telephone call to the Premier at the Disaster Management Centre at Kedron when I passed on this information.
21. Throughout the January 2011 Flood Event very little reference was made by the FOC as to which specific flood operation strategy was being used at any particular time. As far as I was concerned, most of the references regarding water releases from the dams were in terms of how many cubic metres were being released per second, rather than designated strategies.
22. Mr Spiller informs me and I believe that on the morning of 10 January 2011 he sent an email to Mr Drury to inquire as to which operating strategy was being used. Mr Spiller informs me and I believe that at approximately 8.23am, Mr Drury replied with the answer 'W2'.

**TOPIC 2: HOW, IF AT ALL, THAT UNDERSTANDING CHANGED SINCE 12 JANUARY 2011 AND THE REASON FOR THE CHANGE IN UNDERSTANDING**

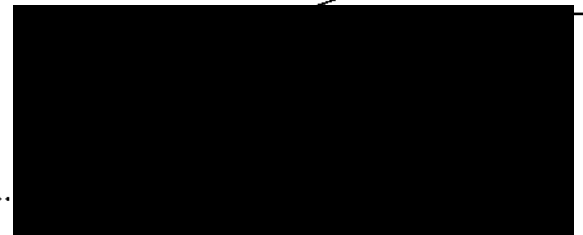
23. My understanding of the concepts and issues outlined in my answer to Topic 1 has not changed since 12 January 2011. I based my understanding on the documents provided to me during that particular period time. When I revisit or review those documents, I still interpret the documents in the same way and form the same conclusions.

Signed:



Barry Kevin Dennien

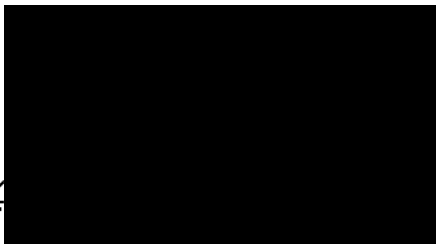
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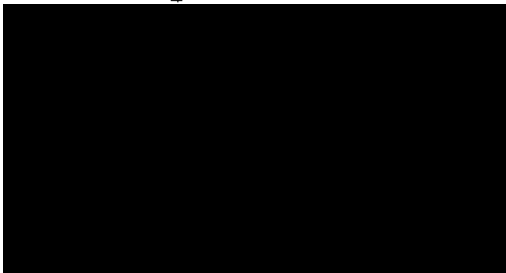
[Justice of the Peace/Solicitor]

TOPIC 3: MY UNDERSTANDING OF ANY DIFFERENCES BETWEEN THE ACCOUNT OF THE CHOICE AND TIMING OF THE DAM OPERATIONS STRATEGIES EMPLOYED TO MANAGE THE FLOOD EVENT IN THE SEQ WATER GRID MANAGER AND SEQWATER MINISTERIAL BRIEFING NOTE TO THE MINISTER FOR NATURAL RESOURCES, MINES AND ENERGY AND MINISTER FOR TRADE THAT APPEARS AS ATTACHMENT SR-12 TO EXHIBIT 11 BEFORE THE QUEENSLAND FLOODS COMMISSION OF INQUIRY ('JANUARY REPORT') AND THE SEQWATER REPORT TITLED 'JANUARY 2011 FLOOD EVENT – REPORT ON THE OPERATION OF SOMERSET DAM AND WIVENHOE DAM' AND DATED 2 MARCH 2011 THAT APPEARS AS EXHIBIT 24 BEFORE THE QUEENSLAND FLOODS COMMISSION OF INQUIRY ('MARCH REPORT')

24. I will refer to the document titled *January 2011 Flood Event* dated 17 January 2011 as the '**Seqwater January Report**' and the document titled *January 2011 Flood Event - Report on the Operation of Somerset Dam and Wivenhoe Dam* dated 2 March 2011 as the '**Seqwater March Report**'.
25. While I was aware of both the Seqwater January Report and the Seqwater March Report, I have not previously had cause, or occasion, to compare their respective accounts of the choice and timing of the dam operation strategies employed to manage the January 2011 Flood Event.
26. However, for the purpose of answering the Commission's questions on this topic, I have undertaken a quick comparison of the two reports.
27. As discussed previously, I can only comment on the accuracy of the transcription of the strategies in the reports, not on whether these were the correct strategies.

Signed: 

Barry Kevin Dennien

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28. From my review of these documents, I am now aware of some differences in the references contained in the documents, as to when the flood operation strategies being used for Wivenhoe Dam changed or transitioned.
29. I am aware that at page 8 of the Seqwater January Report it provides that:
- a. at 7.00pm on 9 January 2011 the operational strategy transitioned to strategy W2;
  - b. at 6.30am on 10 January 2011 the operation strategy transitioned to strategy W3; and
  - c. at 11.00am on 11 January 2011 the operation strategy transitioned to strategy W4.
30. In relation to the Seqwater March Report, I am aware that:
- a. at page 190 it provides that on 8 January 2011 at 8.00am operation strategy W3 was adopted for use, after an attempt to transition to operation strategy W2;
  - b. at page 194 it provides that on 11 January 2011 at 8.00am the operation strategy transitioned to strategy W4; and
  - c. at page 87, Appendix M - Flood Event Log, it provides that the strategy changed from urban damage to dam safety (which I understand is the objective of W4) at 12:36pm on 10 January 2011.
31. I cannot comment on why these differences between the reports exist.

**TOPIC 4: WHEN I FIRST BECAME AWARE OF THE DIFFERENCES, IF ANY, REFERRED TO IN TOPIC 3**

32. I first became aware of the differences referred to in Topic 3 over the last few days.

Signed



Barry Kevin Dennien

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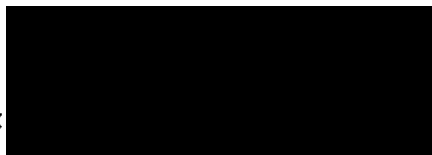


[Justice of the Peace/Solicitor]

**TOPIC 5: ALL DISCUSSIONS, CORRESPONDENCE, MEETINGS OR BRIEFINGS I PARTICIPATED IN, IN RELATION TO THE JANUARY REPORT AND THE MARCH REPORT, AND IN RESPECT OF THESE IDENTIFYING ANY THAT RELATED TO THE DIFFERENCES BETWEEN THE REPORTS REFERRED TO IN TOPIC 3 ABOVE**

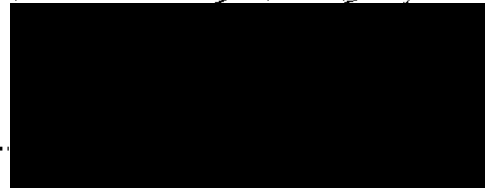
33. All of the emails and documents I have been able to locate in relation to the production of the Ministerial Brief and the Seqwater January Report are attached to this statement as **Annexure C**.
34. The Water Grid Manager was not responsible for the information contained in the Seqwater January Report.
35. The Water Grid Manager was responsible for the coordination of the Ministerial Briefing Note dated 16 January 2011. The Briefing Note had the Seqwater January Report as an attachment. The Water Grid Manager prepared the covering note, being the first 3 pages of the Briefing Note.
36. I recall that I took part in a teleconference in relation to the Ministerial Briefing Note on or about 15 January 2011. The Agenda for that particular teleconference is contained as part of the material disclosed in Annexure D to this statement. I recall that Mr Borrows, Mr Bob Reilly of DERM and Mr Peter Allen of DERM took part in that teleconference and one of the main matters discussed with them was when they would have their respective parts of the attachments for the Ministerial Briefing Note completed.
37. The Water Grid Manager was provided with a draft of the Seqwater January Report prior to its inclusion in the Ministerial Brief. The Water Grid Manager made comments on the draft report, only in relation to its level of detail and the language it used. I recall that we were concerned that the report should be readable and readily

Signed:



Barry Kevin Dennien

Taken by:.....

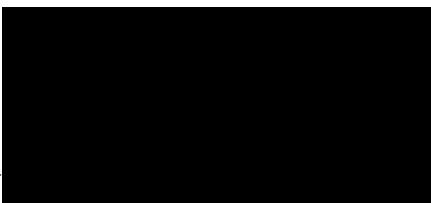


[Justice of the Peace/Solicitor]

comprehensible by persons who did not have a technical knowledge of dam operation terminology.

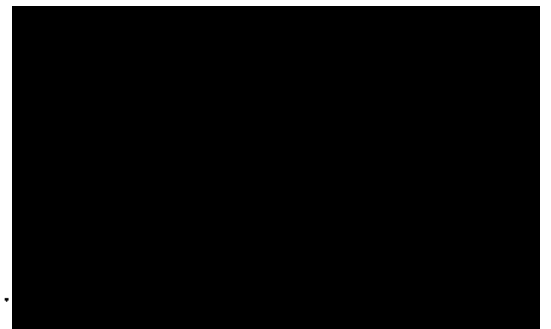
38. On 16 January 2011 at 6.05pm, Elaina Smouha, the Director of Governance and Regulatory Compliance for the Water Grid Manager, emailed Peter Borrows a copy of the draft report with certain highlighted questions and statements on pages 3, 5, 6, 7 and 12. The purpose of these questions was to indicate where it was considered the language used could be clearer or more detail could be provided. The Water Grid Manager did not question the substance of the Seqwater January Report or the information contained in it. A copy of Ms Smouha's email and the copy of the draft report it attached are contained in **Annexure C**.
39. The Water Grid Manager did not have any input into the preparation of the Seqwater March Report or the information contained in it.
40. I did not see a draft copy of the Seqwater March Report prior to its publication.
41. I first learnt that the Seqwater March Report had been published, was on or about 7 March 2011, when Ms Jade Simmons, a Water Grid Manager employee, emailed me a copy of the report.
42. I do not recall reading the Seqwater March Report when it was published, other than perhaps glancing through it to see whether it had any relevance to the Water Grid Manager.
43. I have not participated in any discussions, correspondence, meetings or briefings in respect of the identification of the differences between the Seqwater January Report and the Seqwater March Report.

Signed



Barry Kevin Dennien

Taken by:.....



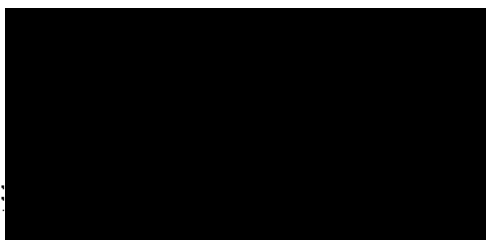
[Justice of the Peace/Solicitor]

**TOPIC 6: ANY DECISION MADE, OR ACTION TAKEN, BY ME IN RELATION TO THE DIFFERENCES, IF ANY, REFERRED TO IN TOPIC 3**

44. I have not made any decisions or taken any action in relation to the differences referred to in Topic 3.
45. All the facts and circumstances deposed to herein are within my own knowledge, save such as are deposed to from information only, and my means of knowledge and sources of knowledge appear in this my statement to the Commission.

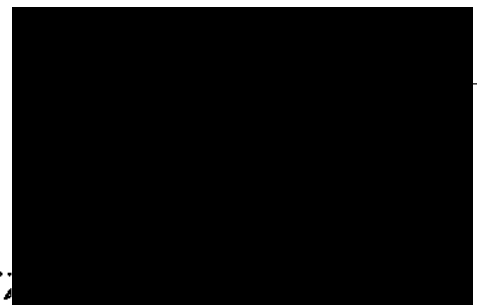
Sworn by Barry Kevin Dennien on 1 February 2012 at Brisbane in the presence of:

Signed:



Barry Kevin Dennien

Taken by:.....



[Justice of the Peace/Solicitor]

**DRAFT Protocol (interim) for the public dissemination of information relating to the operation of Wivenhoe and Somerset Dams (The Dams) for the January 2011 flood event (The Event)**

**Purpose of this document**

This interim protocol seeks to balance the state's requirement to continue to inform the public about matters relating to the operation of The Dams and the entities comprising the SEQ Water Grid – Seqwater, LinkWater, WaterSecure and the SEQ Water Grid Manager - (Water Grid Entity/s), in light of the announcement of the Independent Commission of Inquiry into Queensland's flood disaster (Inquiry).

The Water Grid Entities have been consulted on, and agree with this interim protocol.

This protocol only applies to information relating to The Event and information that may form the subject of the Inquiry. The release of all other information will continue to follow the standard operating procedures of the Water Grid Communications Unit.

As far as practicable, the standard operating procedures will apply to the release of information relating to The Event with the Water Grid Communications Unit being the public/media interface in the first instance for public inquiries about the Water Grid Entities under the Water Grid brand.

**This protocol sets out overarching guidelines, and should not be construed as providing any legal advice. It is the responsibility of the Water Grid Entity to obtain its own independent legal advice if it deems appropriate.**

For clarity, this protocol does not apply to information produced or relating to non-Water Grid Entities (e.g. the Bureau of Meteorology, Brisbane City Council, the Distributor-Retailers, other government Departments etc). Any media/public enquiries relating to non-Water Grid Entities should be directed to the relevant entity. Where information relates to both a Water Grid Entity and non-Water Grid Entity, the non-Water Grid Entity's approval should be sought prior to any release.

**Background**

The general principles and processes covered in this interim protocol relate to the following types of information

1. Reports, studies and information relating to The Dams and their operation prior or relating to The Event either already or not in the public domain
2. Technical data such as dam releases and similar relating to The Dams either during or before The Event
3. Public commentary on items 1 & 2

## **General Principles**

As an overarching principle, the Water Grid Communications Unit will remain the central point of reference for media inquiries and ministerial requests. The Water Grid Communications Unit will use its reasonable endeavours to meet requested timeframes, however it should be noted that the Water Grid Communications Unit is dependent on advice and approval from relevant Water Grid Entities regarding the release of information, and this may affect the ability to meet deadlines.

A minor exception to the standard operating procedures is that the Water Grid Entity may respond directly to queries/questions if the Water Grid Communications Unit (or the Minister's Office) is met with continual requests by the public/media to speak directly with the relevant Water Grid Entity.

If such circumstances arise, the Water Grid Communications Unit will liaise with the relevant Water Grid Entity.

All publicly released information relating to a Water Grid Entity's scope and responsibilities for The Event shall be attributed to the relevant Water Grid Entity, when appropriate. Comments received from Water Grid Entities may also be attributed to the specific Water Grid Entity rather than a "spokesperson" on behalf of the Water Grid, when appropriate.

If a Water Grid Entity decides not to make information relating to The Event available, the Water Grid Communications Unit will relay this to the entity/person requesting the information, including any reasons that the Water Grid Entity has advised.

### **Guideline framework for assessing the public release of information**

The following may provide guidance in assessing the public release of SEQ Water Grid information relating to The Event (this includes the release of information to other organisations/entities that have no jurisdiction over the Water Grid Entity), taking into account the intent of the Inquiry.

It should be noted that all disclosure should be assessed in the context of the specific request or question.

The following is a guide and Water Grid Entities should seek their own independent legal advice regarding such matters. The table below should not limit a Water Grid Entity in forming its own view on the appropriateness of disclosure.

Water Grid Entities should balance the interest of the State to continue to keep the public informed, and the following guidelines (including the intent of the Inquiry).

Where information concerns another agency/entity, or if circumstances deem it appropriate, the relevant Water Grid Entity should consult with that agency/entity prior to any release of information. For example, information on regulatory context, where another agency/entity was involved in developing or approving a document, where a document/information refers to another agency/entity etc.

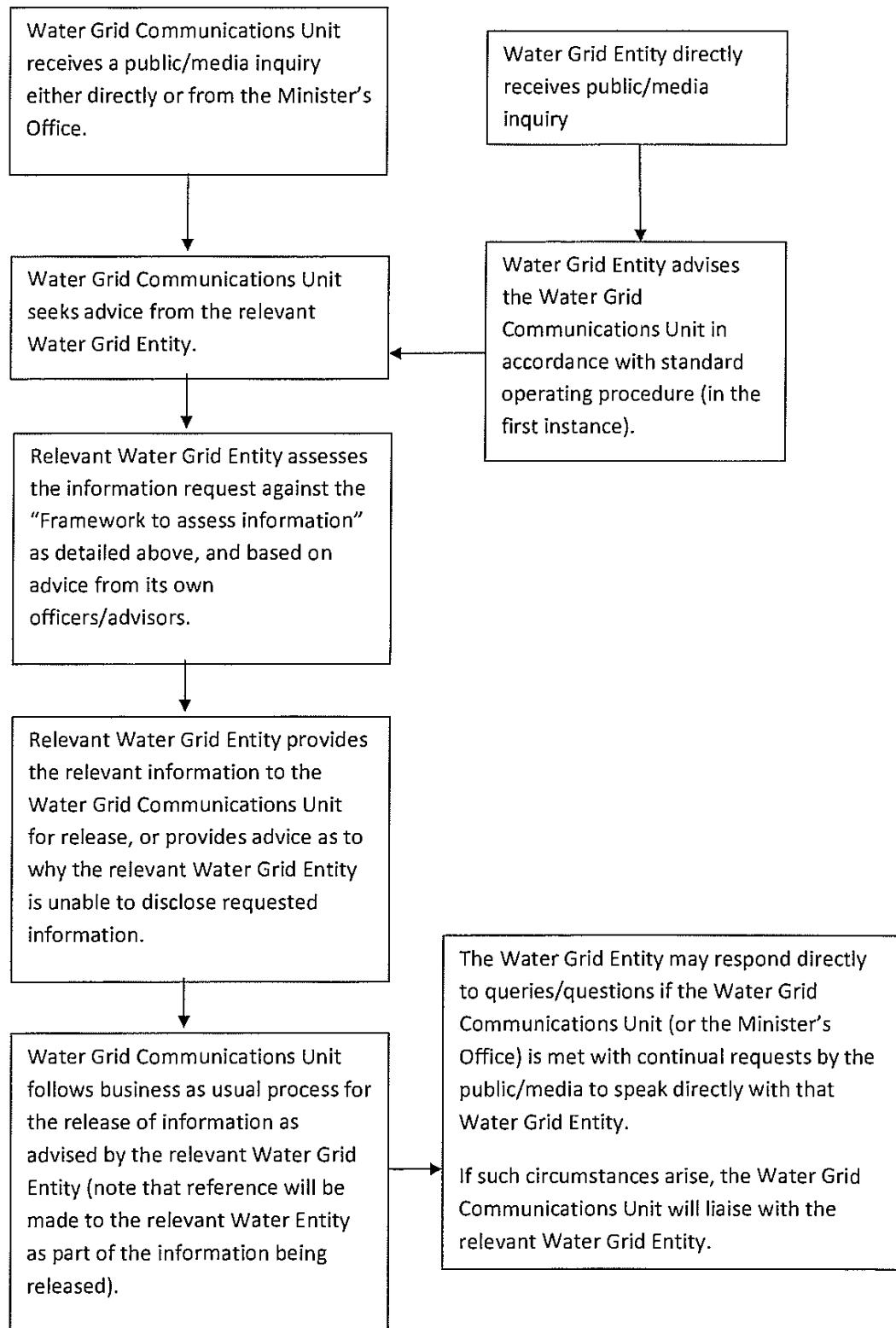
Upon the release of the Inquiry's terms of reference, these guidelines may be subject to review.

Category of information	Disclosure guidance
<p>Information that is already publicly available</p>	<p>May be appropriate.</p> <p>However, for any public statements made prior to the announcement of the Inquiry, that may be considered to be commentary, opinion or speculation regarding the flood event (see third category below), the Water Grid Entity may consider refraining from reinforcing such statements in light of the Inquiry.</p>
<p>Information (that is not publicly available) that would be released if an application for disclosure was made under the <i>Right to Information Act 2009</i> (RTI Act), or if the document should have been published under the RTI Act's publication scheme requirements.</p> <p><i>Examples of information that may fall under this category:</i></p> <ul style="list-style-type: none"> <li>• <i>Flood Mitigation Manual</i></li> <li>• <i>Historical reports (i.e. technical situation reports)</i></li> <li>• <i>Policies, procedures, protocols</i></li> </ul>	<p>May be appropriate.</p> <p>However, the Water Grid Entity who owns/produced the information should take into account the disclosure requirements of the RTI Act.</p> <p>It should also be noted that under the RTI Act, where a Water Grid Entity has received a request for information that may reasonably concern another government, agency or person (third party), the third party must be consulted as to their view on whether the information is disclosable under the RTI Act.</p> <p>In light of the above, as a matter of courtesy, other concerned agencies should be consulted prior to information being released regardless of whether a RTI Act application has been made.</p> <p>Agencies should also have regard to the non-disclosure of any personal information that may be contained in such documents, as defined under the <i>Information Privacy Act 2009</i>.</p>
<p>Commentary, opinion or speculation as to what would have happened/not happened, or on how effectively we responded to or managed the event. Questions that cannot be conclusively answered without proper investigation, this will include matters which are likely to be investigated and answered through the Inquiry.</p> <p><i>Examples of information that may fall under this category (Subject to review upon release of the Inquiry terms of reference):</i></p> <ul style="list-style-type: none"> <li>• <i>What would have occurred in the absence of Wivenhoe Dam and Somerset Dams</i></li> <li>• <i>How much Wivenhoe Dam reduced the flood</i></li> </ul>	<p>May not be appropriate.</p>

<p><i>peak</i></p> <ul style="list-style-type: none"> <li>• <i>Ability to foresee the event and the effectiveness of warnings</i></li> <li>• <i>How much damage Wivenhoe and Somerset Dams prevented</i></li> <li>• <i>How effectively Wivenhoe and Somerset Dams were managed as flood mitigators</i></li> <li>• <i>How decisions were made under the Flood Mitigation Manual and whether they were effective and compliance – especially decisions where the Manual permitted some level of discretion</i></li> <li>• <i>Would it have made a difference if pre-emptive releases were undertaken prior to the flood event</i></li> <li>• <i>Would it have made a difference if Wivenhoe Dam releases were increased prior to the flood event</i></li> <li>• <i>The effectiveness and appropriateness of the release strategies under the Flood Mitigation Manual</i></li> </ul>	
<p><b>Pure factual information (before, during and after the flood event)</b></p> <p><i>Examples of information that may fall under this category:</i></p> <ul style="list-style-type: none"> <li>• <i>Actual dam levels</i></li> <li>• <i>Actual volume of dam releases</i></li> <li>• <i>When the gates were opened/shut</i></li> <li>• <i>Actual volume of inflows</i></li> <li>• <i>The regulatory context of the Flood Mitigation Manual under the Water Supply (Safety and Reliability) Act 2008</i></li> <li>• <i>Volumes of desalinated water and purified recycled water supplied</i></li> </ul>	<p>May be appropriate – subject to the proper due diligence being undertaken to ensure the accuracy of such information.</p> <p>However, for any public statements on pure fact made prior to the announcement of the Inquiry, the Water Grid Entity may choose to consider refraining from reinforcing such statements in light of the Inquiry.</p> <p>The Water Grid Communications Unit will consult with the relevant Water Grid Entity regarding the reinforcement of public statements of pure factual information.</p>

## Processes

Below is a guide to the process for the collation of information relating to the Event.



## Litsupport Brisbane

---

**From:** Rob Drury [rdrury@...]  
**Sent:** Tuesday, 11 January 2011 7:58 AM  
**To:** Dan Spiller  
**Subject:** Re: Technical Report

Wiv. 173% Som 160%

---

**From:** Dan Spiller <Daniel.Spiller@...>  
**To:** Rob Drury  
**Sent:** Tue Jan 11 07:47:51 2011  
**Subject:** RE: Technical Report

Rob,

Can you please urgently provide dam levels as percentage?

Dan

---

**From:** Rob Drury [mailto:rdrury@...]  
**Sent:** Tuesday, 11 January 2011 6:36 AM  
**To:** Rob Drury; Dan Spiller; Paul Bird; Stan Stevenson; Peter Borrows; Peter.Allen@...  
**Cc:** David Roberts  
**Subject:** RE: Technical Report

Attached is the latest report. Also below is the BoM warning with info on the Lockyer flood. The Somerset Council chambers had water through it and the library and they are working off site at the moment so communications with the Council may be impacted.

Basically the FOC was going to try to slow our releases last night to give a small window for the Lockyer flood to go through however we again received and are still receiving heavy rain in the catchments. Hence the best we can do at this stage is not increase releases.

Currently the FOC has shut some sluices at Somerset to store more water to keep Wivenhoe below RL74 at which we need to start increasing releases to ensure dam security and minimise downstream flood impacts if possible.

The strategy is now to keep releases at current levels so as to not worsen the situation downstream as the Lockyer recorded levels higher than any on record at some spots. However we may still need to increase releases depending on what happens through the day.

The FOC have given our release strategy (not really different in releases at this stage) to the BoM and they will reissue their flood warnings based on that and other flows in the Lockyer and Bremer and downstream.

The FOC have spoken to BCC and ICC and we will send them an update. BCC are having a LDMG meeting this morning.

Rob

---

**From:** Aifs Operational Manager[SMTP:AIFS@...]  
**Sent:** Tuesday, January 11, 2011 4:06:54 AM

To: weather

Subject: BOM: FLDWARN for Lower Brisbane and Bremer Rs [SEC=UNCLASSIFIED] Auto forwarded by a Rule

TO::BOM [REDACTED]  
[REDACTED]

Australian Government Bureau of Meteorology Queensland

**PRIORITY**

FLOOD WARNING FOR THE LOCKYER, BREMER, WARRILL AND BRISBANE RIVER BELOW WIVENHOE INCLUDING BRISBANE CITY Issued at 4:06 AM on Tuesday the 11th of January 2011 by the Bureau of Meteorology, Brisbane.

The main flood waters in the Lockyer Creek are now arriving at Lyons Bridge, with strong stream rises expected during Tuesday.

Wivenhoe dam is providing significant mitigation of upper Brisbane floods. River flows from the Bremer and Lockyer catchments combined with releases from Wivenhoe dam are expected to increase levels in Brisbane during Tuesday.

At the Brisbane City Gauge, minor flood levels of about 2.1 metres are expected with the afternoon high tide on Tuesday and levels of about 3 metres are expected with the high tides on Wednesday causing moderate flooding.

(3 metres at the Brisbane City gauge is about 1.5 metres higher than the highest tide of the year at this location).

**LOCKYER CREEK:**

Extremely heavy rainfall during Monday led to extreme rises in the Lockyer Creek catchment and Laidley Creek at Mulgowie. Record flood levels of 18.92 metres were recorded at Gatton Monday evening before the station failed. This level was well above the previous record peak of 16.33 metres from the February 1893 flood.

The main flood waters are currently arriving at Lyons Bridge, with strong stream rises expected in the next few hours. The Lockyer Creek at Glenore Grove peaked at 14.60 metres at 11:30pm, which is 0.3 metres below the 1974 flood.

Renewed stream rises have commenced in Lockyer Creek at Lyons Bridge with a peak between 16 and 16.5 metres expected Tuesday morning. This is likely to be similar in level to the 1996 flood.

**BREMER RIVER:**

The Bremer River at Walloon has exceeded the moderate flood level. The Bremer River at Rosewood peaked at 5.8 metres around midnight Monday.

The Bremer River at Ipswich is expected to reach about 12.7 metres on Tuesday afternoon. Higher levels are possible.

**WARRILL CREEK**

Warrill Creek at Amberley peaked at 5.98 metres around 9pm Monday.

**MIDDLE AND LOWER BRISBANE:**

Moderate flooding is developing at Savages Crossing and at Mt Crosby Weir.

At the Brisbane City Gauge (lower end of Edward Street and at Thornton Street), minor flood levels of about 2.1 metres are expected with the afternoon high tide on Tuesday and levels of about 3 metres are expected with the high tides on Wednesday causing moderate flooding.

(3 metres at the Brisbane City gauge is about 1.5 metres higher than the highest tide of the year at this location).

#### Predicted River Heights/Flows:

Ipswich: Reach about 12.7 metres (major) during Tuesday afternoon.

Moggill: Reach about 12 metres (minor) during Tuesday afternoon.

Jindalee: Reach about 7 metres (minor) overnight Tuesday.

Brisbane: Reach about 2.1 metres (minor) with the afternoon high tide on Tuesday. Reach about 3 metres (moderate) with the high tides on Wednesday.

(3 metres at the Brisbane City gauge is about 1.5 metres higher than the highest tide of the year at this location).

Further rises are possible at all four locations depending on further rain.

#### Next Issue:

The next warning will be issued at about 8am Tuesday.

#### Latest River Heights:

Lockyer Ck at Helidon #	12.68m steady	03:02 PM MON 10/01/11
Flagstone Ck at Brown-Zirbels Rd *	3.49m falling	02:10 AM TUE 11/01/11
Sandy Creek at Sandy Creek Road #	2.15m falling	03:19 AM TUE 11/01/11
Ma Ma Ck at Harm's *	3.26m rising	02:30 AM TUE 11/01/11
Tenthill Ck at Tenthill *	5.57m rising	02:40 AM TUE 11/01/11
Lockyer Ck at Gatton #	18.92m rising	06:30 PM MON 10/01/11
Laidley Ck at Mulgowie *	6.39m rising	02:20 AM TUE 11/01/11
Laidley Ck at Laidley	8.7m falling slowly	10:00 PM MON 10/01/11
Laidley Ck at Showground Weir #	7.84m rising	03:25 AM TUE 11/01/11
Laidley Ck at Warrego Hwy *	6.41m rising	02:00 AM TUE 11/01/11
Lockyer Ck at Glenore Grove #	13.8m falling	03:24 AM TUE 11/01/11
Lockyer Ck at Lyons Br #	15.55m rising	03:23 AM TUE 11/01/11
Lockyer Ck at Rifle Range Rd *	15.39m rising	02:40 AM TUE 11/01/11
Lockyer Ck at O'Reilly's Weir #	18m falling	03:28 AM TUE 11/01/11
Brisbane R at Lowood Pump Stn #	15.93m falling	03:31 AM TUE 11/01/11
Brisbane R at Savages Crossing #	15.89m rising	03:29 AM TUE 11/01/11
Brisbane R at Burtons Br #	12.22m rising	03:29 AM TUE 11/01/11
Brisbane R at Kholo Br #	7.99m rising	03:29 AM TUE 11/01/11
Brisbane R at Mt Crosby #	15.82m steady	03:30 AM TUE 11/01/11
Brisbane R at Mt Crosby #	14.08m falling	04:39 PM MON 10/01/11
Brisbane R at Colleges Crossing #	13.91m rising	03:32 AM TUE 11/01/11
Bremer R at Rosewood#	5.56m falling	03:11 AM TUE 11/01/11
Bremer R at Five Mile Br Walloon #	6.4m rising	03:15 AM TUE 11/01/11
Warrill Ck at Greens Rd Amberley #	5.84m falling	03:29 AM TUE 11/01/11
Bremer R at One Mile Br #	13.75m rising	03:31 AM TUE 11/01/11
Bremer R at Hancocks Br Brassall #	11.33m rising	03:22 AM TUE 11/01/11
Bremer R at Ipswich #	8.55m rising	03:31 AM TUE 11/01/11
Brisbane R at Moggill #	7.07m rising	03:29 AM TUE 11/01/11
Brisbane R at Jindalee Br #	4.5m rising	03:29 AM TUE 11/01/11
Brisbane R at City Gauge #	1.4m falling	03:15 AM TUE 11/01/11

\*automatic station

Warnings and River Height Bulletins are available at <http://www.bom.gov.au/qld/flood/>. Flood Warnings are also available on telephone 1300 659 219 at a low call cost of 27.5 cents, more from mobile, public and satellite phones.

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For more information regarding this service, please contact your service provider.

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority trading as Seqwater



Swimming in weirs and fast flowing water is FATAL

**rethink it.**



Ph [REDACTED] | Fax [REDACTED] | M [REDACTED] | E [rdrury@seqwater.com.au](mailto:rdrury@seqwater.com.au)  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

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**From:** Barry Dennien <Barry.Dennien[REDACTED]>  
**Sent:** Tuesday, January 11, 2011 8:32 AM  
**To:** Dan Spiller <Daniel.Spiller[REDACTED]>  
**Subject:** Re: Levels

---

Yes  
Wed night ipswich  
Thurs brisbane

Regards  
Barry Dennien

On 11/01/2011, at 8:28 AM, "Dan Spiller" <Daniel.Spiller[REDACTED]> wrote:

Based on 3700 cumecs release?

By when?

---

**From:** Barry Dennien  
**Sent:** Tuesday, 11 January 2011 8:29 AM  
**To:** Dan Spiller  
**Subject:** Re: Levels

BOM forecast 6000 plus cumecs in river 4 plus meters at port office

74 flood 5.45m

Regards

Barry Dennien

On 11/01/2011, at 8:00 AM, "Dan Spiller" <Daniel.Spiller[REDACTED]> wrote:

Wivenhoe Dam: 173%

Somerset Dam: 160%

Daniel Spiller

Director, Operations

SEQ Water Grid Manager

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

Email: [daniel.spiller@seqwater.com.au](mailto:daniel.spiller@seqwater.com.au) [REDACTED]

Visit: Level 15, 53 Albert Street Brisbane

Post: PO Box 16205, City East QLD 4002

ABN: 14783 317 630

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Cindy Hulsey

---

**From:** Barry Dennien  
**Sent:** Tuesday, 11 January 2011 8:33 AM  
**To:** Dan Spiller  
**Subject:** Re: Levels

**Categories:** T8

Dan let qui know asap

Regards  
Barry Dennien

On 11/01/2011, at 8:28 AM, "Dan Spiller" <Daniel.Spiller@...> wrote:

Based on 3700 cumecs release?

By when?

---

**From:** Barry Dennien  
**Sent:** Tuesday, 11 January 2011 8:29 AM  
**To:** Dan Spiller  
**Subject:** Re: Levels

BOM forecast 6000 plus cumecs in river 4 plus meters at port office

74 flood 5.45m

Regards

Barry Dennien

On 11/01/2011, at 8:00 AM, "Dan Spiller" <Daniel.Spiller@...> wrote:

Wivenhoe Dam: 173%

Somerset Dam: 160%

**Daniel Spiller**

Director, Operations

SEQ Water Grid Manager

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

Email: daniel.spiller [REDACTED]

Visit: Level 15, 53 Albert Street Brisbane

Post: PO Box 16205, City East QLD 4002

ABN: 14783 317 630

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**Cindy Hulsey**

---

**From:** Tim Watts [Tim.Watts@...]  
**Sent:** Tuesday, 11 January 2011 8:52 AM  
**To:** Dan Spiller; Best Debbie; Lance McCallum; Geoff Stead; pborrows@...  
**Subject:** RE: Water Grid dam release strategy  
**Categories:** T8

After speaking to Dan, his offer a face-to-face briefing is not required.  
We don't want to impact on operations and are happy to be updated by email or phone.  
Tim

**Tim Watts**  
Policy Advisor  
Office of the Minister for Natural Resources,  
Mines and Energy and Minister for Trade  
Phone: [REDACTED]  
Mobile: [REDACTED]  
Fax: [REDACTED]

**From:** Tim Watts  
**Sent:** Tuesday, 11 January 2011 8:32 AM  
**To:** 'Dan Spiller'; 'Best Debbie'; Lance McCallum; Geoff Stead; 'pborrows@...' Dennien Barry  
**Subject:** RE: Water Grid dam release strategy

Dan Debbie  
A briefing would be good at a time appropriate to your setting of the release strategy for the coming hours.  
Please confirm if 10am is still your preferred time.  
Please also let me know if you require assistance from this end.  
Tim

**Tim Watts**  
Policy Advisor  
Office of the Minister for Natural Resources,  
Mines and Energy and Minister for Trade  
Phone: [REDACTED]  
Mobile: [REDACTED]  
Fax: [REDACTED]

**From:** Dan Spiller [mailto:Daniel.Spiller@...]  
**Sent:** Tuesday, 11 January 2011 7:17 AM  
**To:** Stephen Robertson; 'Ken Smith (ken.smith@...)'; Lance McCallum; Tim Watts; Geoff Stead; Lauren Sims; 'Martin.Peter@...'; 'Dunn.KerryG@...';  
**Cc:** Barry Dennien; 'pborrows@...'; 'Rob Drury'; 'pbird@...'; 'Damien Brown (damien.brown@...); 'hob.reilly@...'; 'terry.wall@...'; 'Madgwick.Darren@...'  
**Subject:** Water Grid dam release strategy

All,

Attached is the latest report, with the BoM warning on the Lockyer flood below.

Key points are:

- Current releases are 2,750 cubic metres per second (about 240,000 ML/day). Due to heavy rainfall in the catchment, it was not possible to reduce releases to allow the Lockyer Valley flows to pass.
- Further rainfall may result in the need to increase releases.

- Wivenhoe Dam is at 73.51m AHD and rising at about 25mm/hour. Above 74m, the primary objective becomes maintaining the security of the dam. Releases would be increased at this level with less scope for consideration of downstream impacts.

The BoM is remodeling based on this release strategy. There is some uncertainty about the level of flows coming from the Lockyer.

Please call me on [REDACTED] if you require any further information.

Debbie and Tim: I recommend that a briefing for the Minister would be appropriate, perhaps around 10am.

Regards,  
Daniel Spiller

Australian Government Bureau of Meteorology Queensland

PRIORITY

FLOOD WARNING FOR THE LOCKYER, BREMER, WARRILL AND BRISBANE RIVER BELOW WIVENHOE INCLUDING BRISBANE CITY Issued at 4:06 AM on Tuesday the 11th of January 2011 by the Bureau of Meteorology, Brisbane.

The main flood waters in the Lockyer Creek are now arriving at Lyons Bridge, with strong stream rises expected during Tuesday.

Wivenhoe dam is providing significant mitigation of upper Brisbane floods. River flows from the Bremer and Lockyer catchments combined with releases from Wivenhoe dam are expected to increase levels in Brisbane during Tuesday.

At the Brisbane City Gauge, minor flood levels of about 2.1 metres are expected with the afternoon high tide on Tuesday and levels of about 3 metres are expected with the high tides on Wednesday causing moderate flooding.

(3 metres at the Brisbane City gauge is about 1.5 metres higher than the highest tide of the year at this location).

LOCKYER CREEK:

Extremely heavy rainfall during Monday led to extreme rises in the Lockyer Creek catchment and Laidley Creek at Mulgowie. Record flood levels of 18.92 metres were recorded at Gatton Monday evening before the station failed. This level was well above the previous record peak of 16.33 metres from the February 1893 flood.

The main flood waters are currently arriving at Lyons Bridge, with strong stream rises expected in the next few hours. The Lockyer Creek at Glenore Grove peaked at 14.60 metres at 11:30pm, which is 0.3 metres below the 1974 flood.

Renewed stream rises have commenced in Lockyer Creek at Lyons Bridge with a peak between 16 and 16.5 metres expected Tuesday morning. This is likely to be similar in level to the 1996 flood.

BREMER RIVER:

The Bremer River at Walloon has exceeded the moderate flood level. The Bremer River at Rosewood peaked at 5.8 metres around midnight Monday.

The Bremer River at Ipswich is expected to reach about 12.7 metres on Tuesday afternoon. Higher levels are possible.

WARRILL CREEK

Warrill Creek at Amberley peaked at 5.98 metres around 9pm Monday.

**MIDDLE AND LOWER BRISBANE:**

Moderate flooding is developing at Savages Crossing and at Mt Crosby Weir.

At the Brisbane City Gauge (lower end of Edward Street and at Thornton Street), minor flood levels of about 2.1 metres are expected with the afternoon high tide on Tuesday and levels of about 3 metres are expected with the high tides on Wednesday causing moderate flooding.

(3 metres at the Brisbane City gauge is about 1.5 metres higher than the highest tide of the year at this location).

**Predicted River Heights/Flows:**

Ipswich: Reach about 12.7 metres (major) during Tuesday afternoon.

Moggill: Reach about 12 metres (minor) during Tuesday afternoon.

Jindalee: Reach about 7 metres (minor) overnight Tuesday.

Brisbane: Reach about 2.1 metres (minor) with the afternoon high tide on Tuesday. Reach about 3 metres (moderate) with the high tides on Wednesday.

(3 metres at the Brisbane City gauge is about 1.5 metres higher than the highest tide of the year at this location).

Further rises are possible at all four locations depending on further rain.

**Next Issue:**

The next warning will be issued at about 8am Tuesday.

**Latest River Heights:**

Lockyer Ck at Helidon #	12.68m steady	03:02 PM MON 10/01/11
Flagstone Ck at Brown-Zirbels Rd *	3.49m falling	02:10 AM TUE 11/01/11
Sandy Creek at Sandy Creek Road #	2.15m falling	03:19 AM TUE 11/01/11
Ma Ma Ck at Harm's *	3.26m rising	02:30 AM TUE 11/01/11
Tenthill Ck at Tenthill *	5.57m rising	02:40 AM TUE 11/01/11
Lockyer Ck at Gatton #	18.92m rising	06:30 PM MON 10/01/11
Laidley Ck at Mulgowie *	6.39m rising	02:20 AM TUE 11/01/11
Laidley Ck at Laidley	8.7m falling slowly	10:00 PM MON 10/01/11
Laidley Ck at Showground Weir #	7.84m rising	03:25 AM TUE 11/01/11
Laidley Ck at Warrego Hwy *	6.41m rising	02:00 AM TUE 11/01/11
Lockyer Ck at Glenore Grove #	13.8m falling	03:24 AM TUE 11/01/11
Lockyer Ck at Lyons Br #	15.55m rising	03:23 AM TUE 11/01/11
Lockyer Ck at Rifle Range Rd *	15.39m rising	02:40 AM TUE 11/01/11
Lockyer Ck at O'Reilly's Weir #	18m falling	03:28 AM TUE 11/01/11
Brisbane R at Lowood Pump Stn #	15.93m falling	03:31 AM TUE 11/01/11
Brisbane R at Savages Crossing #	15.89m rising	03:29 AM TUE 11/01/11
Brisbane R at Burtons Br #	12.22m rising	03:29 AM TUE 11/01/11
Brisbane R at Kholo Br #	7.99m rising	03:29 AM TUE 11/01/11
Brisbane R at Mt Crosby #	15.82m steady	03:30 AM TUE 11/01/11
Brisbane R at Mt Crosby #	14.08m falling	04:39 PM MON 10/01/11
Brisbane R at Colleges Crossing #	13.91m rising	03:32 AM TUE 11/01/11
Bremer R at Rosewood#	5.56m falling	03:11 AM TUE 11/01/11
Bremer R at Five Mile Br Walloon #	6.4m rising	03:15 AM TUE 11/01/11
Warrill Ck at Greens Rd Amberley #	5.84m falling	03:29 AM TUE 11/01/11
Bremer R at One Mile Br #	13.75m rising	03:31 AM TUE 11/01/11
Bremer R at Hancocks Br Brassall #	11.33m rising	03:22 AM TUE 11/01/11
Bremer R at Ipswich #	8.55m rising	03:31 AM TUE 11/01/11
Brisbane R at Moggill #	7.07m rising	03:29 AM TUE 11/01/11

Brisbane R at Jindalee Br #  
Brisbane R at City Gauge #

4.5m rising  
1.4m falling

03:29 AM TUE 11/01/11  
03:15 AM TUE 11/01/11

\*automatic station

Warnings and River Height Bulletins are available at <http://www.bom.gov.au/qld/flood/>.  
Flood Warnings are also available on telephone 1300 659 219 at a low call cost of 27.5 cents, more from mobile, public and satellite phones.

-----Safe Stamp-----  
Your Anti-virus Service scanned this email. It is safe from known viruses.  
For more information regarding this service, please contact your service provider.

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority trading as Seqwater



Swimming in weirs and  
flowing water is FAI

rethink



Ph [REDACTED] | Fax [REDACTED] | M [REDACTED] | E [rdrury@seqwater.com.au](mailto:rdrury@seqwater.com.au)  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

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Please consider the environment before printing this email.

Cindy Hulsey

---

**From:** Dan Spiller  
**Sent:** Tuesday, 11 January 2011 9:06 AM  
**To:** Barry Dennien  
**Subject:** RE: Levels  
  
**Categories:** T8

Just have.

Colin is sending 5000 cumecs inundation maps and street list now. Starting work on 6000 cumecs impacts.

Seqwater is closing out this strategy. They will then start work on worse case scenarios for this afternoon (ie dam fills to above 75m AHD and all flows need to be passed through). We will provide this to BoM to model river levels and then to Brisbane to model inundation impacts.

QUU advised and planning.

Linkwater advised and planning.

Dan

---

**From:** Barry Dennien  
**Sent:** Tuesday, 11 January 2011 9:00 AM  
**To:** Dan Spiller  
**Subject:** Re: Levels

Did you get him

Regards  
Barry Dennien

On 11/01/2011, at 8:51 AM, "Dan Spiller" <[Daniel.Spiller@seqwater.com.au](mailto:Daniel.Spiller@seqwater.com.au)> wrote:

Left msg. Sent email. Ringing again.

---

**From:** Barry Dennien  
**Sent:** Tuesday, 11 January 2011 8:52 AM  
**To:** Dan Spiller  
**Subject:** Re: Levels

Dan

Have you rung col Jensen premier has asked

Regards

Barry Dennien

On 11/01/2011, at 8:28 AM, "Dan Spiller" <Daniel.Spiller[REDACTED]> wrote:

Based on 3700 cumecs release?

By when?

---

**From:** Barry Dennien  
**Sent:** Tuesday, 11 January 2011 8:29 AM  
**To:** Dan Spiller  
**Subject:** Re: Levels

BOM forecast 6000 plus cumecs in river 4 plus meters at port office

74 flood 5.45m

Regards

Barry Dennien

On 11/01/2011, at 8:00 AM, "Dan Spiller" <Daniel.Spiller[REDACTED]> wrote:

Wivenhoe Dam: 173%

Somerset Dam: 160%

**Daniel Spiller**

Director, Operations

**SEQ Water Grid Manager**

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

Email: [daniel.spiller\[REDACTED\]](mailto:daniel.spiller[REDACTED])

Visit: Level 15, 53 Albert Street Brisbane

Post: PO Box 16205, City East QLD 4002

ABN: 14783 317 630

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**From:** Barry Dennien <Barry.Dennien@[REDACTED]>  
**Sent:** Tuesday, January 11, 2011 9:13 AM  
**To:** Dan Spiller <Daniel.Spiller@[REDACTED]>; Michael Lyons <Michael.Lyons@[REDACTED]>  
**Subject:** Re: Levels

---

Mike

Can you start preparing a media statement on why we need to release the water

Dam safety in simple English

Secondly things are moving fast we need to think our  
Media comments

Regards  
Barry Dennien

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Somerset Dam: 160%

**Daniel Spiller**

Director, Operations

**SEQ Water Grid Manager**

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

Email: [daniel.spiller@seq.com.au](mailto:daniel.spiller@seq.com.au)

Visit: Level 15, 53 Albert Street Brisbane

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ABN: 14783 317 630

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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	W39	<b>Date of TSR release</b>	11.1.2011	<b>Time of TSR release</b>	12.00pm
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### Seawater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Maintain releases to keep Wivenhoe below fuse plug initiation and releases need to be made to ensure the dam security and minimise flood impacts downstream if possible</li> </ul>										
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Maintain current release of 3970cumecs as long as possible but it may need to be increased</li> <li>Close sluices at Somerset Dam to store more water however will affect upstream areas.</li> <li>Current estimate of peak dam level is between EL74.5 and EL74.8 (assuming no further significant rainfall). However it is noted that rainfall is continuing across the catchment.</li> <li>Further rainfall in the next 3 hours will require releases to be increased in accordance with Strategy W4, page 29 of the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam (Flood Operations Manual)</li> </ul>										
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Brisbane River:	Impact as below.										

### Somerset Dam (Full Supply Level 99.00 m AHD)

The dam level is 103.30 AHD and rising. Peak inflow to the dam is estimated to be about 4,200 m<sup>3</sup>/s. Volume stored above FSL is 240,000ML at 163.3%

The dam level peaked at 103.52m AHD at 19:00 on Monday 10 January 2011, (unless further significant rainfall is experienced). Areas around Kilcoy will continue to be adversely affected.

### Wivenhoe Dam (Full Supply Level 67.00 m AHD)

The dam level is 74.1m AHD and rising at about 25 mm/hour. Holding 930,000ML above FSL and 179.5%. Releases from the dam are currently 3,970cumecs/s. Outflows into the Brisbane River from both Lockyer Creek and the Bremer River are also increasing.

At this stage it is considered that without further rainfall the dam can be kept at around 74.8m.

The aim is to prevent fuse plug initiation.

Currently the situation is being assessed every 3 hours.

If further rainfall occurs, dam releases may need to be increased further.

#### Outlook

Heavy rainfall continues throughout South East Queensland and the situation could deteriorate over the next 24 hours. The flood operation centre will continue to monitor the situation and provide situation reports every six hours until the situation stabilizes.

<b>Seqwater Technical Officer name</b>	Robert Drury
<b>Seqwater Technical Officer position title</b>	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

<b>BoM Technical Officer name</b>	Peter Baddiley
<b>BoM Technical Officer position title</b>	
<b>BoM Technical Officer contact details</b>	flood.qld [REDACTED]

#### Brisbane City Council (BCC) assessment

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

Council has been advised of the current status.

<b>BCC Technical Officer name</b>	Chris Lavin
<b>BCC Technical Officer position title</b>	Disaster Operations Manager
<b>BCC Technical Officer contact details</b>	[REDACTED]

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

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

Council has been advised of the current status.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)

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

Council has been advised of the current status.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	11.1.2011	Time	PM	or Event	
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## Litsupport Brisbane

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**From:** Stan Stevenson [sstevenson@seqwater.com.au]  
**Sent:** Tuesday, 11 January 2011 12:46 PM  
**To:** Dan Spiller; SEQWGM Emergency  
**Cc:** Peter Borrows; Rob Drury; Paul Bird; David Roberts  
**Subject:** Technical Situation Report W39 (2).docx  
**Attachments:** Technical Situation Report W39 (2).docx

Latest situation report for dam releases, Rob Drury is isolated on the road so I am sending on his behalf

Regards

**Stan Stevenson**  
Acting EGM Water Delivery  
QLD Bulk Water Supply Authority *trading as Seqwater*



Ph (07) 3060 1111 | Fax (07) 3060 1111 | Mobile (07) 3060 1111 | E [sstevenson@seqwater.com.au](mailto:sstevenson@seqwater.com.au)  
Level 3, 240 Margaret St, Brisbane City QLD 4000 Australia  
PO Box 16146, City East QLD 4002  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W39</b>	<b>Date of TSR release</b>	<b>11.1.2011</b>	<b>Time of TSR release</b>	<b>12.00pm</b>
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Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld

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

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

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SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	11.1.2011	Time	PM	For Event	
--------------	------	-----------	------	----	-----------	--

Gina O'Driscoll

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**From:** Paul Bird [pbird@redacted] on behalf of Corporate Communications [corpcommunications@redacted]  
**Sent:** Tuesday, 11 January 2011 1:02 PM  
**To:** SEQWGM Media Reception; arcebuck@redacted; greg.swain@redacted; GSTUBBS@redacted; Kathy Petrik; lisa.m.martin@redacted; Paula Weston; tjacobs@redacted; Arminda Roberts; Bec Middlemiss; Michael Flechtner; Mike Foster; Tara King; Barry Dennien; Dan Spiller; Scott Denner  
**Cc:** Michael Lyons; Mike Foster; ELT  
**Subject:** Release Update  
**Attachments:** image001.jpg

As at 1.00 pm on Tuesday 11 January, the following applies:

**SOMERSET DAM:**

Releases have stopped, however levels in Somerset are expected to continue rising and areas around Kilcoy are likely to be impacted.

**WIVENHOE DAM:**

Releases through five gates have been increased to 344,000 megalitres as at 1.00pm and may need to be increased to around 516,000 megalitres a day by Wednesday 12 January due to rainfall in the Stanley and Upper Brisbane.

Local Councils have been advised that as a result of Lockyer Creek flows, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January.

**NORTH PINE DAM:**

Five gates are open, and will continue until at least Wednesday 12 January.

The local Council is being kept informed regarding Youngs Crossing.

**LESLIE HARRISON DAM:**

Gate releases are underway due to rainfall and inflows.

**HINZE DAM:**

A minor release of around 4,300 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.

**RECREATION UPDATE:**

Both Wivenhoe and Somerset are closed to all recreational activities.

The following recreation sites are closed –

- O'Sheas Crossing
- Hamon Cove
- Logan Inlet
- Captain Logan Camp
- Lumley Hill
- Spillway Common/ Atkinson's Crossing

- Cormorant Bay
- Branch Creek
- Billies Bay/Hays Landing
- The Spit
- Lake Somerset Holiday Park Kirkleagh
- Somerset Park Camping area

This information will be updated during Tuesday 11 January.

Paul Bird  
Senior Communications Advisor  
Queensland Bulk Water Supply Authority *trading as Seqwater*



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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W47</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>5am</b>
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Maintain controlled releases.</li> <li>Keep sluices closed at Somerset Dam to store more water however will affect upstream areas.</li> </ul>
<b>Key considerations</b>	Storage levels: Above FSL
	Inflows: Inflows expected well over 1,500,000ML.
	Rainfall: Continuing
	Lockyer/Bremer: Monitoring their inflows
	Brisbane River: Impact as below.

### Somerset/Wivenhoe

Our strategy revolved ensuring dam security and was around trying to prevent initiation of the first fuse plug at EL 75.6m. If this happens we will get a rapid increase of about 2,000m<sup>3</sup>/s in outflow from the dam in addition to the gate release which could be as high as 10,000m<sup>3</sup>/s at the time.

Only minimal falls occurred overnight in the order of mm.

Sluices have been closed at Somerset and this will result in high upstream water levels affecting Kilcoy. Somerset is at 105.1m holding 719730ML and 189.5%. Some flows are going over the Somerset spillway.

Somerset should peak at around 105.2m (1974 peak level was 106.5m).

At 0500 Wivenhoe Dam was 74.77m AHD holding 2,195,287ML and 188%.

The FOC has begun an appropriate closure sequence to reduce releases.

Current release rate is 4,300cumecs.  
Further reductions will occur throughout the week..

Assuming no further rain, the dam peaked around 74.97m AHD which was around 600mm below the first fuse plug initiation level.

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is also maintaining close contact with warning agencies and local councils.

It should be noted that the flow in the lower Brisbane R in 1974 was about 9,500m<sup>3</sup>/s

**North Pine Dam:**

Five gates are open and continuing to drop. Releases may still continue until Wednesday 12 January. The event magnitude is estimated to be a 1:10,000 year exceedance probability.

The local Council is being kept informed regarding Youngs Crossing.

**Leslie Harrison Dam:**

Gate releases are underway due to rainfall and inflows.

**Hinze Dam:**

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

<b>Seqwater Technical Officer name</b>	Robert Drury
<b>Seqwater Technical Officer position title</b>	Dam Operations Manager

**BoM assessment**

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

BoM has been advised.

<b>BoM Technical Officer name</b>	Peter Baddiley
<b>BoM Technical Officer position title</b>	
<b>BoM Technical Officer contact details</b>	flood.qld

**Brisbane City Council (BCC) assessment**

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

Council has been advised of the current strategy

<b>BCC Technical Officer name</b>	Chris Lavin
<b>BCC Technical Officer position title</b>	Disaster Operations Manager
<b>BCC Technical Officer contact details</b>	

Ipswich City Council (ICC) assessment (if required)  
 (to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>ICC Technical Officer name</b>	Tony Trace
<b>ICC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>ICC Technical Officer contact details</b>	

Somerset Regional Council (SRC) assessment (if required)  
 (to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>SRC Technical Officer name</b>	Tony Jacobs
<b>SRC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>SRC Technical Officer contact details</b>	

Collated and distributed by (Agency)

<b>Contact Officer signature</b>	
<b>Contact Officer name</b>	Rob Drury
<b>Contact Officer position title</b>	Dam Operations Manager

<b>Next TSR due</b>	<b>Date</b>	12.1.2011	<b>Time</b>	PM	<b>For Event</b>	
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**From:** Dan Spiller <Daniel.Spiller[REDACTED]>  
**Sent:** Wednesday, January 12, 2011 5:37 AM  
**To:** stephen.robertson[REDACTED]; ken.smith[REDACTED]  
Bradley John <John.Bradley[REDACTED]>  
lance.mccallum[REDACTED]; Tim.Watts[REDACTED]  
Geoff.Stead[REDACTED]; Lauren.Sims[REDACTED]  
'Martin.PeterJ[REDACTED]'; 'Dunn.KerryG[REDACTED]'; Best  
Debbie <Debbie.Best[REDACTED]>  
**Cc:** Barry Dennien <Barry.Dennien[REDACTED]>; Peter Borrows  
<pborrows[REDACTED]>; Rob Drury <rdrury[REDACTED]>  
SEQWGM Media <media[REDACTED]>; SEQWGM Emergency  
<SEQWGM.Emergency[REDACTED]>;  
Madgwick.Darren[REDACTED]; damien.brown[REDACTED]  
Reilly Bob <Bob.Reilly[REDACTED]>  
**Subject:** Dam release update  
**Attach:** Technical Situation Report W47.docx

---

All,

Attached is the most recent situation report.

There was minimum rainfall in the catchment last night, meaning that dam levels and release rates were reduced.

Wivenhoe Dam is currently at 188%, having peaked at about 191% (74.97m AHD, about 0.6m below the first fuse peak). Somerset Dam is at about 190%, which is its peak level.

Releases are now at 4,300 cubic metres per second (about 370,000 ML/day), having peaked at 7,500 cubic metres per second (about 650,000 ML/day) for a couple of hours.

We will update the report about every three hours. The next report will include more information about the closing sequence, including the broad timeframes for dam levels to be reduced. Note that, while dam levels are reducing, they remain at critical levels.

An update on water treatment will be provided later this morning.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

**Daniel Spiller**

Director, Operations

SEQ Water Grid Manager

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

Email: [daniel.spiller\[REDACTED\]](mailto:daniel.spiller[REDACTED])

Visit: Level 15, 53 Albert Street Brisbane

Post: PO Box 16205, City East QLD 4002

ABN: 14783 317 630

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## TECHNICAL SITUATION REPORT

TSR Number	W47	Date of TSR release	12.1.2011	Time of TSR release	5am
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### Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

Current objectives	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>										
Strategy	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Maintain controlled releases.</li> <li>Keep sluices closed at Somerset Dam to store more water however will affect upstream areas.</li> </ul>										
Key considerations	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 1,500,000ML</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 1,500,000ML	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
Inflows:	Inflows expected well over 1,500,000ML										
Rainfall:	Continuing										
Lockyer/Bremer:	Monitoring their inflows										
Brisbane River:	Impact as below.										

### Somerset/Wivenhoe

Our strategy revolved ensuring dam security and was around trying to prevent initiation of the first fuse plug at EL 75.6m. If this happens we will get a rapid increase of about 2,000m<sup>3</sup>/s in outflow from the dam in addition to the gate release which could be as high as 10,000m<sup>3</sup>/s at the time.

Only minimal falls occurred overnight in the order of mm.

Sluices have been closed at Somerset and this will result in high upstream water levels affecting Kilcoy. Somerset is at 105.1m holding 719730ML and 189.5%. Some flows are going over the Somerset spillway.

Somerset should peak at around 105.2m (1974 peak level was 106.5m).

At 0500 Wivenhoe Dam was 74.77m AHD holding 2,195,287ML and 188%.

The FOC has begun an appropriate closure sequence to reduce releases.

Current release rate is 4,300cumecs.  
Further reductions will occur throughout the week.

Assuming no further rain, the dam peaked around 74.97m AHD which was around 600mm below the first fuse plug initiation level.

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is also maintaining close contact with warning agencies and local councils.

It should be noted that the flow in the lower Brisbane R in 1974 was about 9,500m<sup>3</sup>/s

**North Pine Dam:**

Five gates are open and continuing to drop. Releases may still continue until Wednesday 12 January. The event magnitude is estimated to be a 1:10,000 year exceedance probability.

The local Council is being kept informed regarding Youngs Crossing.

**Leslie Harrison Dam:**

Gate releases are underway due to rainfall and inflows.

**Hinze Dam:**

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

**BoM assessment**

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld

**Brisbane City Council (BCC) assessment**

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

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

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

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

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

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

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	PM	or Event	
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**From:** Paul Bird [pbird [REDACTED]]  
**Sent:** Wednesday, 12 January 2011 6:05 AM  
**To:** SEQWGM Media; Geoff Stead; aroebuck [REDACTED]; greg.swain [REDACTED]; GSTUBBS [REDACTED]; Kathy Petrik; lisa.m.martin [REDACTED]; Paula Weston; tjacobs [REDACTED]; Arminda Roberts; Bec Middlemiss; Michael Fiechtner; Mike Foster; Tara King; Barry Dennien; Dan Spiller; Scott Denner  
**Cc:** Michael Lyons; ELT  
**Subject:** Release Update

As at 6.00 am on Wednesday 12 January, the following applies:

**SOMERSET DAM:**

Releases have stopped, however levels in Somerset are expected to continue rising and areas around Kilcoy are likely to be impacted. Some releases are going over the spillway and releases into Wivenhoe will need to recommence in the near future.

**WIVENHOE DAM:**

The Flood Operations Centre has begun an appropriate closure sequence to reduce releases.

Releases have been reduced slowly during the night to drop levels and are currently at 369,800 megalitres per day.

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes.

The Centre is also maintaining close contact with warning agencies and local councils.

**NORTH PINE DAM:**

Five gates are open, and will continue. It is expected with no further rain to close the gates today or tomorrow.

The local Council is being kept informed regarding Youngs Crossing.

**LESLIE HARRISON DAM:**

Gate releases are underway due to rainfall and inflows. It is expected that the dam release may finish later today.

**WINZE DAM:**

A minor release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.

This information will be updated during the morning of Wednesday January 12

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**From:** Barry Dennien <Barry.Dennien [REDACTED]>  
**Sent:** Wednesday, January 12, 2011 6:15 AM  
**To:** Dan Spiller <Daniel.Spiller [REDACTED]>; Colin Jensen  
<colin.jensen [REDACTED]>  
**Subject:** Re: Dam release update

---

Col

Further info

Regards  
Barry Dennien

On 12/01/2011, at 5:37 AM, "Dan Spiller" <Daniel.Spiller [REDACTED]> wrote:

All,

Attached is the most recent situation report.

There was minimum rainfall in the catchment last night, meaning that dam levels and release rates were reduced.

Wivenhoe Dam is currently at 188%, having peaked at about 191% (74.97m AHD, about 0.6m below the first fuse peak). Somerset Dam is at about 190%, which is its peak level.

Releases are now at 4,300 cubic metres per second (about 370,000 ML/day), having peaked at 7,500 cubic metres per second (about 650,000 ML/day) for a couple of hours.

We will update the report about every three hours. The next report will include more information about the closing sequence, including the broad timeframes for dam levels to be reduced. Note that, while dam levels are reducing, they remain at critical levels.

An update on water treatment will be provided later this morning.

Please call me on [REDACTED] if you require further information.

Regards,

Dan

**Daniel Spiller**

Director, Operations

**SEQ Water Grid Manager**

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

Email: [daniel.spiller@seqwater.com.au](mailto:daniel.spiller@seqwater.com.au)

Visit: Level 15, 53 Albert Street Brisbane

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<Technical Situation Report W47.docx>

## Dan Spiller

---

**From:** Rob Drury [rdrury@seqwater.com.au]  
**Sent:** Wednesday, 12 January 2011 7:58 AM  
**To:** Dan Spiller  
**Subject:** RE: Dam release update  
**Attachments:** image001.jpg; image002.png

### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 mAHD at 06:00 on 12 January 2011 and the dam is discharging 1,230 m<sup>3</sup>/s over the spillway. Sluice gates will be utilised to assist the draining of the flood storage compartment commencing later Wednesday.

Wivenhoe Dam peaked at 74.97 mAHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s. Wivenhoe Dam was 74.75 m AHD at 07:30 and generally falling slowly.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be in excess of 2 million megalitres.

### North Pine

At 07:00 North Pine Dam was 39.78 mAHD falling and releasing about 105 m<sup>3</sup>/s. North Pine has peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m<sup>3</sup>/s. The event has a volume of around 200,000 ML. It is expected that gates will be close later Wednesday or early Thursday.

### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority trading as Seqwater



Swimming in weirs and  
flowing water is **FAI**

**rethink**

Ph [REDACTED] | Fax [REDACTED] | M [REDACTED] E [rdrury@seqwater.com.au](mailto:rdrury@seqwater.com.au)  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

---

**From:** Dan Spiller [mailto:[Daniel.Spiller@seqwater.com.au](mailto:Daniel.Spiller@seqwater.com.au)]  
**Sent:** Wednesday, 12 January 2011 5:37 AM  
**To:** [stephen.robertson@seqwater.com.au](mailto:stephen.robertson@seqwater.com.au); [ken.smith@seqwater.com.au](mailto:ken.smith@seqwater.com.au); Bradley John;  
[lance.mccallum@seqwater.com.au](mailto:lance.mccallum@seqwater.com.au); Tim.Watts@seqwater.com.au; Geoff.Stead@seqwater.com.au  
[Lauren.Sims@seqwater.com.au](mailto:Lauren.Sims@seqwater.com.au); 'Martin.PeterJ@seqwater.com.au'; 'Dunn.KerryG@seqwater.com.au'; Best Debbie  
**Cc:** Barry Dennien; Peter Borrows; Rob Drury; SEQWGM Media; SEQWGM Emergency;  
[Madgwick.DarrenT@seqwater.com.au](mailto:Madgwick.DarrenT@seqwater.com.au); [damien.brown@seqwater.com.au](mailto:damien.brown@seqwater.com.au); Reilly Bob  
**Subject:** Dam release update

All,

Attached is the most recent situation report.

There was minimum rainfall in the catchment last night, meaning that dam levels and release rates were reduced.

Wivenhoe Dam is currently at 188%, having peaked at about 191% (74.97m AHD, about 0.6m below the first fuse peak). Somerset Dam is at about 190%, which is its peak level.

Releases are now at 4,300 cubic metres per second (about 370,000 ML/day), having peaked at 7,500 cubic metres per second (about 650,000 ML/day) for a couple of hours.

We will update the report about every three hours. The next report will include more information about the closing sequence, including the broad timeframes for dam levels to be reduced. Note that, while dam levels are reducing, they remain at critical levels.

An update on water treatment will be provided later this morning.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

Daniel Spiller  
Director, Operations  
SEQ Water Grid Manager

Phone: [REDACTED] Fax: [REDACTED] | Mobile: [REDACTED]  
Email: [daniel.spiller@seqwater.com.au](mailto:daniel.spiller@seqwater.com.au)  
Visit: Level 15, 53 Albert Street Brisbane  
Post: PO Box 16205, City East QLD 4002  
ABN: 14783 317 630

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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W48</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>8am</b>
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>										
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Develop and implement closing plan for next 7 or so days</li> </ul>										
<b>Key considerations</b>	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 2,000,000ML</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 2,000,000ML	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
Inflows:	Inflows expected well over 2,000,000ML										
Rainfall:	Continuing										
Lockyer/Bremer:	Monitoring their inflows										
Brisbane River:	Impact as below.										

### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam is discharging 1,230 m<sup>3</sup>/s over the spillway. Sluice gates will be utilised to assist the draining of the flood storage compartment commencing later Wednesday. At 8am Somerset was 105.11m and 720,400ML at 189.7%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s. Wivenhoe Dam was 74.75 m AHD at 2,192,000ML and 188.1% at 07:30 and generally falling slowly.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be in excess of 2 million megalitres.

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At 07:00 North Pine Dam was 39.78 m AHD falling and releasing about 105 m<sup>3</sup>/s. North Pine has

peaked at 41.11 mAHd at 14:00 on 11 January 1974 with peak release of 2,800 m<sup>3</sup>/s. The event has a volume of around 200,000 ML. It is expected that gates will be close later Wednesday or early Thursday

### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld

### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

Ipswich City Council (ICC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	11am	of Event	
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**From:** Dan Spiller <Daniel.Spiller [REDACTED]>  
**Sent:** Wednesday, January 12, 2011 7:59 AM  
**To:** Barry Dennien <Barry.Dennien [REDACTED]>  
**Subject:** FW: Dam release update

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**From:** Rob Drury [mailto:rdrury [REDACTED]]  
**Sent:** Wednesday, January 12, 2011 7:58 AM  
**To:** Dan Spiller  
**Subject:** RE: Dam release update

#### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

#### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 mAHD at 06:00 on 12 January 2011 and the dam is discharging 1,230 m3/s over the spillway. Sluice gates will be utilised to assist the draining of the flood storage compartment commencing later Wednesday.

Wivenhoe Dam peaked at 74.97 mAHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m3/s. Wivenhoe Dam was 74.75 m AHD at 07:30 and generally falling slowly.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m3/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m3/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be in excess of 2 million megalitres.

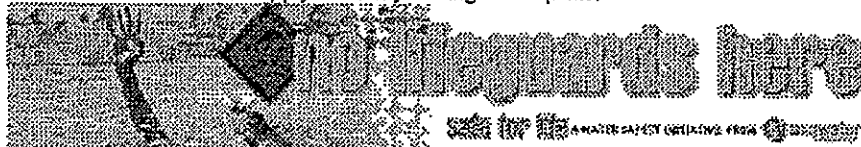
#### North Pine

At 07:00 North Pine Dam was 39.78 mAHD falling and releasing about 105 m3/s. North Pine has peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m3/s. The event has a volume of around 200,000 ML. It is expected that gates will be close later Wednesday or early Thursday.

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority trading as Seqwater



Swimming in weirs and fast flowing water is FATAL



Ph [REDACTED] | Fax [REDACTED] | M [REDACTED] | E rdrury [REDACTED]  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306

---

**From:** Dan Spiller [mailto:Daniel.Spiller@seqwater.com.au]  
**Sent:** Wednesday, 12 January 2011 5:37 AM  
**To:** stephen.robertson@seqwater.com.au; ken.smith@seqwater.com.au; Bradley John; lance.mccallum@seqwater.com.au; Tim.Watts@seqwater.com.au; Geoff.Stead@seqwater.com.au; Lauren.Sims@seqwater.com.au; Martin.PeterJ@seqwater.com.au; Dunn.KerryG@seqwater.com.au; Best Debbie  
**Cc:** Barry Dennien; Peter Borrows; Rob Drury; SEQWGM Media; SEQWGM Emergency; Madgwick.Darren@seqwater.com.au; damien.brown@seqwater.com.au; Reilly Bob  
**Subject:** Dam release update

All,

Attached is the most recent situation report.

There was minimum rainfall in the catchment last night, meaning that dam levels and release rates were reduced.

Wivenhoe Dam is currently at 188%, having peaked at about 191% (74.97m AHD, about 0.6m below the first fuse peak). Somerset Dam is at about 190%, which is its peak level.

Releases are now at 4,300 cubic metres per second (about 370,000 ML/day), having peaked at 7,500 cubic metres per second (about 650,000 ML/day) for a couple of hours.

We will update the report about every three hours. The next report will include more information about the closing sequence, including the broad timeframes for dam levels to be reduced. Note that, while dam levels are reducing, they remain at critical levels.

An update on water treatment will be provided later this morning.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

Daniel Spiller  
Director, Operations  
SEQ Water Grid Manager  
Phone: [REDACTED] Fax: [REDACTED] | Mobile: [REDACTED]  
Email: [daniel.spiller@seqwater.com.au](mailto:daniel.spiller@seqwater.com.au)  
Visit: Level 15, 53 Albert Street Brisbane  
Post: PO Box 16205, City East QLD 4002  
ABN: 14783 317 630

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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	W48	<b>Date of TSR release</b>	12.1.2011	<b>Time of TSR release</b>	8am
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Develop and implement closing plan for next 7 or so days</li> </ul>
<b>Key considerations</b>	Storage levels: Above FSL
	Inflows: Inflows expected well over 2,000,000ML.
	Rainfall: Continuing
	Lockyer/Bremer: Monitoring their inflows
	Brisbane River: Impact as below.

### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam is discharging 1,230 m<sup>3</sup>/s over the spillway. Sluice gates will be utilised to assist the draining of the flood storage compartment commencing later Wednesday. At 8am Somerset was 105.11m and 720,400ML at 189.7%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s. Wivenhoe Dam was 74.75 m AHD at 2,192,000ML and 188.1% at 07:30 and generally falling slowly.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be in excess of 2 million megalitres.

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### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

<b>Seqwater Technical Officer name</b>	Robert Drury
<b>Seqwater Technical Officer position title</b>	Dam Operations Manager

### BoM assessment

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

BoM has been advised.

<b>BoM Technical Officer name</b>	Peter Baddiley
<b>BoM Technical Officer position title</b>	
<b>BoM Technical Officer contact details</b>	flood.qld [redacted]

### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

<b>BCC Technical Officer name</b>	Chris Lavin
<b>BCC Technical Officer position title</b>	Disaster Operations Manager
<b>BCC Technical Officer contact details</b>	[redacted]

Ipswich City Council (ICC) assessment (if required)  
 (to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>ICC Technical Officer name</b>	Tony Trace
<b>ICC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>ICC Technical Officer contact details</b>	

Somerset Regional Council (SRC) assessment (if required)  
 (to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>SRC Technical Officer name</b>	Tony Jacobs
<b>SRC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>SRC Technical Officer contact details</b>	

Collated and distributed by (Agency)

<b>Contact Officer signature</b>	
<b>Contact Officer name</b>	Rob Drury
<b>Contact Officer position title</b>	Dam Operations Manager

<b>Next TSR due</b>	<b>Date</b>	12.1.2011	<b>Time</b>	11am	<b>For Event</b>	
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## Litsupport Brisbane

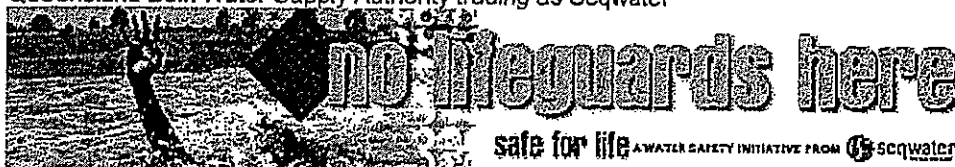
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**From:** Rob Drury [rdrury@seqwater.com.au]  
**Sent:** Wednesday, 12 January 2011 8:21 AM  
**To:** Rob Drury; Dan Spiller; Paul Bird; Stan Stevenson; Peter Borrows; Peter Allen  
**Cc:** David Roberts; Duty Seq  
**Subject:** RE: Technical Report W48  
**Attachments:** Technical Situation Report W48.docx

Attached report W48.

Rob

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority trading as Seqwater



Swimming in weirs and fast  
flowing water is FATAL

**rethink it.**



Ph ( ) | Fax ( ) | M ( ) E rdrury ( )  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

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## TECHNICAL SITUATION REPORT

TSR Number	W48	Date of TSR release	12.1.2011	Time of TSR release	8am
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### Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

Current objectives	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>										
Strategy	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Develop and implement closing plan for next 7 or so days</li> </ul>										
Key considerations	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 2,000,000ML.</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 2,000,000ML.	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
Inflows:	Inflows expected well over 2,000,000ML.										
Rainfall:	Continuing										
Lockyer/Bremer:	Monitoring their inflows										
Brisbane River:	Impact as below.										

### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam is discharging 1,230 m<sup>3</sup>/s over the spillway. Sluice gates will be utilised to assist the draining of the flood storage compartment commencing later Wednesday. At 8am Somerset was 105.11m and 720,400ML at 189.7%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s. Wivenhoe Dam was 74.75 m AHD at 2,192,000ML and 188.1% at 07:30 and generally falling slowly.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be in excess of 2 million megalitres.

### North Pine

At 07:00 North Pine Dam was 39.78 mAHD falling and releasing about 105 m<sup>3</sup>/s. North Pine has

peaked at 41.11 mAHd at 14:00 on 11 January 1974 with peak release of 2,800 m3/s. The event has a volume of around 200,000 ML. It is expected that gates will be close later Wednesday or early Thursday

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld [REDACTED]

#### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	[REDACTED]

Ipswich City Council (ICC) assessment (if required)

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

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)

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

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	11am	for Event	
--------------	------	-----------	------	------	-----------	--

**Gina O'Driscoll**

---

**From:** Paul Bird [pbird [REDACTED]]  
**Sent:** Wednesday, 12 January 2011 8:26 AM  
**To:** SEQWGM Media; ELT; Geoff Stead; aroebuck [REDACTED]; greg.swain [REDACTED]; GSTUBBS [REDACTED]; Kathy Petrik; lisa.m.martin [REDACTED]; Paula Weston; tjacobs [REDACTED]; Arminda Roberts; Bec Middlemiss; Michael Fiechtner; Mike Foster; Tara King; Barry Dennien; Dan Spiller; Scott Denner  
**Cc:** Jade Simmons; Shelley Banks; Michael Lyons; John Adcock  
**Subject:** Release Update

As at 8.00 am on Wednesday 12 January, the following applies:

**SOMERSET DAM:**

Releases have stopped and the level in Somerset has almost peaked. Some releases are going over the spillway and sluice releases into Wivenhoe will need to recommence later on Wednesday 12 January.

**WIVENHOE DAM:**

The Flood Operations Centre has begun an appropriate closure sequence to reduce releases.

The releases from Wivenhoe Dam have been temporarily reduced to 215,000 megalitres per day to allow the peak of Lockyer Creek to enter the Brisbane River.

After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 301,000 megalitres per day.

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes.

The Centre is also maintaining close contact with warning agencies and local councils.

**NORTH PINE DAM:**

Five gates are open, and will continue. It is expected with no further rain to close the gates today or tomorrow.

The local Council is being kept informed regarding Youngs Crossing.

**LESLIE HARRISON DAM:**

Gate releases are underway due to rainfall and inflows. It is expected that the dam release may finish later today.

**HINZE DAM:**

A minor release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.

**RECREATION UPDATE:**

Both Wivenhoe and Somerset are closed to all recreational activities.

The following recreation sites are closed –

- O'Sheas Crossing
- Hamon Cove

- Logan Inlet
- Captain Logan Camp
- Lumley Hill
- Spillway Common/ Atkinson's Crossing
- Cormorant Bay
- Branch Creek
- Billies Bay/Hays Landing
- The Spit
- Lake Somerset Holiday Park Kirkleagh
- Somerset Park Camping area

This information will be updated during the morning of Wednesday January 12

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LD Bulk Water Supply Authority ABN75450239876 (Trading as Seqwater).

**Gina O'Driscoll**

---

**From:** Dan Spiller  
**Sent:** Wednesday, 12 January 2011 9:00 AM  
**To:** 'stephen.robertson'; 'ken.smith'; 'Bradley John'; 'lance.mccallum'; 'Tim.Watts'; 'Geoff.Stead'; 'Lauren.Sims'; 'Martin.Peter'; 'Dunn.KerryG'; 'Best Debbie'  
**Cc:** Barry Dennien; 'Peter Borrows'; 'Rob Drury'; SEQWGM Media; SEQWGM Emergency; 'Madgwick.DarrenT'; 'damien.brown'; 'Reilly Bob'  
**Subject:** Dam release update  
**Attachments:** Technical Situation Report W48.docx

All,

Attached is an updated Technical Support Report, including advice about the gate closure process.

Note that releases have been reduced to 2,500 cubic metres per second while peak Lockyer Valley flows pass. Increases will then increase to 3,500 cubic metres per second.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

**Daniel Spiller**  
Director, Operations  
SEQ Water Grid Manager

Phone: [REDACTED] Fax: [REDACTED] | Mobile: [REDACTED]  
Email: [daniel.spiller@seqwater.com.au](mailto:daniel.spiller@seqwater.com.au)  
Visit: Level 15, 53 Albert Street Brisbane  
Post: PO Box 16205, City East QLD 4002  
ABN: 14783 317 630

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## TECHNICAL SITUATION REPORT

TSR Number	W48	Date of TSR release	12.1.2011	Time of TSR release	8am
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Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

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BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld

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Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

Ipswich City Council (ICC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information).

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	11am	or Event	
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**From:** Dan Spiller <Daniel.Spiller@seqwater.qld.gov.au>  
**Sent:** Wednesday, January 12, 2011 9:01 AM  
**To:** 'ceo@seqwater.qld.gov.au'  
**Cc:** Barry Dennien <Barry.Dennien@seqwater.qld.gov.au>  
**Subject:** FW: Dam release update  
**Attach:** Technical Situation Report W48.docx

---

Colin,

Further to our discussion earlier, attached is the release strategy.

Dan

---

**From:** Dan Spiller  
**Sent:** Wednesday, January 12, 2011 9:00 AM  
**To:** 'stephen.robertson@seqwater.qld.gov.au'; 'ken.smith@seqwater.qld.gov.au'; 'Bradley John'; 'lance.mccallum@seqwater.qld.gov.au'; 'Tim.Watts@seqwater.qld.gov.au'; 'Geoff.Stead@seqwater.qld.gov.au'; 'Lauren.Sims@seqwater.qld.gov.au'; 'Martin.Peter@seqwater.qld.gov.au'; 'Dunn.KerryG@seqwater.qld.gov.au'; 'Best Debbie'  
**Cc:** Barry Dennien; 'Peter Borrows'; 'Rob Drury'; SEQWGM Media; SEQWGM Emergency; 'Madgwick.Darren@seqwater.qld.gov.au'; 'damien.brown@seqwater.qld.gov.au'; 'Reilly Bob'  
**Subject:** Dam release update

All,

Attached is an updated Technical Support Report, including advice about the gate closure process.

Note that releases have been reduced to 2,500 cubic metres per second while peak Lockyer Valley flows pass. Increases will then increase to 3,500 cubic metres per second.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

**Daniel Spiller**  
Director, Operations  
SEQ Water Grid Manager  
Phone: [REDACTED] | Fax: [REDACTED] | Mobile: [REDACTED]  
Email: [daniel.spiller@seqwater.qld.gov.au](mailto:daniel.spiller@seqwater.qld.gov.au)  
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.

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If not an intended recipient of this email, you must not copy, distribute or take any action(s) that relies on it; any form of disclosure, modification, distribution and/or publication of this email is also prohibited. While all care has been taken, the SEQ Water Grid Manager disclaims all liability for loss or damage to person or property arising from this message being infected by a computer virus or other contamination. Unless stated otherwise, this email represents only the views of the sender and not the views of the SEQ Water Grid Manager and/or the Queensland Government.

## TECHNICAL SITUATION REPORT

TSR Number	W48	Date of TSR release	12.1.2011	Time of TSR release	8am
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### Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

Current objectives	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>										
Strategy	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Develop and implement closing plan for next 7 or so days</li> </ul>										
Key considerations	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 2,000,000ML</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 2,000,000ML	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
Inflows:	Inflows expected well over 2,000,000ML										
Rainfall:	Continuing										
Lockyer/Bremer:	Monitoring their inflows										
Brisbane River:	Impact as below.										

### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam is discharging 1,230 m<sup>3</sup>/s over the spillway. Sluice gates will be utilised to assist the draining of the flood storage compartment commencing later Wednesday. At 8am Somerset was 105.11m and 720,400ML at 189.7%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s. Wivenhoe Dam was 74.75 m AHD at 2,192,000ML and 188.1% at 07:30 and generally falling slowly.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be in excess of 2 million megalitres.

### North Pine

At 07:00 North Pine Dam was 39.78 m AHD falling and releasing about 105 m<sup>3</sup>/s. North Pine has

peaked at 41.11 mAHd at 14:00 on 11 January 1974 with peak release of 2,800 m<sup>3</sup>/s. The event has a volume of around 200,000 ML. It is expected that gates will be close later Wednesday or early Thursday

### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld@bom.gov.au

### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

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

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

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

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

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

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

**Collated and distributed by (Agency)**

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	11am	or Event	
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**From:** Barry Dennien <Barry.Dennien@ [REDACTED]>  
**Sent:** Wednesday, January 12, 2011 9:24 AM  
**To:** Dan Spiller <Daniel.Spiller@ [REDACTED]>; Peter Borrows  
<pborrows@ [REDACTED]>  
**Subject:** Fwd: Wivenhoe Dam Flood Operations  
**Attach:** SEQ WGM PrelimRep 12012011.docx; ATT00001.htm

---

Guys urgent proof check please looks ok to me

Regards  
Barry Dennien

Begin forwarded message:

**From:** Brian Cooper Consulting <brian.cooper.consulting@ [REDACTED]>  
**Date:** 12 January 2011 9:12:28 AM AEST  
**To:** Barry Dennien <Barry.Dennien@ [REDACTED]>  
**Cc:** Elaina Smouha <Elaina.Smouha@ [REDACTED]>  
**Subject:** Wivenhoe Dam Flood Operations

Dear Barry,

Please find attached, my letter report giving my initial findings regarding the operations of Wivenhoe and Somerset Dams. Please do not hesitate to call me if you have any questions.

Regards,

Brian Cooper

P.O. Box 205, BELROSE WEST NSW 2085

phone: [REDACTED]

mobile: [REDACTED]

email: brian.cooper.consult@[REDACTED]

ABN: 56154707619

brian  
cooper

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 preliminary 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 initial 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 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 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.

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;
- 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. 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.

Over the last couple of days, the storage level in Wivenhoe Dam has increased to above EL 74.0 and the storage level in Somerset Dam is at EL 103.3 and is rising. This situation would demand strategy W3 for Wivenhoe Dam (*limit flow in the Brisbane River at Moggill to less than 4,000m<sup>3</sup>/s*) and strategy S2 for Somerset Dam (*The crest gates are raised to enable uncontrolled discharge. Operations are to target a correlation of water levels in Somerset Dam and Wivenhoe Dam as set out in a graph. The operations target line shown on this graph is to generally be followed as the flood event progresses. The release rate from Somerset Dam is generally not to exceed the peak inflow into the dam*). These strategies have been followed, although there appears to have been some discretion used in varying the releases from Somerset Dam (water has been held back in that dam). The last Technical Situation Report (W39 on 11/1/2011) however, indicated that there may need to be a move to Strategy W4 for Wivenhoe Dam (fuse plug triggering likely).

I conclude then, 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. 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, rainfall events, storage inflows, releases made and critical levels and discharges together with strategies adopted and projected strategies. 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. I am informed by the Queensland Dam Safety Regulator (Peter Allen) 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.

Regards,



Brian Cooper

Gina O'Driscoll

---

**From:** Barry Dennien  
**Sent:** Wednesday, 12 January 2011 9:39 AM  
**To:** Peter Borrows  
**Subject:** Re: Wivenhoe Dam Flood Operations

Ta

Regards  
Barry Dennien

On 12/01/2011, at 9:36 AM, "Peter Borrows" <pborrows@redacted> wrote:

OK by me.

Peter

---

**From:** Barry Dennien <Barry.Dennien@redacted>  
**To:** Dan Spiller <Daniel.Spiller@redacted>; Peter Borrows  
**Sent:** Wed Jan 12 09:24:06 2011  
**Subject:** Fwd: Wivenhoe Dam Flood Operations

Guys urgent proof check please looks ok to me

Regards  
Barry Dennien

Begin forwarded message:

**From:** Brian Cooper Consulting <brian.cooper.consult@redacted>  
**Date:** 12 January 2011 9:12:28 AM AEST  
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P.O. Box 205, BELROSE WEST NSW 2085  
phone: [REDACTED]  
mobile: [REDACTED]  
email: brian.cooper.consult@briancooperconsulting.com.au  
ABN: 56154707619

brian  
cooper  
consulting

12 January 2011

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CEO, SEQ Water Grid Manager  
PO Box 16205  
City East QLD 4002

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- 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;

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PrelimRep

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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).

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Regards,

  
Brian Cooper

## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W49</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>11am</b>
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual reduction of releases.</li> </ul>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Develop and implement closing plan for next 7 or so days</li> <li>Maintain lower releases until Lockyer peak has passed.</li> <li>Begin dropping Somerset Dam to relieve upstream areas.</li> </ul>
<b>Key considerations</b>	Storage levels: Above FSL
	Inflows: Inflows expected well over 1,500,000ML.
	Rainfall: Continuing
	Lockyer/Bremer: Monitoring their inflows
	Brisbane River: Impact as below.

### Rainfall

No significant rain has fallen over the catchments in the past twelve hours. Less than 10 to 15 millimeters of rainfall is expected over the next 24-48 hours.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam is discharging over the spillway.

One Sluice gate has been opened around 11am to assist the draining of the flood storage compartment. Further sluices may be opened during the day to relieve upstream impacts.

At 11am Somerset was 105.06m and 716,900ML at 188.7% and dropping slightly.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m3/s.

At 11am Wivenhoe Dam was 74.78 m AHD at 2,197,000ML and 188.5% and generally steady.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m3/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m3/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be around 2.3 million megalitres.

## North Pine

At 11:00 North Pine Dam was 39.77 mAHD and falling and still releasing from 5 gates. North Pine has peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m<sup>3</sup>/s. The event has a volume of around 200,000 ML. It is expected that gates will now not close until Thursday or Friday.

## Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

<b>Seqwater Technical Officer name</b>	Robert Drury
<b>Seqwater Technical Officer position title</b>	Dam Operations Manager

## BoM assessment

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

BoM has been advised.

<b>BoM Technical Officer name</b>	Peter Baddiley
<b>BoM Technical Officer position title</b>	
<b>BoM Technical Officer contact details</b>	flood.qld [redacted]

## Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

<b>BCC Technical Officer name</b>	Chris Lavin
-----------------------------------	-------------

<b>BCC Technical Officer position title</b>	Disaster Operations Manager
<b>BCC Technical Officer contact details</b>	

Ipswich City Council (ICC) assessment (if required)  
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<b>ICC Technical Officer name</b>	Tony Trace
<b>ICC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>ICC Technical Officer contact details</b>	

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<b>SRC Technical Officer name</b>	Tony Jacobs
<b>SRC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>SRC Technical Officer contact details</b>	

Collated and distributed by (Agency)

<b>Contact Officer signature</b>	
<b>Contact Officer name</b>	Rob Drury
<b>Contact Officer position title</b>	Dam Operations Manager

<b>Next TSR due</b>	<b>Date</b>	12.1.2011	<b>Time</b>	2pm	<b>or Event</b>	
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## Litsupport Brisbane

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**From:** Rob Drury [rdrury [REDACTED]]  
**Sent:** Wednesday, 12 January 2011 11:24 AM  
**To:** Rob Drury; Dan Spiller; Paul Bird; Stan Stevenson; Peter Borrows; Peter.Allen [REDACTED]  
**Cc:** David Roberts  
**Subject:** RE: Technical Report W49  
**Attachments:** Technical Situation Report W49.docx

Attached report.

Starting to release from Somerset to start giving relief to Kilcoy area as space appears in Wivenhoe.

Rob

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority trading as Seqwater



Swimming in weirs and fast  
flowing water is FATAL

**rethink it.**



Ph [REDACTED] | Fax [REDACTED] | M [REDACTED] | E [rdrury@seqwater.com.au](mailto:rdrury@seqwater.com.au)  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

Important information: This email and any attached information is intended only for the addressee and may contain confidential and/or privileged information. If you are not the addressee, you are notified that any transmission, distribution, or other use of this information is strictly prohibited. The confidentiality attached to this email is not waived, lost or destroyed by reasons of mistaken delivery to you. If you have received this email in error please contact the sender immediately and delete the material from your email system. QLD Bulk Water Supply Authority ABN75450239876 (Trading as Seqwater).

## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W49</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>11am</b>
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Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam is discharging over the spillway.

One Sluice gate has been opened around 11am to assist the draining of the flood storage compartment. Further sluices may be opened during the day to relieve upstream impacts.

At 11am Somerset was 105.06m and 716,900ML at 188.7% and dropping slightly.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s.

At 11am Wivenhoe Dam was 74.78 m AHD at 2,197,000ML and 188.5% and generally steady.

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be around 2.3 million megalitres.

## North Pine

At 11:00 North Pine Dam was 39.77 mAHD and falling and still releasing from 5 gates. North Pine has peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m<sup>3</sup>/s. The event has a volume of around 200,000 ML. It is expected that gates will now not close until Thursday or Friday.

## Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

## BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld

## Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
----------------------------	-------------

BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

Ipswich City Council (ICC) assessment (if required)  
*(to include predicted local inundation areas and depths of inundation based on the information)*

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)  
*(to include predicted local inundation areas and depths of inundation based on the information)*

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	2pm	on Event	
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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W50</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>3pm</b>
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual release of stored floodwaters with minimal impact.</li> </ul>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Continue release of water from Somerset into Wivenhoe to reduce impacts upstream in Kilcoy area</li> <li>Maintain reduced release from Wivenhoe until Lockyer flows are reduced and then increase to discharge flood waters over 7 days</li> </ul>
<b>Key considerations</b>	Storage levels: Above FSL
	Inflows: Inflows expected well over 2,300,000ML.
	Rainfall: Continuing
	Lockyer/Bremer: Monitoring their inflows
	Brisbane River: Impact as below.

### Rainfall

Rainfall in the last 12 hours is generally below 5mm with a couple of 10mm falls in the Stanley and North Pine catchments. There is no significant rain expected in the next 4 days.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam has been discharging over the spillway. One sluice was opened at 1030 12 January 2011 and the dam is discharging 1,440 m<sup>3</sup>/s. Sluice gates will be utilised to drain of the flood storage compartment during the next 5 days.

At 3pm Somerset was 104.94m and 708,505ML at 186.5%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

At 3pm Wivenhoe Dam was 74.81 m AHD at 2,201,636ML and 188.9% and fluctuating slightly due to the releases coming from Somerset but relatively steady.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be approximately 2.6 million megalitres.

#### North Pine

North Pine peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m3/s. The event has a volume of around 200,000 ML.

At 3.00pm North Pine Dam was 39.74 mAHD and 217,370 ML and 101.4% and slowly falling. It is expected that gates will be closed Thursday or Friday.

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

<b>Seqwater Technical Officer name</b>	Robert Drury
<b>Seqwater Technical Officer position title</b>	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

<b>BoM Technical Officer name</b>	Peter Baddiley
<b>BoM Technical Officer position title</b>	
<b>BoM Technical Officer contact details</b>	flood.qld

#### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

<b>BCC Technical Officer name</b>	Chris Lavin
<b>BCC Technical Officer position title</b>	Disaster Operations Manager
<b>BCC Technical Officer contact details</b>	

Ipswich City Council (ICC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>ICC Technical Officer name</b>	Tony Trace
<b>ICC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>ICC Technical Officer contact details</b>	

Somerset Regional Council (SRC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>SRC Technical Officer name</b>	Tony Jacobs
<b>SRC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>SRC Technical Officer contact details</b>	

Collated and distributed by (Agency)

<b>Contact Officer signature</b>	
<b>Contact Officer name</b>	Rob Drury
<b>Contact Officer position title</b>	Dam Operations Manager

<b>Next TSR due</b>	<b>Date</b>	12.1.2011	<b>Time</b>	8pm	<b>or Event</b>	
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**Dan Spiller**

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**From:** Robert Drury [druryr] [REDACTED]  
**Sent:** Wednesday, 12 January 2011 3:36 PM  
**To:** Dan Spiller; Dan Spiller  
**Attachments:** Technical\_Situation\_Report\_W50.docx

## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W50</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>3pm</b>
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual release of stored floodwaters with minimal impact.</li> </ul>										
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Continue release of water from Somerset into Wivenhoe to reduce impacts upstream in Kilcoy area</li> <li>Maintain reduced release from Wivenhoe until Lockyer flows are reduced and then increase to discharge flood waters over 7 days</li> </ul>										
<b>Key considerations</b>	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 2,300,000ML</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 2,300,000ML	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
Inflows:	Inflows expected well over 2,300,000ML										
Rainfall:	Continuing										
Lockyer/Bremer:	Monitoring their inflows										
Brisbane River:	Impact as below.										

### Rainfall

Rainfall in the last 12 hours is generally below 5mm with a couple of 10mm falls in the Stanley and North Pine catchments. There is no significant rain expected in the next 4 days.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam has been discharging over the spillway. One sluice was opened at 1030 12 January 2011 and the dam is discharging 1,440 m3/s. Sluice gates will be utilised to drain of the flood storage compartment during the next 5 days.

At 3pm Somerset was 104.94m and 708,505ML at 186.5%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m3/s

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m3/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m3/s. This release will then be maintained to drain the flood storage component within the required 7 days.

At 3pm Wivenhoe Dam was 74.81 m AHD at 2,201,636ML and 188.9% and fluctuating slightly due to the releases coming from Somerset but relatively steady.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be approximately 2.6 million megalitres.

#### North Pine

North Pine peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m3/s. The event has a volume of around 200,000 ML.

At 3.00pm North Pine Dam was 39.74 mAHD and 217,370 ML and 101.4% and slowly falling. It is expected that gates will be closed Thursday or Friday.

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld

#### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

Ipswich City Council (ICC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	8pm	on Event	
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**From:** Dan Spiller <Daniel.Spiller@seqwg.com.au>  
**Sent:** Wednesday, January 12, 2011 3:52 PM  
**To:** 'stephen.robertson@seqwg.com.au'; 'ken.smith@seqwg.com.au';  
'Bradley John' <John.Bradley@seqwg.com.au>;  
'lance.mccallum@seqwg.com.au'; 'Tim.Watts@seqwg.com.au';  
'Geoff.Stead@seqwg.com.au'; 'Lauren.Sims@seqwg.com.au';  
'Martin.PeterJ@seqwg.com.au'; 'Dunn.KerryG@seqwg.com.au'; 'Best  
Debbie' <Debbie.Best@seqwg.com.au>  
**Cc:** Barry Dennien <Barry.Dennien@seqwg.com.au>; 'Peter Borrows'  
<pborrows@seqwg.com.au>; 'Rob Drury' <rdrury@seqwg.com.au>;  
SEQWGM Media <media@seqwg.com.au>; SEQWGM Emergency  
<SEQWGM.Emergency@seqwg.com.au>;  
'Madgwick.DarrenT@seqwg.com.au'; 'damien.brown@seqwg.com.au';  
'Reilly Bob' <Bob.Reilly@seqwg.com.au>; seqwg@seqwg.com.au  
**Subject:** Dam release update  
**Attach:** Technical\_Situation\_Report\_W50.docx

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All,

Attached is an updated Technical Support Report, including advice about the gate closure process.

The Wivenhoe Dam release rate has been maintained at 2,500 cubic metres per second. Dam levels have reduced slightly.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

**Daniel Spiller**

Director, Operations

**SEQ Water Grid Manager**

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

Email: [daniel.spiller@seqwg.com.au](mailto:daniel.spiller@seqwg.com.au)

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.

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## TECHNICAL SITUATION REPORT

TSR Number	W50	Date of TSR release	12.1.2011	Time of TSR release	3pm
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### Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

Current objectives	<ul style="list-style-type: none"> <li>Gradual release of stored floodwaters with minimal impact.</li> </ul>										
Strategy	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Continue release of water from Somerset into Wivenhoe to reduce impacts upstream in Kilcoy area</li> <li>Maintain reduced release from Wivenhoe until Lockyer flows are reduced and then increase to discharge flood waters over 7 days</li> </ul>										
Key considerations	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 2,300,000ML</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 2,300,000ML	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
Inflows:	Inflows expected well over 2,300,000ML										
Rainfall:	Continuing										
Lockyer/Bremer:	Monitoring their inflows										
Brisbane River:	Impact as below.										

### Rainfall

Rainfall in the last 12 hours is generally below 5mm with a couple of 10mm falls in the Stanley and North Pine catchments. There is no significant rain expected in the next 4 days.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 m AHD at 08:00 on 12 January 2011 and the dam has been discharging over the spillway. One sluice was opened at 1030 12 January 2011 and the dam is discharging 1,440 m<sup>3</sup>/s. Sluice gates will be utilised to drain of the flood storage compartment during the next 5 days.

At 3pm Somerset was 104.94m and 708,505ML at 186.5%.

Wivenhoe Dam peaked at 74.97 m AHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m<sup>3</sup>/s

The releases from Wivenhoe Dam have been temporarily reduced to 2,500 m<sup>3</sup>/s at 07:30 to allow the peak of Lockyer Creek to enter the Brisbane River. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m<sup>3</sup>/s. This release will then be maintained to drain the flood storage component within the required 7 days.

At 3pm Wivenhoe Dam was 74.81 m AHD at 2,201,636ML and 188.9% and fluctuating slightly due to the releases coming from Somerset but relatively steady.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be approximately 2.6 million megalitres.

#### North Pine

North Pine peaked at 41.11 mAHD at 14:00 on 11 January 1974 with peak release of 2,800 m<sup>3</sup>/s. The event has a volume of around 200,000 ML.

At 3.00pm North Pine Dam was 39.74 mAHD and 217,370 ML and 101.4% and slowly falling. It is expected that gates will be closed Thursday or Friday.

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases are underway due to rainfall and inflows.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld [REDACTED]

#### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

Ipswich City Council (ICC) assessment (if required)

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

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)

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

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	12.1.2011	Time	8pm	or Event	
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## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W51</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>6pm</b>
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Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual release of stored floodwaters with minimal impact.</li> </ul>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Continue release of water from Somerset into Wivenhoe to reduce impacts upstream in Kilcoy area</li> <li>Maintain reduced release from Wivenhoe until Lockyer flows are reduced and then increase to discharge flood waters over 7 days</li> </ul>
<b>Key considerations</b>	Storage levels: Above FSL
	Inflows: Inflows expected well over 2,300,000ML.
	Rainfall: Continuing
	Lockyer/Bremer: Monitoring their inflows
	Brisbane River: Impact as below.

### Rainfall

Rainfall in the last 12 hours is generally below 5mm with a couple of 10mm falls in the Stanley and North Pine catchments. There is no significant rain expected in the next 4 days.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 mAHD at 06:00 on 12 January 2011. One sluice was opened at 1030 12 January 2011 and discharging 1,410 m3/s. Sluice gates will be utilised to drain of the flood storage compartment during the next 5 days.

At 5pm Somerset was 104.86m and 702,953ML at 185.1%.

Wivenhoe Dam peaked at 74.97 mAHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m3/s.

The release from Wivenhoe Dam was reduced to 2,500 m3/s at 07:30 12 January 2011 to allow the peak of Lockyer Creek to enter the Brisbane River and this release has been maintained since. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m3/s. The release is expected to commence Thursday and then be maintained at this level to drain the flood storage component within the required 7 days. The releases will not result in any renewed rises at downstream locations.

At 5pm Wivenhoe Dam was 74.82 m AHD at 2,203,223ML and 189.1% and fluctuating slightly due to the releases coming from Somerset but relatively steady.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be approximately 2.6 million megalitres.

#### North Pine

At 17:00 North Pine Dam had all gates open 1 increment, releasing about 80 m3/s. North Pine peaked at 41.11 m AHD at 14:00 on 11 January 2011 with peak release of 2,800 m3/s. The event has a volume of around 200,000 ML

At 5.00pm North Pine Dam was 39.74 m AHD and 217,370 ML and 101.4% and slowly falling. It is expected that gates will be closed Thursday or Friday.

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases finished late this afternoon.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

<b>Seqwater Technical Officer name</b>	Robert Drury
<b>Seqwater Technical Officer position title</b>	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

<b>BoM Technical Officer name</b>	Peter Baddiley
<b>BoM Technical Officer position title</b>	
<b>BoM Technical Officer contact details</b>	flood.qld [REDACTED]

#### Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

<b>BCC Technical Officer name</b>	Chris Lavin
<b>BCC Technical Officer position title</b>	Disaster Operations Manager
<b>BCC Technical Officer contact details</b>	

Ipswich City Council (ICC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>ICC Technical Officer name</b>	Tony Trace
<b>ICC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>ICC Technical Officer contact details</b>	

Somerset Regional Council (SRC) assessment (if required)  
(to include predicted local inundation areas and depths of inundation based on the information)

Council has been advised of the current strategy.

<b>SRC Technical Officer name</b>	Tony Jacobs
<b>SRC Technical Officer position title</b>	Local Disaster Response Coordinator
<b>SRC Technical Officer contact details</b>	

Collated and distributed by (Agency)

<b>Contact Officer signature</b>	
<b>Contact Officer name</b>	Rob Drury
<b>Contact Officer position title</b>	Dam Operations Manager

<b>Next TSR due</b>	<b>Date</b>	13.1.2011	<b>Time</b>	8am	<b>for Event</b>	
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**Dan Spiller**

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**From:** Water Grid Emergency Manager [seqwgme]  
**Sent:** Wednesday, 12 January 2011 7:12 PM  
**To:** Dan Spiller  
**Subject:** Fwd: Technical Report  
**Attachments:** Technical\_Situation\_Report\_W51.docx; Technical\_Situation\_Report\_W51.doc

Attached is the latest Technical Report.

There are no planned significant changes over night so the next report will be tomorrow morning.

Dan, is 8am okay or do you need it early again? I usually get the FOC status between 6 and 6.30am.

There are 2 copies in different Word format.

Rob

## TECHNICAL SITUATION REPORT

<b>TSR Number</b>	<b>W51</b>	<b>Date of TSR release</b>	<b>12.1.2011</b>	<b>Time of TSR release</b>	<b>6pm</b>
-------------------	------------	----------------------------	------------------	----------------------------	------------

Seqwater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

<b>Current objectives</b>	<ul style="list-style-type: none"> <li>Gradual release of stored floodwaters with minimal impact.</li> </ul>										
<b>Strategy</b>	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Continue release of water from Somerset into Wivenhoe to reduce impacts upstream in Kilcoy area</li> <li>Maintain reduced release from Wivenhoe until Lockyer flows are reduced and then increase to discharge flood waters over 7 days</li> </ul>										
<b>Key considerations</b>	<table> <tr> <td>Storage levels:</td><td>Above FSL</td></tr> <tr> <td>Inflows:</td><td>Inflows expected well over 2,300,000ML.</td></tr> <tr> <td>Rainfall:</td><td>Continuing</td></tr> <tr> <td>Lockyer/Bremer:</td><td>Monitoring their inflows</td></tr> <tr> <td>Brisbane River:</td><td>Impact as below.</td></tr> </table>	Storage levels:	Above FSL	Inflows:	Inflows expected well over 2,300,000ML.	Rainfall:	Continuing	Lockyer/Bremer:	Monitoring their inflows	Brisbane River:	Impact as below.
Storage levels:	Above FSL										
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### Rainfall

Rainfall in the last 12 hours is generally below 5mm with a couple of 10mm falls in the Stanley and North Pine catchments. There is no significant rain expected in the next 4 days.

### Somerset/Wivenhoe

Somerset Dam has peaked at 105.11 mAHD at 06:00 on 12 January 2011. One sluice was opened at 1030 12 January 2011 and discharging 1,410 m3/s. Sluice gates will be utilised to drain of the flood storage compartment during the next 5 days.

At 5pm Somerset was 104.86m and 702,953ML at 185.1%.

Wivenhoe Dam peaked at 74.97 mAHD at 19:00 on 11 January 2011 with a corresponding discharge of 7,450 m3/s.

The release from Wivenhoe Dam was reduced to 2,500 m3/s at 07:30 12 January 2011 to allow the peak of Lockyer Creek to enter the Brisbane River and this release has been maintained since. After the downstream peak in the lower Brisbane River has passed, releases will be increased to maximum of 3,500 m3/s. The release is expected to commence Thursday and then be maintained at this level to drain the flood storage component within the required 7 days. The releases will not result in any renewed rises at downstream locations.

At 5pm Wivenhoe Dam was 74.82 m AHD at 2,203,223ML and 189.1% and fluctuating slightly due to the releases coming from Somerset but relatively steady.

The combined flood event volume in Somerset and Wivenhoe Dams is estimated to be approximately 2.6 million megalitres.

#### North Pine

At 17:00 North Pine Dam had all gates open 1 increment, releasing about 80 m3/s. North Pine peaked at 41.11 mAHd at 14:00 on 11 January 2011 with peak release of 2,800 m3/s. The event has a volume of around 200,000 ML

At 5.00pm North Pine Dam was 39.74 mAHd and 217,370 ML and 101.4% and slowly falling. It is expected that gates will be closed Thursday or Friday.

#### Strategy

The Flood Operations Centre is continuing to monitor rainfalls and water levels through the Brisbane and Pine catchments and reviewing operating strategy every 30 minutes. The FOC is maintaining close contact with warning agencies and local councils.

#### Leslie Harrison Dam:

Gate releases finished late this afternoon.

#### Hinze Dam:

A release of around 8,000 megalitres a day is being made through the emergency gates. There is no public access to the spillway.

Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager
[REDACTED]	

#### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld [REDACTED]

Brisbane City Council (BCC) assessment

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

Ipswich City Council (ICC) assessment (if required)

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

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

Somerset Regional Council (SRC) assessment (if required)

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

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

Collated and distributed by (Agency)

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	13.1.2011	Time	8am	on Event	
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**From:** Dan Spiller <Daniel.Spiller[REDACTED]>  
**Sent:** Wednesday, January 12, 2011 8:34 PM  
**To:** 'stephen.robertson[REDACTED]'; 'ken.smith[REDACTED]';  
'Bradley John' <John.Bradley[REDACTED]>;  
'lance.mccallum[REDACTED]'; 'Tim.Watts[REDACTED]';  
'Geoff.Stead[REDACTED]'; 'Lauren.Sims[REDACTED]';  
'Martin.PeterJ[REDACTED]'; 'Dunn.KerryG[REDACTED]'; 'Best  
Debbie' <Debbie.Best[REDACTED]>  
**Cc:** Barry Dennien <Barry.Dennien[REDACTED]>; 'Peter Borrows'  
<pborrows[REDACTED]>; 'Rob Drury' <rdrury[REDACTED]>;  
SEQWGM Media <media[REDACTED]>; SEQWGM Emergency  
<SEQWGM.Emergency[REDACTED]>;  
'Madgwick.DarrenT[REDACTED]'; 'damien.brown[REDACTED]';  
'Reilly Bob' <Bob.Reilly[REDACTED]>; seqwgm[REDACTED]  
**Subject:** RE: Dam release update  
**Attach:** Technical\_Situation\_Report\_W51.docx

---

All,

Attached is an updated Technical Support Report.

Please call me on [REDACTED] if you require further information.

Regards,  
Dan

**Daniel Spiller**

Director, Operations

**SEQ Water Grid Manager**

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

Email: [daniel.spiller\[REDACTED\]](mailto:daniel.spiller[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.

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If not an intended recipient of this email, you must not copy, distribute or take any action(s) that relies on it; any form of disclosure, modification, distribution and/or publication of this email is also prohibited. While all care has been taken, the SEQ Water Grid Manager disclaims all liability for loss or damage to person or property arising from this message being infected by a computer virus or other contamination. Unless stated otherwise, this email represents only the views of the sender and not the views of the SEQ Water Grid Manager and/or the Queensland Government.

## TECHNICAL SITUATION REPORT

TSR Number	W51	Date of TSR release	12.1.2011	Time of TSR release	6pm
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### Seawater status of inflows and dam operations

*Current status but could change based on inflows or rainfall.*

Current objectives	<ul style="list-style-type: none"> <li>Gradual release of stored floodwaters with minimal impact.</li> </ul>										
Strategy	<ul style="list-style-type: none"> <li>Peak inflows into Wivenhoe were in excess of 12000 cumecs.</li> <li>Continue release of water from Somerset into Wivenhoe to reduce impacts upstream in Kilcoy area</li> <li>Maintain reduced release from Wivenhoe until Lockyer flows are reduced and then increase to discharge flood waters over 7 days</li> </ul>										
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Seqwater Technical Officer name	Robert Drury
Seqwater Technical Officer position title	Dam Operations Manager

#### BoM assessment

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

BoM has been advised.

BoM Technical Officer name	Peter Baddiley
BoM Technical Officer position title	
BoM Technical Officer contact details	flood.qld@bom.gov.au

**Brisbane City Council (BCC) assessment**

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

Council has been advised of the current strategy

BCC Technical Officer name	Chris Lavin
BCC Technical Officer position title	Disaster Operations Manager
BCC Technical Officer contact details	

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

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

Council has been advised of the current strategy.

ICC Technical Officer name	Tony Trace
ICC Technical Officer position title	Local Disaster Response Coordinator
ICC Technical Officer contact details	

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

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

Council has been advised of the current strategy.

SRC Technical Officer name	Tony Jacobs
SRC Technical Officer position title	Local Disaster Response Coordinator
SRC Technical Officer contact details	

**Collated and distributed by (Agency)**

Contact Officer signature	
Contact Officer name	Rob Drury
Contact Officer position title	Dam Operations Manager

Next TSR due	Date	13.1.2011	Time	8am	or Event	
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## Suzie Emery

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**From:** Bradley John [John.Bradley [REDACTED]]  
**Sent:** Saturday, 15 January 2011 10:34 AM  
**To:** Lance.McCallum [REDACTED]; Dan Spiller  
**Cc:** tim.watts [REDACTED]; Barry Dennien  
**Subject:** Re: Urgent - Cabinet in confidence

Thanks Lance - we have anticipated the need for something like this - seqwgm work underway - I will talk to SEQWGM when out of SDMG now on.

Regards  
John B

---

**From:** Lance McCallum [mailto:Lance.McCallum [REDACTED]]  
**Sent:** Saturday, January 15, 2011 10:30 AM  
**To:** spiller daniel [REDACTED]; Bradley John  
**Cc:** Tim Watts <Tim.Watts [REDACTED]>  
**Subject:** Urgent - Cabinet in confidence

John/Dan

The Minister has asked that preparation be done over the weekend that will enable him to go to the Emergency Cabinet meeting on Monday with a position on how the Govt is going to handle the issues of reviewing operational decisions made by SEQwater and SEQWGM in relation to releases from the dams.

I understand that in further to the recent independent review of the Wivenhoe operations manual the WGM is also undertaking further work by compiling a list of the operational experts who authored the manual.

Happy to discuss further.

Thanks, Lance.

-----+  
Think B4U Print

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

3 sheets of A4 paper = 1 litre of water  
-----+

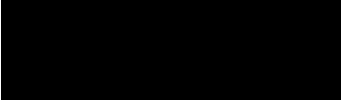
## Suzie Emery

---

**From:** Barry Dennien [Barry.Dennien [REDACTED]]  
**Sent:** Saturday, 15 January 2011 12:10 PM  
**To:** Dan Spiller; John Bradley (john.bradley [REDACTED]); Elaina Smouha; Peter Borrows; bob.reilly [REDACTED]  
**Subject:** 2 pm phone hook up - Wivenhoe operations brief preparation

Folks

Details of phone hook up:



Agenda to follow in approx one hour

Barry Dennien

## Suzie Emery

---

**From:** Elaina Smouha [elainamir[REDACTED]]  
**Sent:** Saturday, 15 January 2011 1:42 PM  
**To:** john.bradley[REDACTED]  
**Cc:** Barry Dennien; Dan Spiller; pborrows[REDACTED]; bob.reilly[REDACTED]  
**Subject:** Cabinet in confidence - discussion points  
**Attachments:** Public inquiry strategy - brief.docx

John

Attached are some discussion points for our 2pm teleconference about Monday's Emergency Cabinet meeting.

Regards

Elaina

## Discussion points for teleconference

### What is the objective?

- a) Ensuring public transparency
- b) To answer the State's questions on the performance of Wivenhoe Dam operations
- c) Preparation for a public inquiry
- d) Normal and logical course of conduct after the occurrence of a major flood event – Review requirement under the Flood Mitigation Manual

### Background

- 1) Design of Dam – Storages/Spillway upgrade (Responsible: Seqwater)
- 2) How does Wivenhoe Dam work as a flood mitigator? Stats on how much did Wivenhoe Dam knock off the flood peak? **[Priority to get out to the public]** (Responsible: Seqwater)
- 3) Development of Flood Mitigation Manual (Responsible: Seqwater/DERM)
  - a. Four strategies
  - b. History of Flood Mitigation Manual updates and peer review
- 4) Responsibility under the *Water Supply (Safety and Reliability) Act 2008* (Responsible: DERM)
  - a. What is the formal reporting process following a major flood event?
- 5) "The Event" – operation of Wivenhoe Dam (Responsible: Seqwater)
  - a. Event report under the Flood Mitigation Manual
- 6) "The Event" – management of the Water Grid emergency under the SEQ Water Grid Emergency Response Plan (Responsible: SEQ Water Grid Manager)
- 7) What next?
  - a. SWOT
    - i. Community feedback
    - ii. A significant (from a national perspective)

### Seqwater report

Flood Mitigation Manual requires a report to the Chief Executive after a significant flood event, on the effectiveness of the operational procedures:

- Get more comprehensive report from Brian Cooper? – review appropriateness of trigger levels – take into account the accuracy of rainfall forecasts provided by BOM at the time – reliability of weather forecasts.
- Set up expert panel for Flood Mitigation Manual review
- Communication Protocol and incorporation into the Flood Mitigation Manual (revisit in the next fortnight)

Seqwater to procure review.

Urgent accelerated review due to anticipated further rainfall.

**Suzie Emery**

---

**From:** Elaina Smouha [elainamir [REDACTED]]  
**Sent:** Saturday, 15 January 2011 4:37 PM  
**To:** Barry Dennien; Dan Spiller; Michael Lyons  
**Subject:** Ministerial brief - outline  
**Attachments:** Ministerial brief - contents outline.docx

## Discussion points for teleconference

### What is the objective?

- a) Ensuring public transparency
- b) To answer the State's questions on the performance of Wivenhoe Dam operations
- c) Preparation for a public inquiry
- d) Normal and logical course of conduct after the occurrence of a major flood event – Review requirement under the Flood Mitigation Manual

### Background (focus on Brisbane River flooding issues)

- 1) Design of Dam – Storages/Spillway upgrade (*Information provider: Seqwater and Peter Allen - DERM*) [1/3 to ½ a page]
- 2) "The Flood Event" – Q&A (*Information provider: Seqwater*) [2 ½ pages]
  - a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)
  - b. How does Wivenhoe Dam work as a flood mitigator?
  - c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?
  - d. Statistics on how much did Wivenhoe Dam knock off the flood peak.
  - e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?
  - f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?
  - g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)
  - h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?
  - i. What is the fuse plug and why did it need to be maintained?
  - j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?
  - k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

- 3) The Flood Mitigation Manual (*Information Provider: Seqwater/DERM*) [ ½ to 1 page]
  - a. Describe the decision making framework - Four strategies
  - b. How is the Manual designed to work?
  - c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?
  - d. **Attach** Minister Robertson’s request for advice on pre-emptive release and our response (*Information provider: SEQ Water Grid Manager*)
- 4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (*Information provider: Peter Allen - DERM*)
  - a. Flood Mitigation Manual approval
  - b. Formal reporting process under the Flood Mitigation Manual – **attach** report resulting from the February 1999 flood event
  - c. Decision making process under the Flood Mitigation Manual –
    - i. Who makes the flood release decisions under the Manual?
    - ii. who is informed/consulted?
    - iii. effect of the recent Flood Communication Protocol?
- 5) Brian Cooper Flood Mitigation Manual compliance review (*Responsible: SEQ Water Grid Manager*)

### Seqwater report

(*Information provider: Seqwater, Peter Allen and Bob Reilly*)

Seqwater, in consultation with Peter Allen and Bob Reilly, to set out how Seqwater’s Flood Mitigation Manual Report to the Chief Executive on the effectiveness of the operational procedures will be undertaken.

- **Attach** table of contents of the 1999 Flood Mitigation Manual report
- Reflect Brian Cooper’s compliance review
- Peer review – establishment of an expert panel – who will be on it? Peter Allen and Bob Reilly may provide some input.
- Communication Protocol and incorporation into the Flood Mitigation Manual (revisit in the next fortnight?)

Timeframes on the development of the report – consider urgency due to anticipated further rainfall during this summer.

CTS No. [REDACTED]

**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"/> <b>Noted</b>
<input type="checkbox"/> Further information required	
Minister [REDACTED]	
Dated     /     /	16 / 1 / 11

**RECEIVED**  
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.

**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: [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:
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File Ref:

Page 1 of

- **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.

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

File Ref:

Page 3 of

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

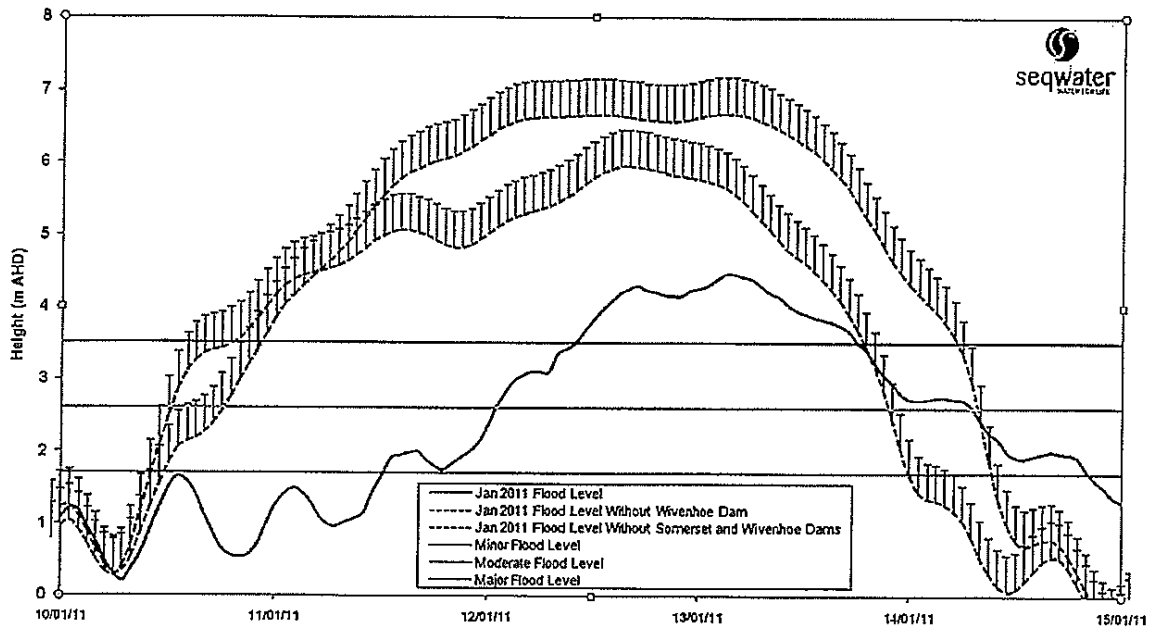
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

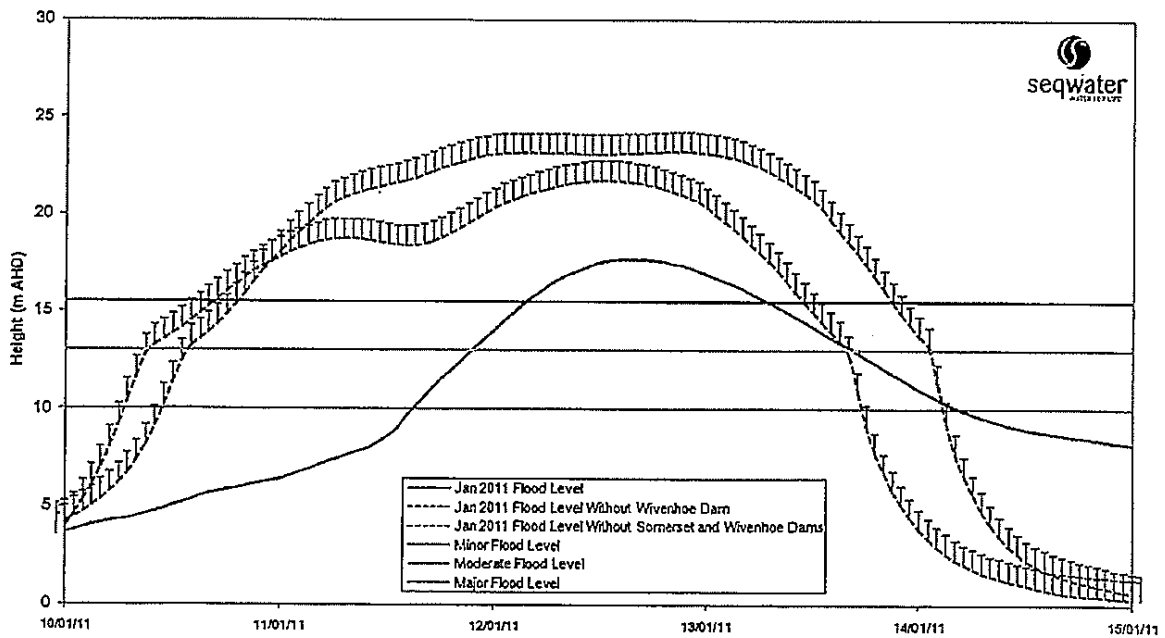
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

- 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.



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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.

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.

The primary objectives of the procedures contained in the flood 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. 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

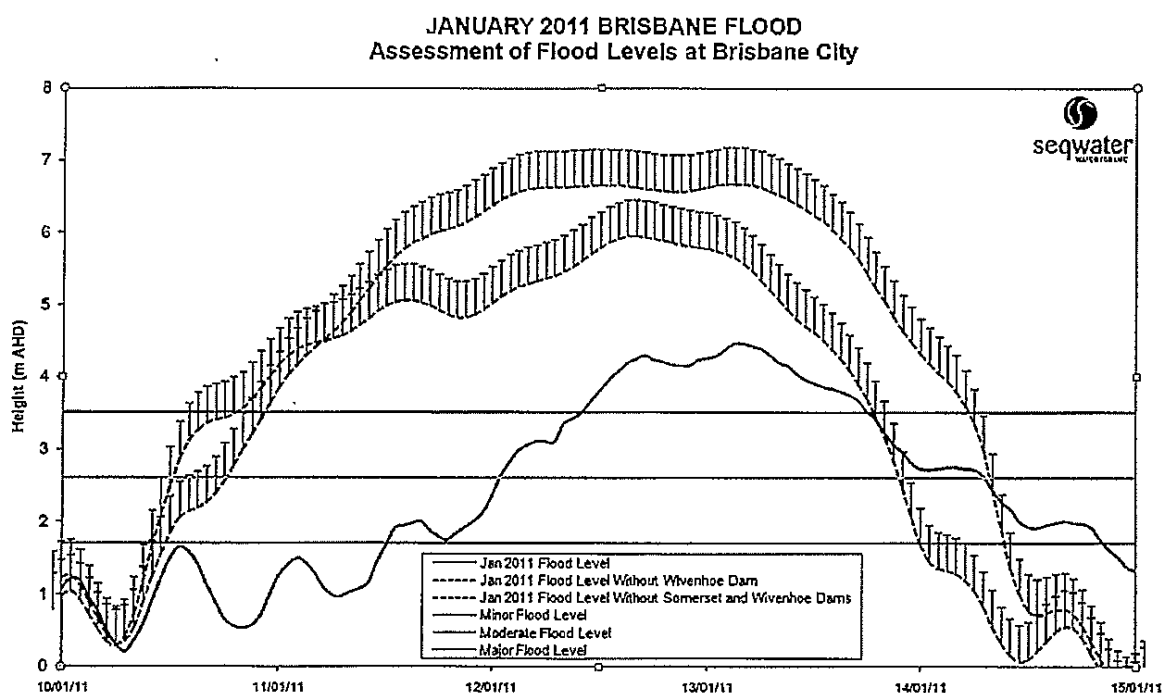
(Tuesday)	next 11 hours, while ensuring water levels in the dam did not rise further and initiate a fuse plug embankment.
08:00 12/01/2011 (Wednesday)	Minimum possible release level reached, with inflows matching outflows. Further reductions in release rate would likely cause the dam level to rise.
21:00 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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

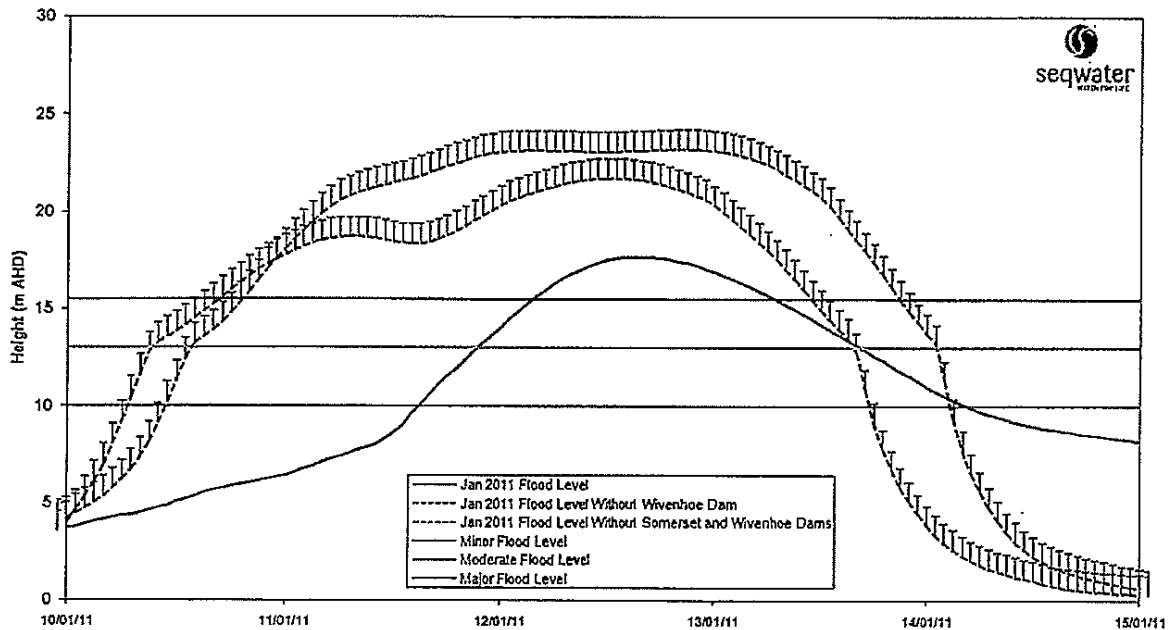
The following graphs demonstrate the significant benefits of Wivenhoe Dam in mitigating the current flood event, with reductions in flood peak of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

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.
- 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.
  - 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.

# ***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 [REDACTED]  
25 OCT 2010

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

RECEIVED  
28 OCT 2010

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.

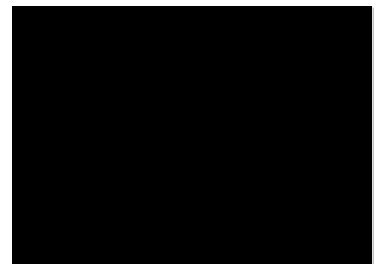
I am also advised that our water supply is more secure than ever before, due to storages being full, key Water Grid projects completed and ongoing water efficiency.

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.





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 [REDACTED].

Yours sincerely

STEPHEN ROBERTSON MP

  
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.

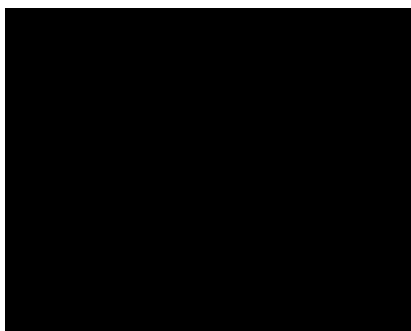
The SEQ Water Grid Manager has assessed the water security implications of the release to be negligible, having no impact on our ability to meet the risk criteria specified in the System Operating Plan or our ability to meet our supply obligations to Grid Customers. From a water security perspective, 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 [REDACTED] or by email on [dan.spiller@seqwater.com.au](mailto:dan.spiller@seqwater.com.au) [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 suitability 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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brian  
cooper  
consulting

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

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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.

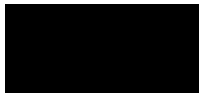
*Conclusions:*

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

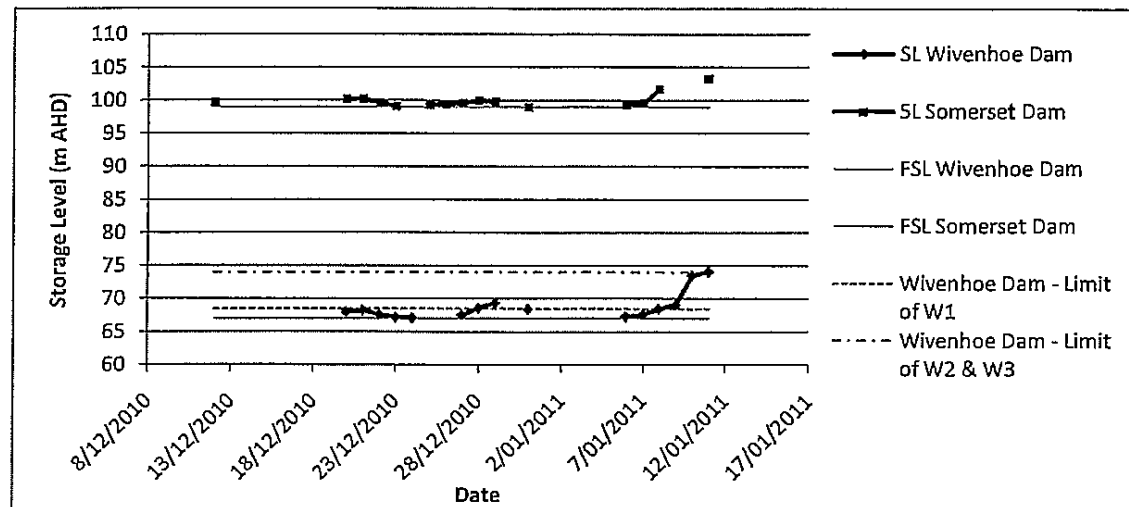
*Note1: For a number of the above actions, given the short time frame for the review on compliance of actual flood operations with the Flood Mitigation Manual, it was not possible to source some of the information required to confirm that requirements had been fulfilled. These actions will be audited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

Action	Comment
<b><i>Flood Strategies for Wivenhoe Dam:</i></b>	
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. 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.	Technical Situation Reports indicate that every attempt was made to keep the specified road crossings open
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:	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
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>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

Wivenhoe & Somerset Dams – Storage Level Behaviour (as presented in Technical Situation Reports)



Date	Time	TSR	Wyandhoe Dam Release (m <sup>3</sup> /s)				Gate No.	Opening (m)	Sta
			Regulators	Hydro	Gates	Total			
12/12/2010	1400	W1							
13/12/2010	1300	W2		10	290	300			
15/12/2010	1800	W3							
16/12/2010	1600	W4			0				
17/12/2010	1200	W5							
17/12/2010	1800	W6	Closed		Opening Op. Initiated				
	1830			13	50	63	3	0.5	
18/12/2010	0700	W7							
19/12/2010	0700	W8			150	150	3	1.5	
19/12/2010	1800	W9			300	300	3	3	
20/12/2010	0700	W10							
20/12/2010	0900	W11							62.2
20/12/2010	0900	W12							62.2
21/12/2010	0730	W13			peak 1,280 [0500]				62.2
22/12/2010	0830	W14							62.2
22/12/2010	1800	W15			Closing sequence				62.2
23/12/2010	0800	W16			All gates expected to be closed by 1500				62.2
23/12/2010	1430	W17			350		3	1.5	62.2
24/12/2010	0630	W18			All gates expected to be closed by 1800				62.2
24/12/2010	1130	W19	4,200 cfs/day from reg. & Hydro		Radial gate ops ceased @ 1300		3	zero	62.2
25/12/2010	0830	W20							62.2
26/12/2010	0800	W21							62.2
27/12/2010	0800	W22							62.2
28/12/2010	0700	W23			347 (initially) then back to 45				62.2
29/12/2010	0700	W24							62.2
30/12/2010	0700	W25			Whenhoes Lockyer = 1,600 m <sup>3</sup> /s				62.2
31/12/2010	0700	W26			Whenhoes Lockyer = 1,600 m <sup>3</sup> /s				62.2
		W27							62.2
06/01/2011	1100	W28			Commence opening RG @ 1800 & ramp up to 300 m <sup>3</sup> /s by 2200				62.2
07/01/2011	0700	W29							62.2
07/01/2011	1500	W30			Release started 1500 to be incr. slowly to ~3,200 m <sup>3</sup> /s by 1400 tomorrow				62.2
08/01/2011	0700	W31			~890		All (S) RG's open		62.2
09/01/2011	0700	W32			1,343				62.2
		W33							62.2
09/01/2011	2100	W34			1,400				62.2
		W35							62.2
		W36							62.2
		W37							62.2
11/01/2011	0630	W38			2,750 since 1930 on 10/2/2011		All (S) gates		62.2
11/01/2011	1200	W39			3,970				62.2



# 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.

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## 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 Cowsarr 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.

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**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 Yarowonga 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

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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 Lerderberg 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

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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 Mardi 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.

**resumé**

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.

**résumé**

- 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

Tel: [REDACTED]  
Mobile: [REDACTED]  
Email: [brian.cooper.consult@brian.cooper.consult](mailto:brian.cooper.consult@brian.cooper.consult) [REDACTED]

résumé

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.

**From:** Barry Dennien <Barry.Dennien[REDACTED]>  
**Sent:** Sunday, January 16, 2011 12:25 PM  
**To:** Dan Spiller <Daniel.Spiller[REDACTED]>  
**Subject:** Fwd: Cabinet in confidence - Ministerial brief outline - Regulatory context  
**Attach:** Regulatory context for the dams.doc; ATT00001.htm

---

Regards  
Barry Dennien

Begin forwarded message:

**From:** "peter.allen[REDACTED]"  
**Date:** 16 January 2011 11:57:56 AM AEST  
**To:** "rdrury[REDACTED]";  
"pborrows[REDACTED]";  
"dutysed[REDACTED]"; "john.bradley[REDACTED]";  
<john.bradley[REDACTED]>, Barry Dennien <Barry.Dennien@[REDACTED]>  
"daniel[REDACTED]";  
"michael.lyons[REDACTED]"; elaina.smouha[REDACTED];  
<michael.lyons[REDACTED]"; elaina.smouha[REDACTED]>;  
"peter.allen[REDACTED]";  
"mfoster[REDACTED]";  
"bob.reilly[REDACTED]";  
**Cc:** "threereillys[REDACTED]";  
**Subject:** Re: Fw: Cabinet in confidence - Ministerial brief outline - Regulatory context

Barry,

This is the proposed regulatory context to go into the Ministerial Briefing. Both Bob Reilly and Peter Borrows have reviewed it and are happy with it.

Peter Allen  
Director Dam Safety (Water Supply)  
DERM

Allen Peter <Peter.Allen[REDACTED]> wrote:

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

**From:** Elaina Smouha <elainami[REDACTED]>  
**To:** mfoster[REDACTED]; Allen Peter;  
Reilly Bob; pborrows <pborrows[REDACTED]>;

715A

rdnury [REDACTED]

<rdnury [REDACTED]; dutysec [REDACTED]  
<dutysec [REDACTED]

Cc: Bradley John; Dennien Barry [REDACTED]; spiller daniel [REDACTED]  
SEQWGM; Lyons

Michael [REDACTED]; smouha elaina [REDACTED]

Sent: Sat Jan 15 17:02:53 2011

Subject: Cabinet in confidence - Ministerial brief outline

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

Elaina Smouha

Director, Governance and Regulatory Compliance

SEQ Water Grid Manager

Phone: [REDACTED]

Email: elaina.smouha [REDACTED]

715B

<mailto:elaina.smouha>

Visit: Level 15, 53 Albert Street Brisbane

Post: PO Box 16205, City East QLD 4002

ABN: 14783 317 630

+-----+

Think B4U Print

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

3 sheets of A4 paper = 1 litre of water

+-----+

715C

## **Regulatory context for the dams' flood operations**

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

- a) Flood operations to be conducted in accordance with manual's provisions.  
(There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
- b) Flood operations to be under the control of CEO-approved engineers (who are highly qualified and experienced)
- c) 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.
- d) Reporting on the flood operations during flood events.
- e) Reviews after flood events such as the January 2011 event. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??):

"...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

715D

## Suzie Emery

---

**From:** Bradley John [John.Bradley [REDACTED]]  
**Sent:** Sunday, 16 January 2011 12:55 PM  
**To:** Barry Dennien; Dan Spiller  
**Subject:** RE: Should the Wivenhoe have been bigger? | Courier Mail Andrew Bolt Blog

Barry

Can you pls ask Peter B to add this question to the BN today

Is it true Wivenhoe didn't comply with ANCOLD standard?

Why didn't you implement recommendations of the 2007 report ?

John Bradley  
Director-General  
Department of Environment and Resource Management  
**Telephone:** [REDACTED]  
**Email:** John.Bradley [REDACTED]  
**www.derm.qld.gov.au**

Department of Environment and Resource Management  
400 George Street, Brisbane Q 4000  
GPO Box 2454, Brisbane Q 4001

---

**From:** Barry Dennien [mailto:Barry.Dennien [REDACTED]]  
**Sent:** Sunday, 16 January 2011 7:25 AM  
**To:** spiller daniel [REDACTED]; Bradley John  
**Subject:** Fwd: Should the Wivenhoe have been bigger? | Courier Mail Andrew Bolt Blog

For note

Regards  
Barry Dennien

Begin forwarded message:

**From:** Barry Dennien <Barry.Dennien [REDACTED]>  
**Date:** 16 January 2011 7:00:05 AM AEST  
**To:** Peter Borrows <pborrows [REDACTED]>  
**Subject:** Should the Wivenhoe have been bigger? | Courier Mail Andrew Bolt Blog

[http://blogs.news.com.au/couriermail/andrewbolt/index.php/couriermail/comments/should\\_the\\_wivenhoe\\_have\\_been\\_bigger/](http://blogs.news.com.au/couriermail/andrewbolt/index.php/couriermail/comments/should_the_wivenhoe_have_been_bigger/)

Peter

It may be worthwhile starting to gather all dam studies and reports

Note this blog is selectively picking bits of information from the 2007 report

Talk later

Barry

Regards  
Barry Dennien

---

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+-----+

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3 sheets of A4 paper = 1 litre of water

+-----+

## Suzie Emery

---

**From:** Lance McCallum [Lance.McCallum@qld.gov.au]  
**Sent:** Sunday, 16 January 2011 2:45 PM  
**To:** Bradley John; Dan Spiller; Barry Dennien; Hunt Dan  
**Cc:** Kirstie Ross; Tim Watts; Geoff Stead  
**Subject:** Special cabinet Meeting - Monday 17 January 2010 - Pre Brief

Confidential

John,Dan('s) ,Barry

I confirm a pre-cabinet briefing tomorrow morning from 9am in Minister Robertson's boardroom.

Thanks

Lance.

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## Suzie Emery

---

**From:** Peter Borrows [pborrows [REDACTED]]  
**Sent:** Sunday, 16 January 2011 3:59 PM  
**To:** bob.reilly [REDACTED]; Rob Drury; Duty Seq; john.bradley [REDACTED]; Barry Dennien; Dan Spiller  
**Cc:** Michael Lyons; Mike Foster; Elaina Smouha; peter.allen [REDACTED]  
**Subject:** Cabinet in confidence - Ministerial brief outline  
**Attachments:** Ministerial brief - contents outline.docx

Please see attached draft with attachment.

In relation to the draft contents outline sent yesterday, the following is a cross reference FYI.

Regards, Peter.

**Peter Borrows**  
Chief Executive Officer  
Queensland Bulk Water Supply Authority *trading as Seqwater*



[REDACTED] | E pborrows [REDACTED]  
Level 3, 240 Margaret St, Brisbane City QLD 4000  
PO Box 16146, City East QLD 4002  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)



---

**From:** Elaina Smouha [mailto:elainamir [REDACTED]]  
**Sent:** Saturday, 15 January 2011 5:03 PM  
**To:** Mike Foster; peter.allen [REDACTED]; bob.reilly [REDACTED]; Peter Borrows; Rob Drury; Duty Seq  
**Cc:** john.bradley [REDACTED]; barry.dennien [REDACTED]; daniel.spiller [REDACTED]; michael.lyons [REDACTED]; Elaina Smouha  
**Subject:** Cabinet in confidence - Ministerial brief outline

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

**Elaina Smouha**

Director, Governance and Regulatory Compliance  
SEQ Water Grid Manager

Email: [elaina.smuha](mailto:elaina.smuha)

Visit: Level 15, 53 Albert Street Brisbane

Post: PO Box 16205, City East QLD 4002

ABN: 14783 317 630

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QLD Bulk Water Supply Authority ABN75450239876 (Trading as Seqwater).

## Ministerial brief outline

### What is the objective?

- a) Ensuring public transparency
- b) To answer the State's questions on the performance of Wivenhoe Dam operations
- c) Preparation for a public inquiry
- d) Normal and logical course of conduct after the occurrence of a major flood event – Review requirement under the Flood Mitigation Manual

### Background (focus on Brisbane River flooding issues)

- 1) Design of Dam – Storages/Spillway upgrade (*Information provider: Seqwater and Peter Allen - DERM*) [1/3 to ½ a page]
- 2) "The Flood Event" – Q&A (*Information provider: Seqwater*) [2 ½ pages]
  - a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)
  - b. How does Wivenhoe Dam work as a flood mitigator?
  - c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?
  - d. Statistics on how much did Wivenhoe Dam knock off the flood peak.
  - e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?
  - f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?
  - g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)
  - h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?
  - i. What is the fuse plug and why did it need to be maintained?
  - j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?
  - k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

- 3) The Flood Mitigation Manual (*Information Provider: Seqwater/DERM*) [ ½ to 1 page]
- a. Describe the decision making framework - Four strategies
  - b. How is the Manual designed to work?
  - c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?
  - d. **Attach** Minister Robertson's request for advice on pre-emptive release and our response (*Information provider: SEQ Water Grid Manager*)
- 4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (*Information provider: Peter Allen - DERM*)
- a. Flood Mitigation Manual approval
  - b. Formal reporting process under the Flood Mitigation Manual – **attach** report resulting from the February 1999 flood event
  - c. Decision making process under the Flood Mitigation Manual –
    - i. Who makes the flood release decisions under the Manual?
    - ii. who is informed/consulted?
    - iii. effect of the recent Flood Communication Protocol?
- 5) Brian Cooper Flood Mitigation Manual compliance review (*Responsible: SEQ Water Grid Manager*)

### Seqwater report

(*Information provider: Seqwater, Peter Allen and Bob Reilly*)

Seqwater, in consultation with Peter Allen and Bob Reilly, to set out how Seqwater's Flood Mitigation Manual Report to the Chief Executive on the effectiveness of the operational procedures will be undertaken.

- **Attach** table of contents of the 1999 Flood Mitigation Manual report
- Reflect Brian Cooper's compliance review
- Peer review – establishment of an expert panel – who will be on it? Peter Allen and Bob Reilly may provide some input.
- Communication Protocol and incorporation into the Flood Mitigation Manual (revisit in the next fortnight?)

Timeframes on the development of the report – consider urgency due to anticipated further rainfall during this summer.

## Suzie Emery

---

**From:** Elaina Smouha [elainamir[REDACTED]]  
**Sent:** Sunday, 16 January 2011 4:07 PM  
**To:** Dan Spiller; Barry Dennien  
**Subject:** Cabinet in confidence - Regulatory context  
**Attachments:** Regulatory\_context\_for\_the\_dams[1].docx

I have tracked my changes.

Elaina

## Regulatory context for the dams' flood operations

~~These Operational procedures for flood mitigation for a dam~~ are contained in the Flood Mitigation Manual (~~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 Officer (CEO) of DERM (or his delegate) approves the ~~manual~~ 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 CEO to take into account when approving the Flood Mitigation Manual.

The ~~manual for the dams~~ Flood Mitigation Manual requires, amongst other matters:

- a) 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. (~~There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This discretion was not used/exercised in the January 2011 flood event.~~)
- b) Flood operations to be under the control of CEO-approved engineers (who are highly qualified and experienced)
- c) 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.
- d) Reporting on the flood operations during flood events.
- e) ~~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.~~ For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (*Attachment??*):
- e) ~~"...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)~~

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. The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not legally binding on the parties to it 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 ~~None of them are not~~ involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator, Department of Environment and Resource Management), which undertakes the CEO's regulatory functions.

**From:** Peter Borrows <pborrows[REDACTED]>  
**Sent:** Sunday, January 16, 2011 4:28 PM  
**To:** bob.reilly[REDACTED]; Rob Drury <rdrury[REDACTED]>; Duty Seq  
<dutyseq[REDACTED]>; john.bradley[REDACTED]; Barry Dennien  
<Barry.Dennien[REDACTED]>; Dan Spiller  
<Daniel.Spiller[REDACTED]>  
**Cc:** Michael Lyons <Michael.Lyons[REDACTED]>; Mike Foster  
<mfoster[REDACTED]>; Elaina Smouha <elainamir[REDACTED]>;  
peter.aller[REDACTED]  
**Subject:** Cabinet in confidence - Ministerial brief outline  
**Attach:** Ministerial brief - contents outline.docx; Ministerial Briefing Note January 17  
2011 Final Draft for distribution.doc; Jan 2011 Flood Event\_Ver 1\_draft for  
distribution.docx

---

Please see attached draft with attachment.

In relation to the draft contents outline sent yesterday, the following is a cross reference FYI.

The attached Ministerial Briefing Note addresses the questions contained in the Ministerial Information Request as follows:

- 1) Design of Dam – Storages/Spillway upgrade

**Refer Section 1**

- 2) "The Flood Event" – Q&A

- a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)

**Refer Section 2.5**

- b. How does Wivenhoe Dam work as a flood mitigator?

**Refer Sections 2.1, 2.3 and 3.1**

- c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?

**Refer Sections 3.1 and 3.2**

- d. Statistics on how much did Wivenhoe Dam knock off the flood peak.

**Refer Section 2.1**

- e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?

**Refer Sections 2.1 and 2.2**

- f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?

**Refer Section 2.4**

- g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)

1201F

**Refer Section 2.4**

- h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?

**Refer Section 2.2**

- i. What is the fuse plug and why did it need to be maintained?

**Refer Section 2.3**

- j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?

**Refer Section 2.4**

- k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

**Refer Section 2.4**

3) The Flood Mitigation Manual

**Refer Section 3.1**

- a. Describe the decision making framework - Four strategies

**Refer Section 3.2**

- b. How is the Manual designed to work?

**Refer Section 3.2**

- c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?

**Refer Section 3.1**

- 4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (Information provider: Peter Allen - DERM)

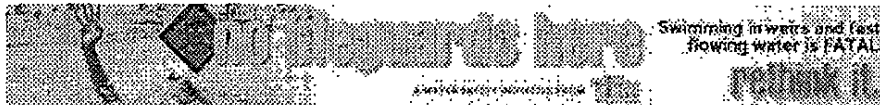
**Refer Section 4**

Regards, Peter.

**Peter Borrows**  
Chief Executive Officer  
Queensland Bulk Water Supply Authority *trading as* Seqwater



Level 3, 240 Margaret St, Brisbane City QLD 4000  
PO Box 16146, City East QLD 4002  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)



---

**From:** Elaina Smouha [mailto:elainami@seqwater.com.au]  
**Sent:** Saturday, 15 January 2011 5:03 PM  
**To:** Mike Foster; peter.allen@seqwater.com.au; bob.reilly@seqwater.com.au; Peter Borrows; Rob Drury; Duty Seq

12016

**Cc:** john.bradley [REDACTED]; barry.dennier [REDACTED]; daniel.spiller [REDACTED];  
michael.lyons [REDACTED]; Elaina Smouha  
**Subject:** Cabinet in confidence - Ministerial brief outline

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

Elaina Smouha  
Director, Governance and Regulatory Compliance  
SEQ Water Grid Manager  
[REDACTED]

Email: [elaina.smouha](mailto:elaina.smouha) [REDACTED]  
Visit: Level 15, 53 Albert Street Brisbane  
Post: PO Box 16205, City East QLD 4002  
ABN: 14783 317 630

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1201H

## Ministerial brief outline

### What is the objective?

- a) Ensuring public transparency
- b) To answer the State's questions on the performance of Wivenhoe Dam operations
- c) Preparation for a public inquiry
- d) Normal and logical course of conduct after the occurrence of a major flood event – Review requirement under the Flood Mitigation Manual

### Background (focus on Brisbane River flooding issues)

- 1) Design of Dam – Storages/Spillway upgrade (*Information provider: Seqwater and Peter Allen - DERM*) [1/3 to 1/2 a page]
- 2) "The Flood Event" – Q&A (*Information provider: Seqwater*) [2 1/2 pages]
  - a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)
  - b. How does Wivenhoe Dam work as a flood mitigator?
  - c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?
  - d. Statistics on how much did Wivenhoe Dam knock off the flood peak.
  - e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?
  - f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?
  - g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)
  - h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?
  - i. What is the fuse plug and why did it need to be maintained?
  - j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?
  - k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

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- 3) The Flood Mitigation Manual (*Information Provider: Seqwater/DERM*) [ ½ to 1 page]
- Describe the decision making framework - Four strategies
  - How is the Manual designed to work?
  - History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?
  - Attach** Minister Robertson's request for advice on pre-emptive release and our response (*Information provider: SEQ Water Grid Manager*)
- 4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (*Information provider: Peter Allen - DERM*)
- Flood Mitigation Manual approval
  - Formal reporting process under the Flood Mitigation Manual – **attach** report resulting from the February 1999 flood event
  - Decision making process under the Flood Mitigation Manual –
    - Who makes the flood release decisions under the Manual?
    - who is informed/consulted?
    - effect of the recent Flood Communication Protocol?
- 5) Brian Cooper Flood Mitigation Manual compliance review (*Responsible: SEQ Water Grid Manager*)

### Seqwater report

(*Information provider: Seqwater, Peter Allen and Bob Reilly*)

Seqwater, in consultation with Peter Allen and Bob Reilly, to set out how Seqwater's Flood Mitigation Manual Report to the Chief Executive on the effectiveness of the operational procedures will be undertaken.

- **Attach** table of contents of the 1999 Flood Mitigation Manual report
- Reflect Brian Cooper's compliance review
- Peer review – establishment of an expert panel – who will be on it? Peter Allen and Bob Reilly may provide some input.
- Communication Protocol and incorporation into the Flood Mitigation Manual (revisit in the next fortnight?)

Timeframes on the development of the report – consider urgency due to anticipated further rainfall during this summer.

1201 J

**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. COMPLIANCE WITH MANUAL**

**6. 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.

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 of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

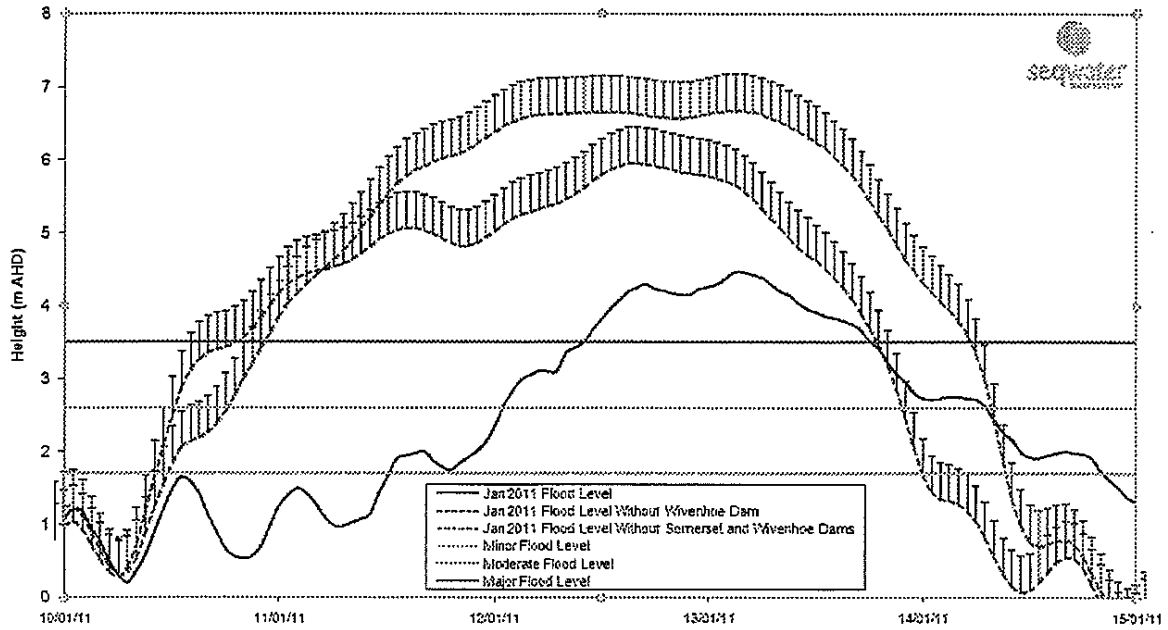
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

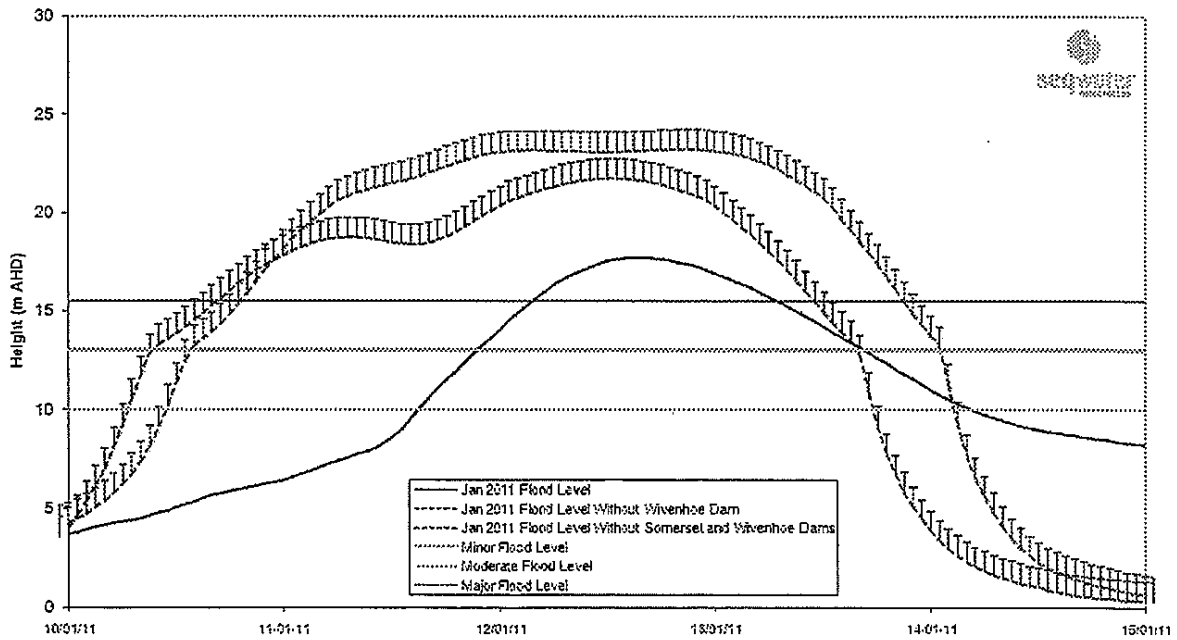
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

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



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



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## 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 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. 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 (Provided by Peter Allen and unedited)

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??): "...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## 5 COMPLIANCE WITH THE MANUAL

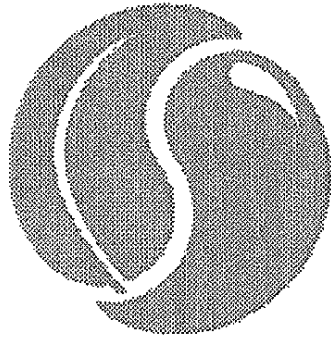
(To be provided)

## 6 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

- Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
- 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 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.

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.

The primary objectives of the procedures contained in the flood 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. 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 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.

## 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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

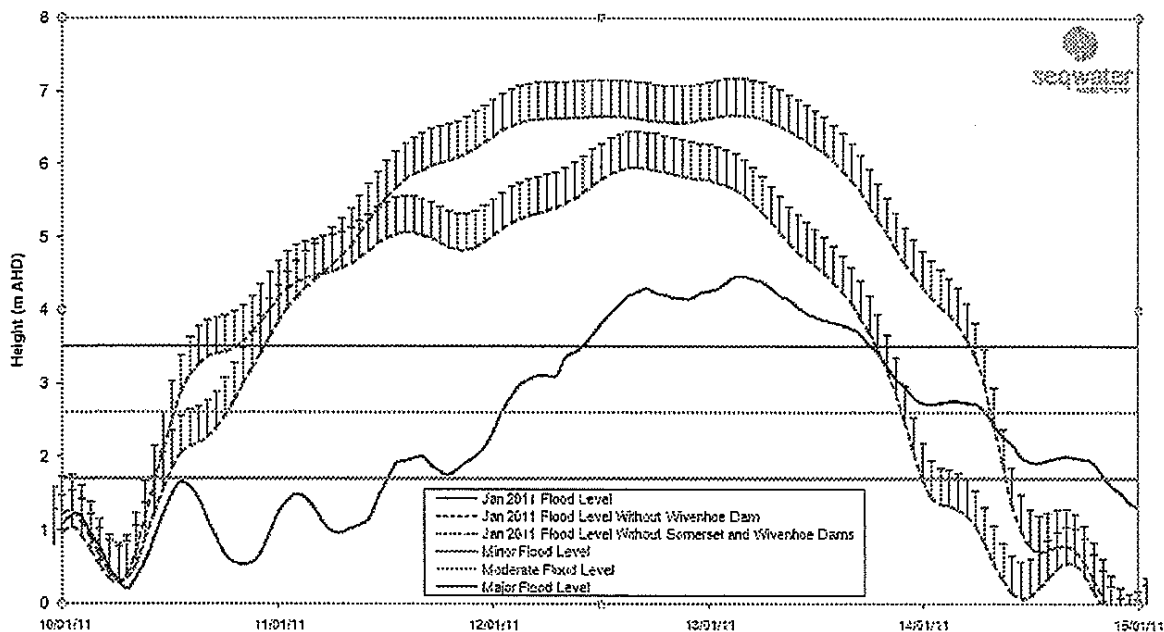
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

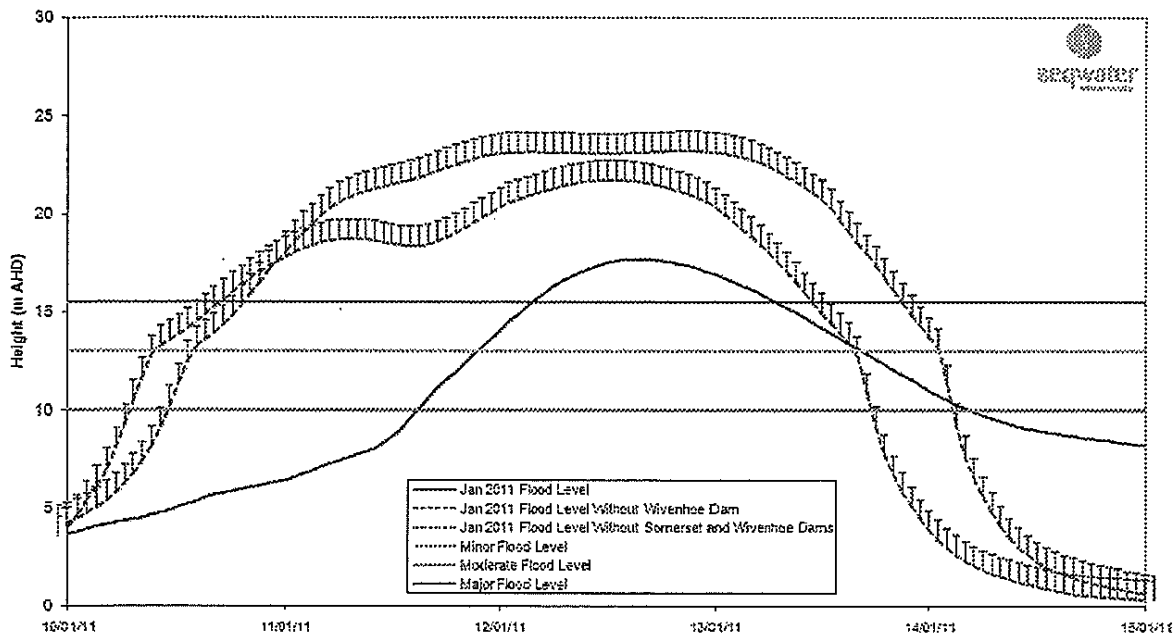
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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 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.
- 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.
  - Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
  - 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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**To:** watergridmedia [REDACTED]  
**Subject:** FW: Cabinet in confidence - Ministerial brief outline  
**Attach:** Ministerial brief - contents outline.docx; Ministerial Briefing Note January 17  
2011 Final Draft for distribution.doc; Jan 2011 Flood Event\_Ver 1\_draft for  
distribution.docx

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**Cc:** Michael Lyons; Mike Foster; Elaina Smouha; peter.allen [REDACTED]  
**Subject:** Cabinet in confidence - Ministerial brief outline

Please see attached draft with attachment.

In relation to the draft contents outline sent yesterday, the following is a cross reference FYI.

The attached Ministerial Briefing Note addresses the questions contained in the Ministerial Information Request as follows:

- 1) Design of Dam – Storages/Spillway upgrade

**Refer Section 1**

- 2) "The Flood Event" – Q&A

- a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)

**Refer Section 2.5**

- b. How does Wivenhoe Dam work as a flood mitigator?

**Refer Sections 2.1, 2.3 and 3.1**

- c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?

**Refer Sections 3.1 and 3.2**

- d. Statistics on how much did Wivenhoe Dam knock off the flood peak.

**Refer Section 2.1**

- e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?

**Refer Sections 2.1 and 2.2**

- f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?

**Refer Section 2.4**

- g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)

**Refer Section 2.4**

- h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?

**Refer Section 2.2**

- i. What is the fuse plug and why did it need to be maintained?

**Refer Section 2.3**

- j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?

**Refer Section 2.4**

- k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

**Refer Section 2.4**

3) The Flood Mitigation Manual

**Refer Section 3.1**

- a. Describe the decision making framework - Four strategies

**Refer Section 3.2**

- b. How is the Manual designed to work?

**Refer Section 3.2**

- c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?

**Refer Section 3.1**

- 4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (Information provider: Peter Allen - DERM)

**Refer Section 4**

Regards, Peter.

**Peter Borrows**

Chief Executive Officer

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**Cc:** john.bradley[REDACTED]; barry.dennien[REDACTED]; daniel.spiller[REDACTED];  
michael.lyons[REDACTED]; Elaina Smouha  
**Subject:** Cabinet in confidence - Ministerial brief outline

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

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**SEQ Water Grid Manager**  
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## Ministerial brief outline

### What is the objective?

- a) Ensuring public transparency
- b) To answer the State's questions on the performance of Wivenhoe Dam operations
- c) Preparation for a public inquiry
- d) Normal and logical course of conduct after the occurrence of a major flood event – Review requirement under the Flood Mitigation Manual

### Background (focus on Brisbane River flooding issues)

- 1) Design of Dam – Storages/Spillway upgrade (*Information provider: Seqwater and Peter Allen - DERM*) [1/3 to ½ a page]
- 2) "The Flood Event" – Q&A (*Information provider: Seqwater*) [2 ½ pages]
  - a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)
  - b. How does Wivenhoe Dam work as a flood mitigator?
  - c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?
  - d. Statistics on how much did Wivenhoe Dam knock off the flood peak.
  - e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?
  - f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?
  - g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)
  - h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?
  - i. What is the fuse plug and why did it need to be maintained?
  - j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?
  - k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

- 3) The Flood Mitigation Manual (*Information Provider: Seqwater/DERM*) [ ½ to 1 page]
  - a. Describe the decision making framework - Four strategies
  - b. How is the Manual designed to work?
  - c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?
  - d. **Attach** Minister Robertson’s request for advice on pre-emptive release and our response (*Information provider: SEQ Water Grid Manager*)
- 4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (*Information provider: Peter Allen - DERM*)
  - a. Flood Mitigation Manual approval
  - b. Formal reporting process under the Flood Mitigation Manual – **attach** report resulting from the February 1999 flood event
  - c. Decision making process under the Flood Mitigation Manual –
    - i. Who makes the flood release decisions under the Manual?
    - ii. who is informed/consulted?
    - iii. effect of the recent Flood Communication Protocol?
- 5) Brian Cooper Flood Mitigation Manual compliance review (*Responsible: SEQ Water Grid Manager*)

## **Seqwater report**

(*Information provider: Seqwater, Peter Allen and Bob Reilly*)

Seqwater, in consultation with Peter Allen and Bob Reilly, to set out how Seqwater’s Flood Mitigation Manual Report to the Chief Executive on the effectiveness of the operational procedures will be undertaken.

- **Attach** table of contents of the 1999 Flood Mitigation Manual report
- Reflect Brian Cooper’s compliance review
- Peer review – establishment of an expert panel – who will be on it? Peter Allen and Bob Reilly may provide some input.
- Communication Protocol and incorporation into the Flood Mitigation Manual (revisit in the next fortnight?)

Timeframes on the development of the report – consider urgency due to anticipated further rainfall during this summer.

## **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. COMPLIANCE WITH MANUAL**

### **6. 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.

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 of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

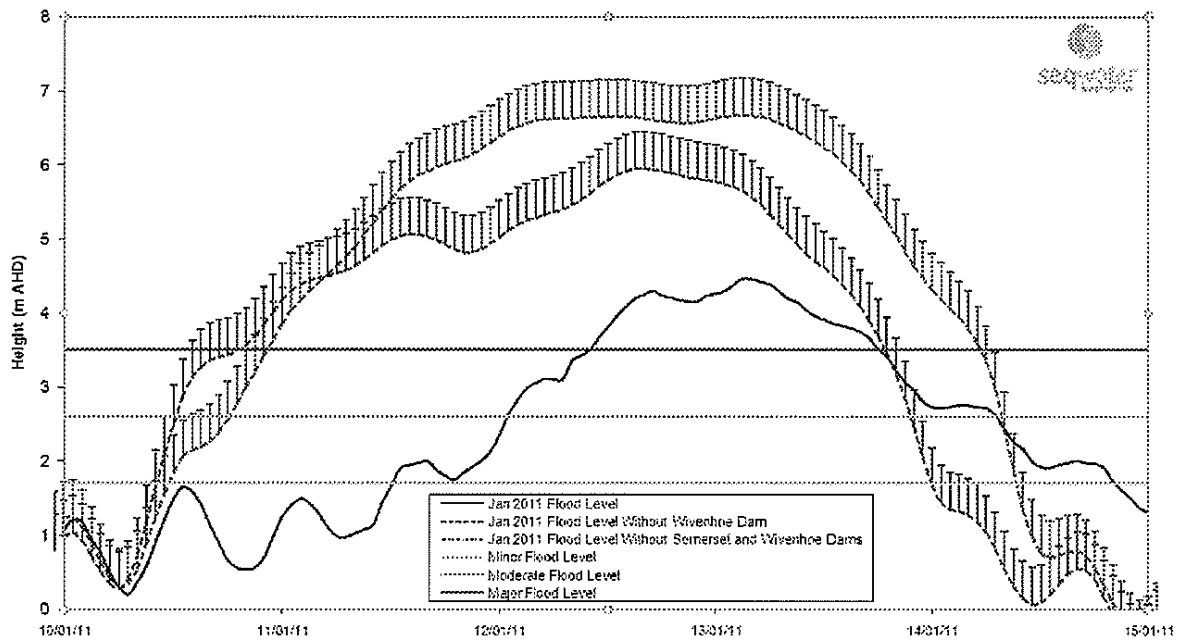
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

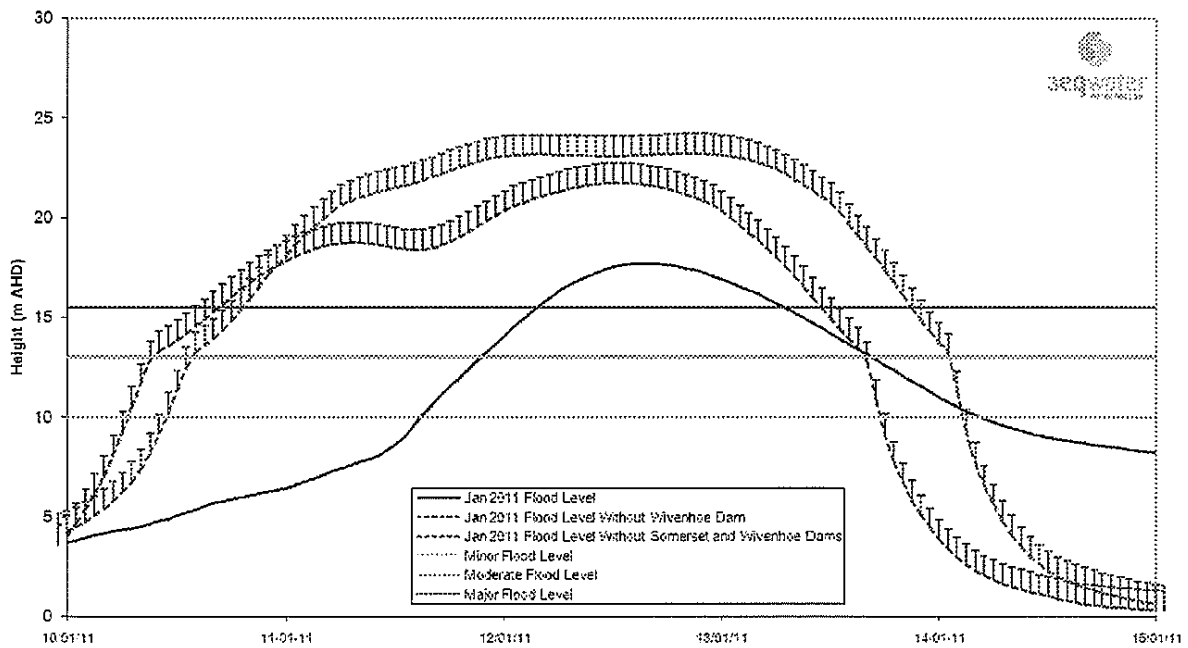
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

# **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 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. 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 (Provided by Peter Allen and unedited)**

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??): "...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## **5 COMPLIANCE WITH THE MANUAL**

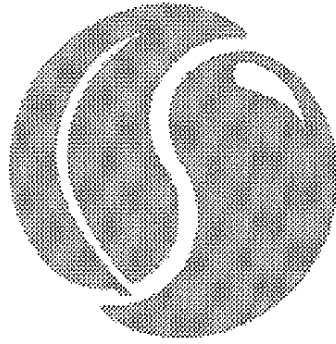
(To be provided)

## 6 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

- Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
- 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 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.

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.

The primary objectives of the procedures contained in the flood 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. 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 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.

## 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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

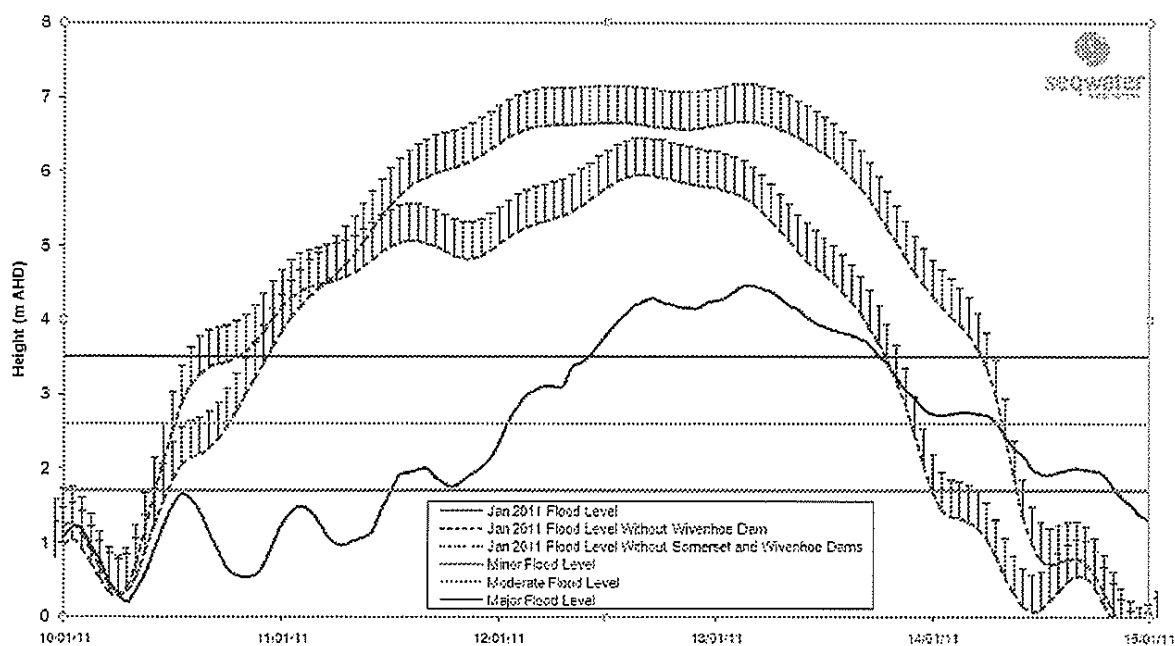
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

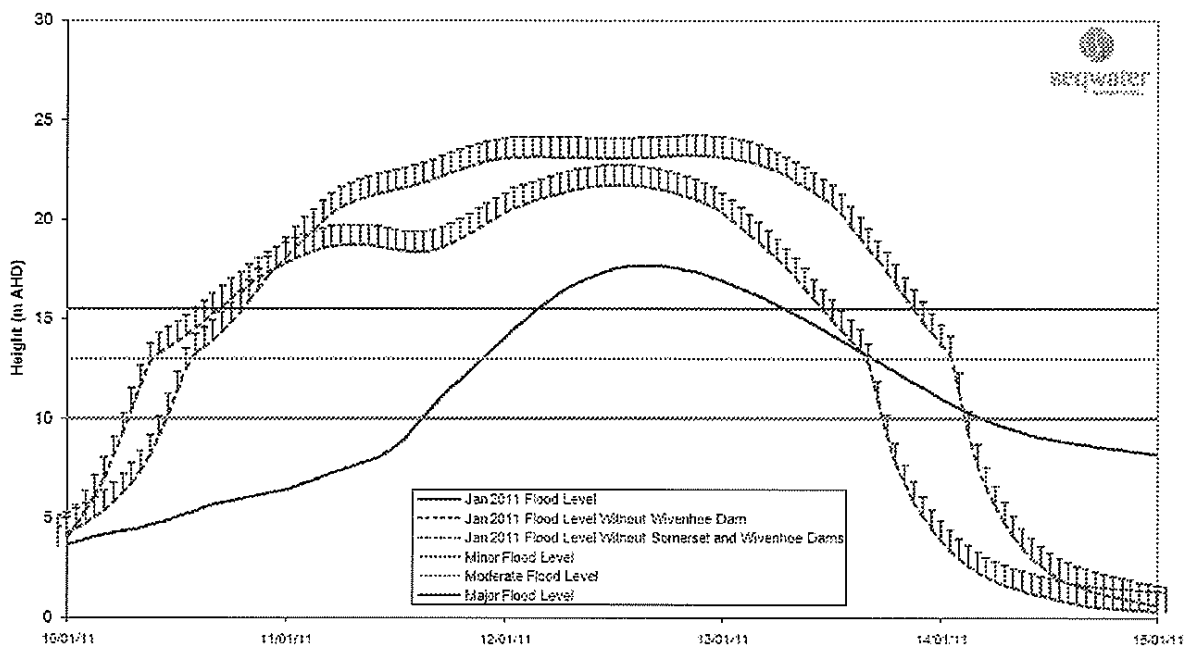
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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 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.
- 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:
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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?
  - 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.
  - Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
  - 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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Gina O'Driscoll

---

From: Kathy Reilly [threereillys [REDACTED]]  
Sent: Sunday, 16 January 2011 6:00 PM  
To: Reilly Bob; pborrows [REDACTED]; john bradley [REDACTED]; Barry Dennien, Dan Spiller; peter.allen [REDACTED]  
Subject: Re: Cabinet in confidence - Ministerial brief outline

Hi Peter

Peter Allen will provide you with some technical commentary, so I will concentrate on the wider issues. In the interests of time, I have not checked my comments with Peter Allen so he and your staff can feel to correct me if I have got my facts wrong.

#### Dam failure versus fuse plug activation

In the current event, the critical issue we were trying to avoid was activation of the fuse plugs, with the first one being activated at (I recall) 75.6 metres--not sure what this was in terms of percentage of capacity. As well as the adverse impacts of such activation cited in the text, the practical effect would also have been to increase, I understand, flood heights by about 0.5 metres in Brisbane. So, we had to avoid this outcome. (Also what the 0.5 metres been worth in terms of avoided property damage?)

Personally, I would emphasise more the arguments around what we had to do to avoid this outcome.

#### Reducing the peak flood in brisbane--last paragraph p.3

This is an important point. However the argument would be strengthened if you more comprehensively explained the reasoning behind the statement. For example, are we saying that because seawater reduced the flow from 6,000 cumecs to 2,500 cumecs, then this was the outcome, and that the only reason we could do that was because we were still 0.5 metres or so below fuse plug activation (and thus had a buffer if there was an unexpected surge in inflows?)

Also what is the 1 metre worth in terms of reduced property damage?

#### Section 2.4

Playing the devil's advocate for a moment with respect to the table on p.7, could someone convincingly argue that if the starting level had been 50% of FSL, you would have had the ability to reduce the releases from Wivenhoe below 2,500 cumecs at the height of the flood event, and thus further reduce the peak height in Brisbane /Ipswich?

#### Seawater report (p.13)

The specific additional issues that I suggest we include are:

- whether it is worth investigating increasing the flood capacity of Wivenhoe--I know a fair bit of work has been done on this issue
- 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.

I also suggest the review be undertaken by an independent expert and that an expert panel be formed to provide review of the report and identification of any additional issues requiring investigation--this is important if you are picking up possible improvement by other agencies.

#### Minor points.

- throughout the text can we be clear what we mean by the term "failure"--to the Minister I suspect this means the dam will collapse and I do not think this is what meant in some cases.
- the spillway upgrade in 2035 is not intended to improve flood mitigation capacity, I understand (p.2)

- the first few paragraphs in section 2.1 refer to the sceario where Wivenhoe did not exist--could this be made clearer in the text?
- Finally, could we make the point that Wivenhoe/Somerset does not control Lockyer/Bremer and that the flood flow at the river peak was compromised of x % from these sources. In the last few days, I have explained to many people around Milton/Auchenflower (where there was significant flooding) this point and they are always surprised. There appears to be a strong view in the community that Wivenhoe was supposed to stop any repetition of the 1974 flood and therefore it "failed" in this task given what has happened.

egards

b

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

From: Reilly Bob  
 To: threereillys [REDACTED]  
 Sent: Sunday, January 16, 2011 4:33 PM  
 Subject: Fw: Cabinet in confidence - Ministerial brief outline

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

From: Peter Borrows <pborrow [REDACTED]>  
 To: Reilly Bob; Rob Drury <rdrury [REDACTED]>; Duty Seq <dutyseq [REDACTED]>; Bradley John; Dennien Barry [REDACTED]  
 SEQWGM; spiller daniel [REDACTED]  
 Cc: Lyons Michael [REDACTED]; Mike Foster <mfoster [REDACTED]>; Elaina Smouha <elainamir [REDACTED]>; Allen Peter  
 Sent: Sun Jan 16 16:28:29 2011  
 Subject: Cabinet in confidence - Ministerial brief outline

Please see attached draft with attachment.

In relation to the draft contents outline sent yesterday, the following is a cross reference FYI.

The attached Ministerial Briefing Note addresses the questions contained in the Ministerial Information Request as follows:

1) Design of Dam – Storages/Spillway upgrade

Refer Section 1

2) "The Flood Event" – Q&A

a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)

Refer Section 2.5

b. How does Wivenhoe Dam work as a flood mitigator?

Refer Sections 2.1, 2.3 and 3.1

c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?

Refer Sections 3.1 and 3.2

d. Statistics on how much did Wivenhoe Dam knock off the flood peak.

Refer Section 2.1

e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?

Refer Sections 2.1 and 2.2

f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?

Refer Section 2.4

g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)

Refer Section 2.4

h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?

Refer Section 2.2

i. What is the fuse plug and why did it need to be maintained?

Refer Section 2.3

j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?

Refer Section 2.4

k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

Refer Section 2.4

### 3) The Flood Mitigation Manual

Refer Section 3.1

a. Describe the decision making framework - Four strategies

Refer Section 3.2

b. How is the Manual designed to work?

Refer Section 3.2

c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?

Refer Section 3.1

### 4) Regulatory context - Water Supply (Safety and Reliability) Act 2008 (Information provider: Peter Allen - DERM)

Refer Section 4

Regards. Peter.

Peter Borrows

Chief Executive Officer

Queensland Bulk Water Supply Authority trading as Seqwater

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From: Elaina Smouha [mailto:[elainami@seqwater.com.au](mailto:elainami@seqwater.com.au)] [REDACTED]  
Sent: Saturday, 15 January 2011 5:03 PM  
To: Mike Foster; peter.allen [REDACTED]; bob.reilly [REDACTED]; Peter Borrows; Rob Drury; Duty Seq  
Cc: john.bradley [REDACTED]; barry.dennier [REDACTED]; daniel.spiller [REDACTED];  
michael.lyons [REDACTED]; Elaina Smouha  
Subject: Cabinet in confidence - Ministerial brief outline

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

Elaina Smouha

Director, Governance and Regulatory Compliance

SEQ Water Grid Manager

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## Suzie Emery

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**From:** Elaina Smouha [elainamir[REDACTED]]  
**Sent:** Sunday, 16 January 2011 6:05 PM  
**To:** Peter Borrows  
**Cc:** Barry Dennien; Dan Spiller  
**Subject:** Re: Cabinet in confidence - Ministerial brief outline  
**Attachments:** Seqwater Jan\_2011\_Flood\_Event\_Ver\_1\_draft\_for\_distribution[1].docx; Seqwater Ministerial\_Briefing\_Note\_January\_17\_2011\_Final\_Draft\_for\_distribution[1].docx

Peter

As per your conversation with Barry, we have highlighted some queries within your attached reports.

Regards

Elaina

On Sun, Jan 16, 2011 at 4:28 PM, Peter Borrows <pborrows[REDACTED]> wrote:

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4) Regulatory context - *Water Supply (Safety and Reliability) Act 2008* (Information provider: Peter Allen - DERM)

**Refer Section 4**

Regards, Peter.

**Peter Borrows**

Chief Executive Officer

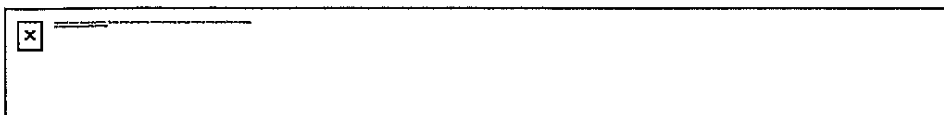
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**From:** Elaina Smouha [mailto:[elainami@seqwater.com.au](mailto:elainami@seqwater.com.au)]  
**Sent:** Saturday, 15 January 2011 5:03 PM  
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**Subject:** Cabinet in confidence - Ministerial brief outline

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Regards

Elaina

**Elaina Smouha**

Director, Governance and Regulatory Compliance

SEQ Water Grid Manager

Email: [elaina.smouha@seqwater.com.au](mailto:elaina.smouha@seqwater.com.au)

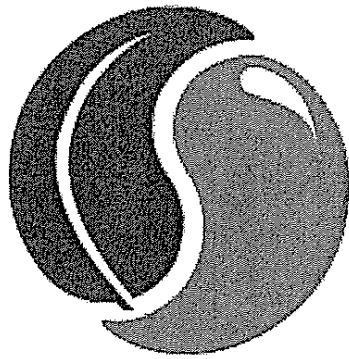
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WATER FOR LIFE

**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 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.

**Inconsistent with statement on page 8?**

### 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.

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.

The primary objectives of the procedures contained in the flood 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. 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. River flows at Moggill? Not releases?
- **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. River flows at Moggill? Not releases?
- **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 Should this be 370,000 as per teleconference?
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 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.

#### Assumptions for model?

Is it a dual or triple peak? Should we explain in detail why is it so unique?

## 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.

Weather forecasts were consistently less than actual. Emphasise reliance on BOM advice.

Need to specify BOM forecasts and actual rainfall experienced for each time step.

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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

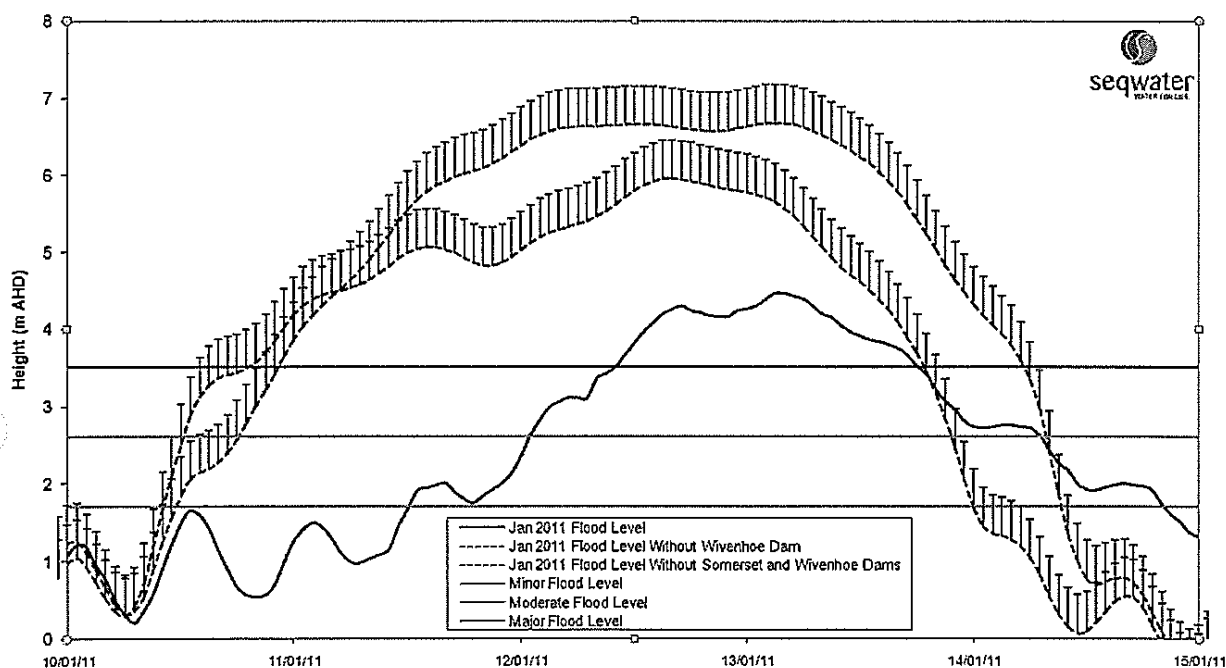
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

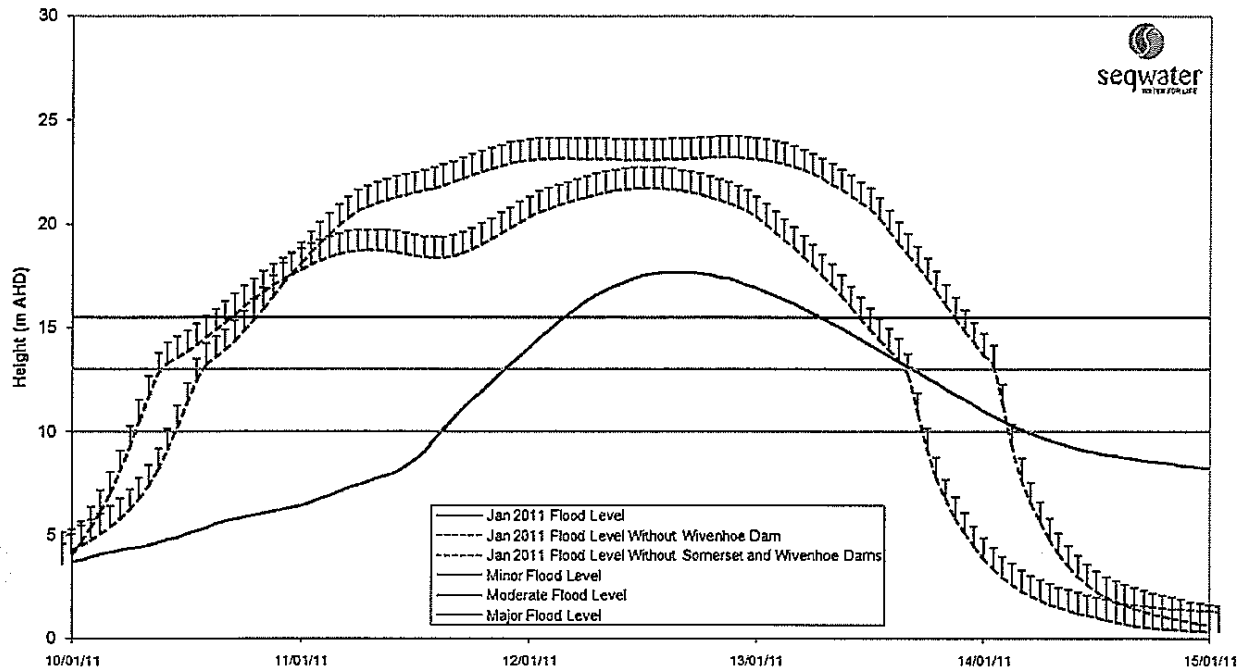
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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 notion is supported by BOM.

**Blue line of graph – Breakdown the component of % of Wivenhoe Dam release and downstream inflows.**

## 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.
- 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.
  - Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
  - 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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**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. COMPLIANCE WITH MANUAL**

**6. 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. Would it have made any difference to the current flood event?

Was it relevant to this event i.e any di? Would water have been released through it? Would the Flood Mitigation Manual decision levels changed?

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 of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

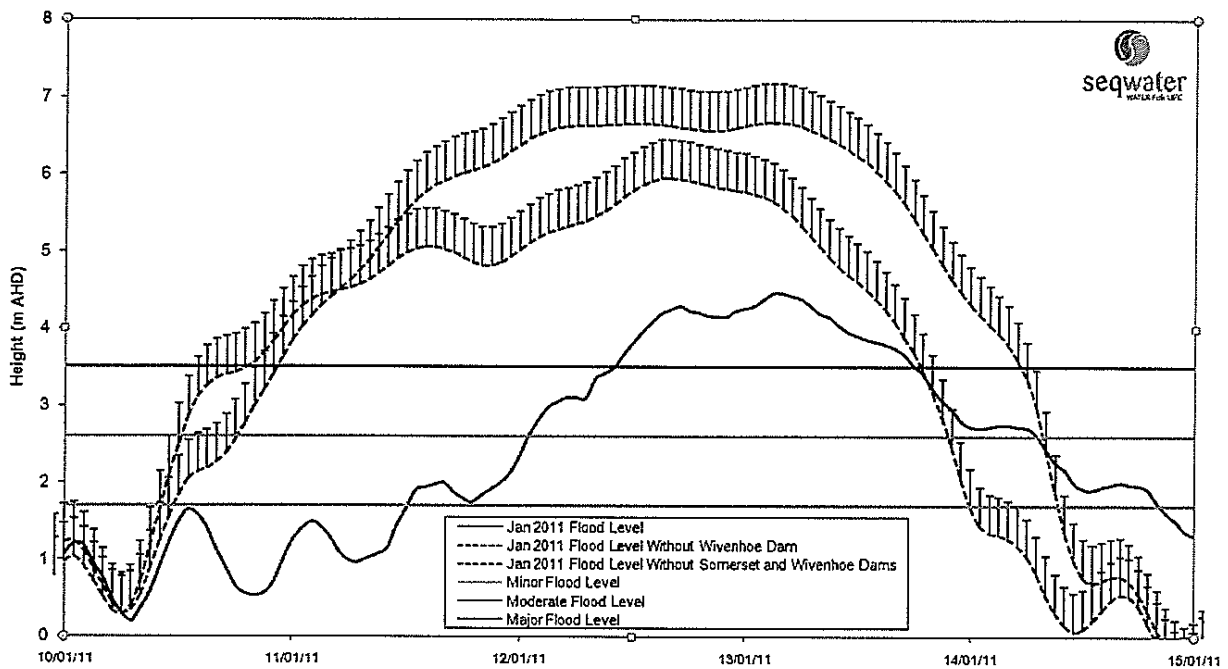
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

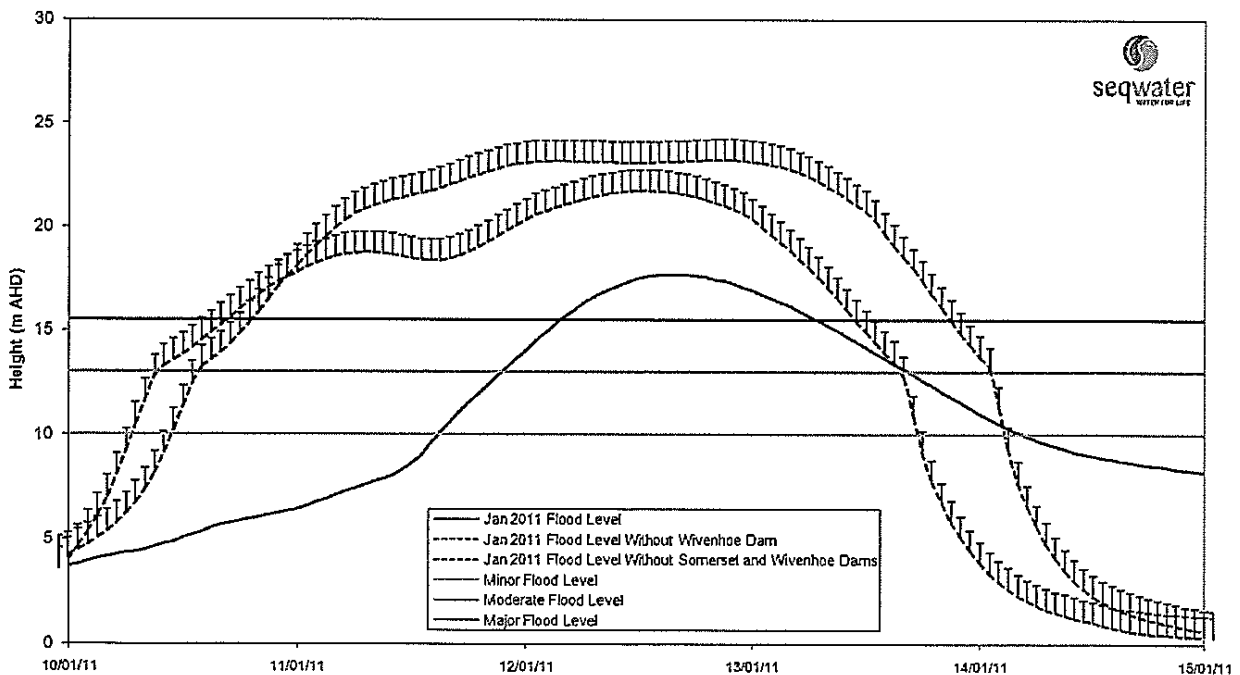
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

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



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



**Blue line of graph – Breakdown the component of % of Wivenhoe Dam release and downstream inflows.**



## 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.

**Why didn't we let the first fuse plug go? Why not 200%? Why not 205%?**

**Dam is rock core etc.**

## 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.

Detail specific impacts – which bridges knocked out, how long people isolated, which towns impacted, how many people impacted?

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.

What are the assumptions in terms of the releases at different levels?

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 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. 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.

Can we attach CV of experts? Note Colin Apelt chaired the Brisbane Flood Study and chairs the current Brisbane Flood taskforce.

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 (Provided by Peter Allen and unedited)

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??): "...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## **5 COMPLIANCE WITH THE MANUAL**

**(To be provided)**

## 6 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
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  - 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

- Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
- 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.

## Suzie Emery

---

**From:** Barry Dennien [Barry.Dennien [REDACTED]]  
**Sent:** Sunday, 16 January 2011 7:36 PM  
**To:** Dan Spiller  
**Subject:** Fwd: River height calculation [SEC=UNCLASSIFIED]

Regards  
Barry Dennien

Begin forwarded message:

**From:** Peter Baddiley <P.Baddiley [REDACTED]>  
**Date:** 16 January 2011 7:05:22 PM AEST  
**To:** Barry Dennien <Barry.Dennien [REDACTED]>  
**Cc:** Rob Vertessy <R.Vertessy [REDACTED]>, Peter Baddiley <P.Baddiley [REDACTED]>  
**Subject:** RE: River height calculation [SEC=UNCLASSIFIED]

Thanks Barry for your kind remark. It is a testing time for all of us.

Re your request, I think the Bureau need to respond to this request because it relates to questions about predicted flood levels which is a Bureau responsibility.

From what I can see now with the data that the Bureau has and from my involvement in the events on Tuesday/Wednesday, the significant increase in WD discharges through Tuesday clearly has a significant impact (increase) on downstream peak flood levels, rates of rise and timing.

However, again from my understanding of what happened based on operational data, modelling and the warning and predicting operations through Tue/Wed, the dam operators firstly increased the releases to manage the dam level and its safety (by necessity of course because of the intense Tuesday rainfalls); but then, when the dam was at a high level, very quickly moved to rapidly reducing the releases to minimise or mitigate the downstream flooding.

I believe, again from what I have before me, that this decision did reduce levels from what they otherwise would have been if a more conservative operation had applied. I don't have experience in operating dams, but it seemed to me a very solid, but "big" decision to make in the timeframe it seems to have been made (again from the reduced discharges evident during Wed morning).

All of these initial viewpoints, of course, needs to be tested with more detailed assessment and modelling yet to happen.

regards, peter

Peter Baddiley  
Regional Hydrology Manager  
Climate & Water Division  
Bureau of Meteorology  
[REDACTED] Ann Street  
GPO Box 413, BRISBANE, QLD, AUSTRALIA 4001  
Phone: [REDACTED]  
EMAIL: p.baddiley [REDACTED]

EMAIL for flood matters: flood.qld [REDACTED]  
WWW : [www.bom.gov.au](http://www.bom.gov.au)

---

**From:** Barry Dennien [mailto:Barry.Dennien@seqwater.com.au]  
**Sent:** Sunday, 16 January 2011 1:17 PM  
**To:** Peter Baddiley  
**Subject:** River height calculation

Hi Peter

You and your team are doing a great job.

We are getting many requests for stats on Wivenhoe's performance during the flood event.

One stat that would be useful to hold back the media until all info is collated is how much impact on river levels did the peak release on Tuesday night have on the river (tuesday noon to midnight). I understand not much however an estimate at this stage would be good.

Regards

Barry

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## Suzie Emery

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**From:** Bradley John [John.Bradley [REDACTED]]  
**Sent:** Sunday, 16 January 2011 7:41 PM  
**To:** Lance.McCallum [REDACTED]; Dan Spiller  
**Cc:** tim.watts [REDACTED]; Barry Dennien  
**Subject:** Re: Urgent - Cabinet in confidence

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Lance

I am sorry for the delay on the brief requested for tonight for Minister - Barry and his team have been working hard all day on this among their other issues - but have had challenges with input from seqwater.

Seqwater has struggled to provide their input in a congenit form and so Barry, Dan and others are still there awaiting for some stuff and finalising it at the end of a very long week.

We think we are about 60 to 90 minutes away at this point. I will forward it to you and Minister as soon as possible and we will talk through at 9 am.

John B

---

**From:** Bradley John  
**Sent:** Saturday, January 15, 2011 10:33 AM  
**To:** 'Lance.McCallum [REDACTED]' <Lance.McCallum [REDACTED]>; spiller daniel [REDACTED]  
**Cc:** 'tim.watts [REDACTED]' <tim.watts [REDACTED]>; Dennien Barry [REDACTED]  
**Subject:** Re: Urgent - Cabinet in confidence

Thanks Lance - we have anticipated the need for something like this - seqwgm work underway - I will talk to SEQWGM when out of SDMG now on.

Regards  
John B

---

**From:** Lance McCallum [mailto:Lance.McCallum [REDACTED]]  
**Sent:** Saturday, January 15, 2011 10:30 AM  
**To:** spiller daniel [REDACTED] Bradley John  
**Cc:** Tim Watts <Tim.Watts [REDACTED]>  
**Subject:** Urgent - Cabinet in confidence

John/Dan

The Minister has asked that preparation be done over the weekend that will enable him to go to the Emergency Cabinet meeting on Monday with a position on how the Govt is going to handle the issues of reviewing operational decisions made by SEQwater and SEQWGM in relation to releases from the dams.

I understand that in further to the recent independent review of the Wivenhoe operations manual the WGM is also undertaking further work by compiling a list of the operational experts who authored the manual.

Happy to discuss further.

Thanks, Lance.

+-----+  
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3 sheets of A4 paper = 1 litre of water  
+-----+

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**From:** Peter Borrows <pborrows [REDACTED]>  
**Sent:** Sunday, January 16, 2011 9:33 PM  
**To:** Barry Dennien <Barry.Dennien [REDACTED]>  
**Cc:** Peter Borrows <pborrows [REDACTED]>; Rob Drury <rdrury [REDACTED]>  
Duty Seq <dutyseq [REDACTED]>  
**Subject:** Fw: Cabinet in confidence - Ministerial brief outline  
**Attach:** WGM Brief with replies.docx; WGM Report with replies.docx; Ministerial Briefing Note January 17 2011 Final Draft for distribution.doc; Jan 2011 Flood Event\_Ver 1\_draft for distribution.docx

---

Barry, a lot of the extra questions will have to be picked up after the event in an interim or final report.

Sorry it has taken so long.

I think everyone is taking longer now.

Peter

---

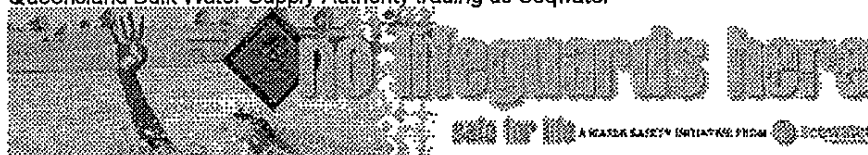
**From:** Rob Drury  
**To:** Peter Borrows  
**Cc:** John Tibaldi; Paul Bird  
**Sent:** Sun Jan 16 21:20:33 2011  
**Subject:** FW: Cabinet in confidence - Ministerial brief outline

Peter,

- Below is a reply to Bob covering most of his comments. Some have been included in the updated Brief and Report and others explained.
- Attached is an updated copy of the Report and the Brief with some minor changes. Most changes are in the fuse plugs and the Report section at the end
- Copies of the WGM comments named appropriately with our comments in red as to whether we made changes or reasons why we didn't. If we said reasons why we couldn't, we did not change the brief or Report in that area.

Rob

Robert Drury  
Dam Operations Manager  
Water Delivery  
Queensland Bulk Water Supply Authority *trading as Seqwater*



Swimming in weirs and fast flowing water is FATAL

rethink it.



[REDACTED] | E rdrury [REDACTED]  
Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306  
Website | [www.seqwater.com.au](http://www.seqwater.com.au)

---

**From:** Peter Borrows  
**Sent:** Sunday, 16 January 2011 6:06 PM  
**To:** Rob Drury  
**Cc:** John Tibaldi; Paul Bird; Jim Pruss; Peter Borrows  
**Subject:** Fw: Cabinet in confidence - Ministerial brief outline

120110

Have a look.

I'll call in a while. You'll have to get input from John T I think.

---

**From:** Kathy Reilly <threereillys@brisbane.qld.gov.au>  
**To:** Reilly Bob <Bob.Reilly@brisbane.qld.gov.au>; Peter Borrows; john.bradley <john.bradley@brisbane.qld.gov.au>; barry.dennier <barry.dennier@brisbane.qld.gov.au>; dan.spiller <dan.spiller@brisbane.qld.gov.au>; peter.allen <peter.allen@brisbane.qld.gov.au>  
**Sent:** Sun Jan 16 17:59:36 2011  
**Subject:** Re: Cabinet in confidence - Ministerial brief outline

Hi Peter

Peter Allen will provide you with some technical commentary, so I will concentrate on the wider issues. In the interests of time, I have not checked my comments with Peter Allen so he and your staff can feel to correct me if I have got my facts wrong.

#### Dam failure versus fuse plug activation

In the current event, the critical issue we were trying to avoid was activation of the fuse plugs, with the first one being activated at (I recall) 75.6 metres—not sure what this was in terms of percentage of capacity. As well as the adverse impacts of such activation cited in the text, the practical effect would also have been to increase, I understand, flood heights by about 0.5 metres in Brisbane. So, we had to avoid this outcome. (Also what the 0.5 metres been worth in terms of avoided property damage?)

This is not necessarily correct, the main reasons are as per the document rather than a 0.5m increase as we could shut down gates, although this again increases the levels to make up for the fuse plug flow. Personally, I would emphasise more the arguments around what we had to do to avoid this outcome.

#### Reducing the peak flood in brisbane--last paragaph p.3

This is an important point. However the argument would be strengthened if you more comprehensively explained the reasoning behind the statement. For example, are we saying that because seqwater reduced the flow from 6,000 cumecs to 2,500 cumecs, then this was the outcome, and that the only reason we could do that was because we were still 0.5 metres or so below fuse plug activation (and thus had a buffer if there was an unexpected surge in inflows?) We really did this because we managed to stop the increase in the dam rising. Did try to cover this in the report.

Also what is the 1 metre worth in terms of reduced property damage? Haven't been able to quantify this yet.

#### Section 2.4

Playing the devil's advocate for a moment with respect to the table on p.7, could someone convincingly argue that if the starting level had been 50% of FSL, you would have had the ability to reduce the releases from Wivenhoe below 2,500 cumecs at the height of the flood event, and thus further reduce the peak height in Brisbane /Ipswich? Possibly, but at no stage had 50% reduction in Wivenhoe been seriously canvassed by Govt nor could we have probably got to 50% after every event.

#### Seqwater report (p.13)

The specific additional issues that I suggest we include are:

- whether it is worth investigating increasing the flood capacity of Wivenhoe—I know a fair bit of work has been done on this issue
- 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.

Included in report.

I also suggest the review be undertaken by an independent expert and that an expert panel be formed to provide review of the report and identification of any additional issues requiring investigation—this is important if you are picking up possible improvement by other agencies.

Left out of report as a decision not by Seqwater.

1201AC

**Minor points.**

- throughout the text can we be clear what we mean by the term "failure"--to the Minister I suspect this means the dam will collapse and I do not think this is what meant in some cases.
- the spillway upgrade in 2035 is not intended to improve flood mitigation capacity, I understand (p.2)
- the first few paragraphs in section 2.1 refer to the scenario where Wivenhoe did not exist--could this be made clearer in the text?
- Finally, could we make the point that Wivenhoe/Somerset does not control Lockyer/Bremer and that the flood flow at the river peak was compromised of x % from these sources. In the last few days, I have explained to many people around Milton/Auchenflower (where there was significant flooding) this point and they are always surprised. There appears to be a strong view in the community that Wivenhoe was supposed to stop any repetition of the 1974 flood and therefore it "failed" in this task given what has happened.

Most of these comments included but we cannot split up what source contributes what levels downstream without serious analysis of the whole system. Best estimate the BoM came up with was 50% but that was just an estimate however we agree.

Bob

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

**From:** Reilly Bob  
**To:** threereillys [REDACTED]  
**Sent:** Sunday, January 16, 2011 4:33 PM  
**Subject:** Fw: Cabinet in confidence - Ministerial brief outline

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

**From:** Peter Borrows <pborrow [REDACTED]>  
**To:** Reilly Bob; Rob Drury <rdrury [REDACTED]>; Duty Sec <dutysec [REDACTED]>; Bradley John; Dennien Barry [REDACTED]  
SEQWGM; spiller daniel [REDACTED]  
**Cc:** Lyons Michael [REDACTED]; Mike Foster <mfoste [REDACTED]>; Elaina Smouha <elainami [REDACTED]>; Allen Peter  
**Sent:** Sun Jan 16 16:28:29 2011  
**Subject:** Cabinet in confidence - Ministerial brief outline

Please see attached draft with attachment.

In relation to the draft contents outline sent yesterday, the following is a cross reference FYI.

The attached Ministerial Briefing Note addresses the questions contained in the Ministerial Information Request as follows:

- 1) Design of Dam – Storages/Spillway upgrade

Refer Section 1

- 2) "The Flood Event" – Q&A

- a. Chronology - High level time step of events and significant decision making/changes – more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)

Refer Section 2.5

- b. How does Wivenhoe Dam work as a flood mitigator?

1201AT

Refer Sections 2.1, 2.3 and 3.1

c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?

Refer Sections 3.1 and 3.2

d. Statistics on how much did Wivenhoe Dam knock off the flood peak.

Refer Section 2.1

e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?

Refer Sections 2.1 and 2.2

f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?

Refer Section 2.4

g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)

Refer Section 2.4

h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?

Refer Section 2.2

i. What is the fuse plug and why did it need to be maintained?

Refer Section 2.3

j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?

Refer Section 2.4

k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

Refer Section 2.4

### 3) The Flood Mitigation Manual

Refer Section 3.1

a. Describe the decision making framework - Four strategies

Refer Section 3.2

b. How is the Manual designed to work?

Refer Section 3.2

c. History of Flood Mitigation Manual updates and peer review – who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?

Refer Section 3.1

4) Regulatory context - Water Supply (Safety and Reliability) Act 2008 (Information provider: Peter Allen - DERM)

Refer Section 4

1201AU

Regards, Peter.

Peter Borrows

Chief Executive Officer

Queensland Bulk Water Supply Authority trading as Seqwater

[REDACTED] E pborrows [REDACTED]

Level 3, 240 Margaret St, Brisbane City QLD 4000  
PO Box 16146, City East QLD 4002

Website | [www.seqwater.com.au](http://www.seqwater.com.au) <<http://www.seqwater.com.au>>

From: Elaina Smouha [mailto:[elaina.smouha@seqwater.com.au](mailto:elaina.smouha@seqwater.com.au)]  
Sent: Saturday, 15 January 2011 5:03 PM  
To: Mike Foster; peter.allen [REDACTED]; bob.reilly [REDACTED]; Peter Borrows; Rob Drury; Duty Seq  
Cc: john.bradley [REDACTED]; barry.dennien [REDACTED]; daniel.spiller [REDACTED];  
michael.lyons [REDACTED]; Elaina Smouha  
Subject: Cabinet in confidence - Ministerial brief outline

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

Elaina Smouha

Director, Governance and Regulatory Compliance

SEQ Water Grid Manager

[REDACTED]  
Email: [elaina.smouha@seqwater.com.au](mailto:elaina.smouha@seqwater.com.au) <<mailto:elaina.smouha@seqwater.com.au>>

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1201AV

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1201 AW

## **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. COMPLIANCE WITH MANUAL**

#### **6. 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. Would it have made any difference to the current flood event?

Was it relevant to this event i.e any di? Would water have been released through it? Would the Flood Mitigation Manual decision levels changed?

Such an upgrade is only for dam security for PMF not flood mitigation. Changed some wording to reflect this.

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 of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

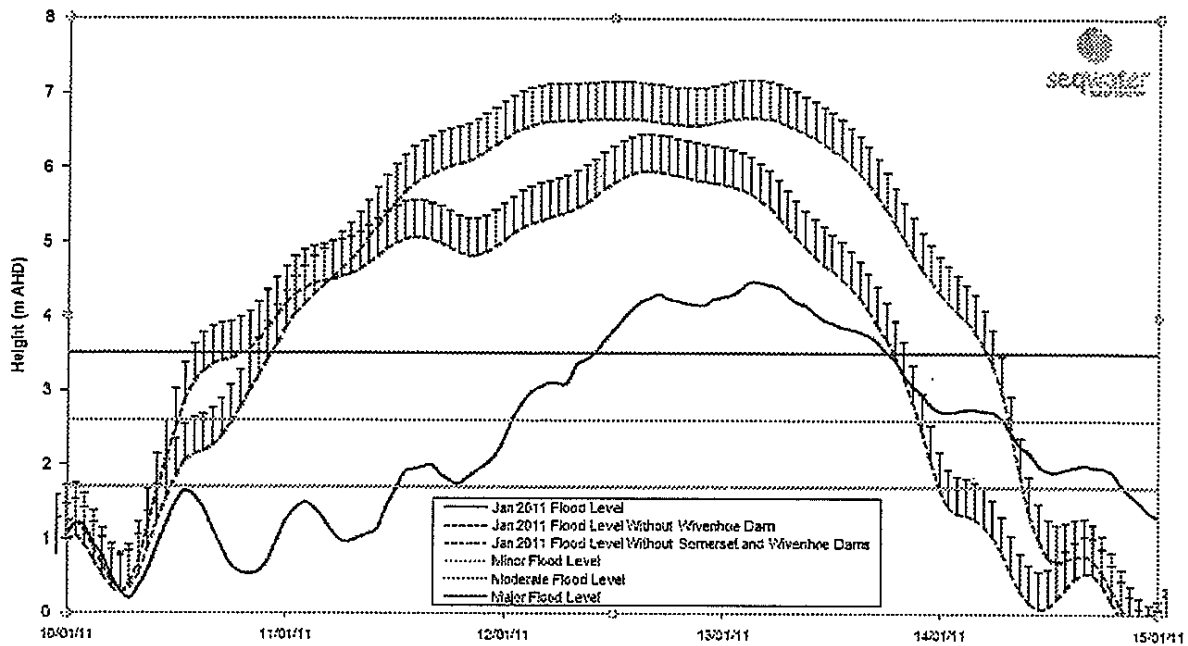
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

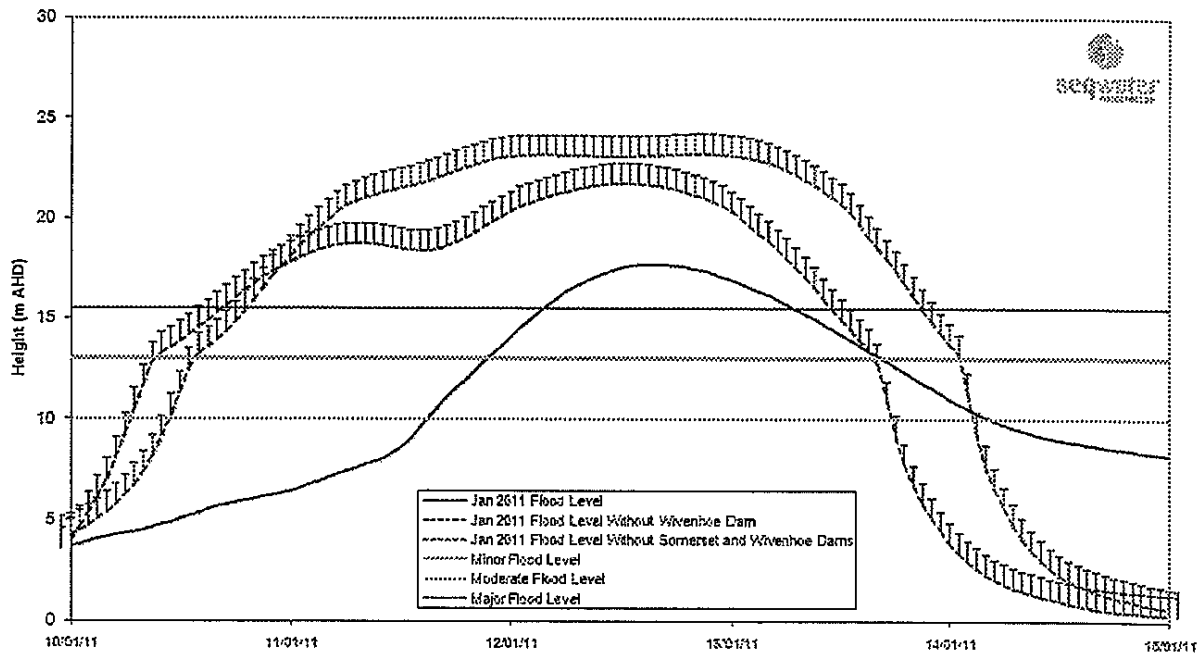
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

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



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



Blue line of graph – Breakdown the component of % of Wivenhoe Dam release and downstream inflows. Seqwater will undertake this work with the BoM but will take some time.



## 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.

**Why didn't we let the first fuse plug go? Why not 200%? Why not 205%?**

**Dam is rock core etc.** See below reasons for not allowing fuse plugs to go.

## 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.

~~Detail specific impacts – which bridges knocked out, how long people isolated, which towns impacted, how many people impacted?~~ This will take quite some time to collate even in terms of times bridges are out, we are still in the middle of a release. Numbers of people will come from council but these details cannot be collated at the moment. Will attempt to do in the next week or so during meetings planned with Councils over the next few weeks.

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.

What are the assumptions in terms of the releases at different levels? Don't fully understand, can address at a later date.

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 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. 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.

Can we attach CV of experts? Note Colin Apelt chaired the Brisbane Flood Study and chairs the current Brisbane Flood Taskforce. Not available at the moment and would not be the CV when he was involved in 1992.

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 (Provided by Peter Allen and unedited)

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??): "...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

See Peter Allen

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## 5 COMPLIANCE WITH THE MANUAL

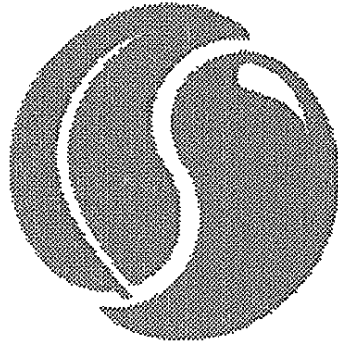
(To be provided)

## 6 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

- Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
- 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**

12018m

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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 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.

~~Inconsistent with statement on page 8?~~ No, in general the system worked well, the fact that a high intensity event could happen where we do not have stations can occur regardless of how many you have, it could happen over the lake and the only way to really monitor is lake rise.

### 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.

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.

The primary objectives of the procedures contained in the flood 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. 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. ~~River flows at Moggill? Not releases?~~ True, but we have just inserted straight from the manual rather than add too much detail, but it is true that there is a relationship to Moggill.
- **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. ~~River flows at Moggill? Not releases?~~ True, but we have just inserted straight from the manual rather than add too much detail, but it is true that there is a relationship to Moggill.
- **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 Should this be 370,000 as per teleconference?
3	26/12/2010	02/01/2011	470,000

Leave as 150,000 as we believe this is correct, will confirm if 350,000 was based on some other numbers.

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.

Assumptions for model? The model was developed by the Expert Panel as part of the Manual review in 2009, we did not include this in the report as we should check with the panel first.

Is it a dual or triple peak? Should we explain in detail why is it so unique? It is a dual peak, we have removed unique as all are unique.

## 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.

Weather forecasts were consistently less than actual. Emphasise reliance on BoM advice.  
Need to specify BoM forecasts and actual rainfall experienced for each time step.

We will need to do significant investigation into this and discussions with the BoM before we make any claims regarding forecast accuracy. The BoM issues a variety of forecasts both qualitative and quantitative.

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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

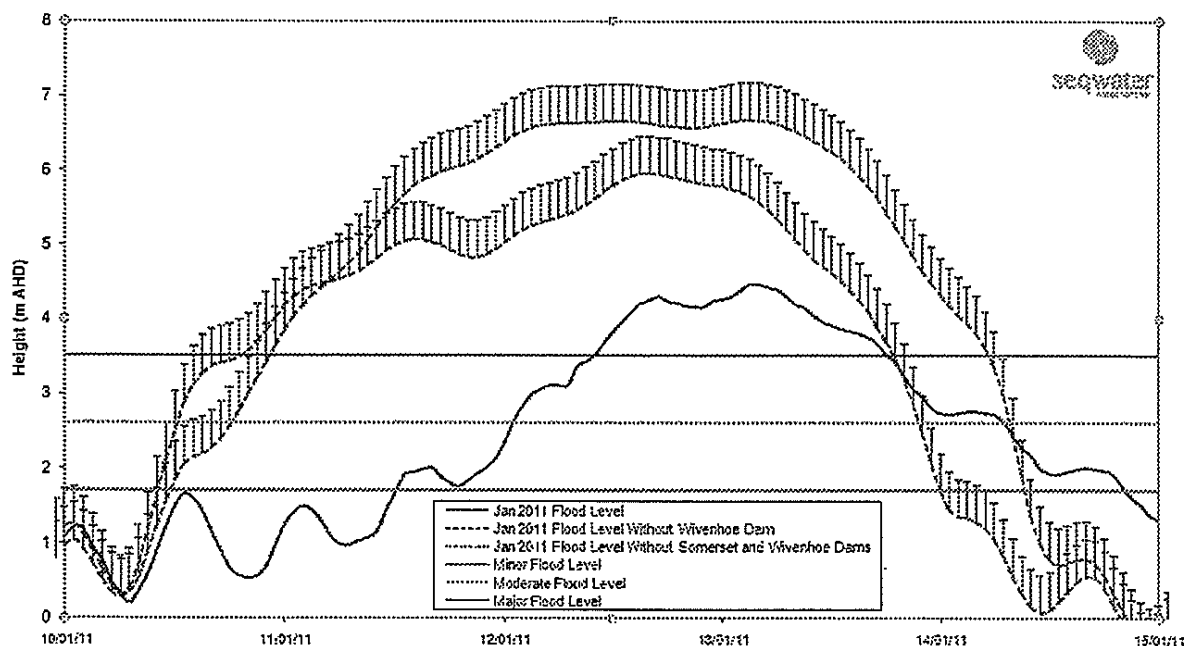
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

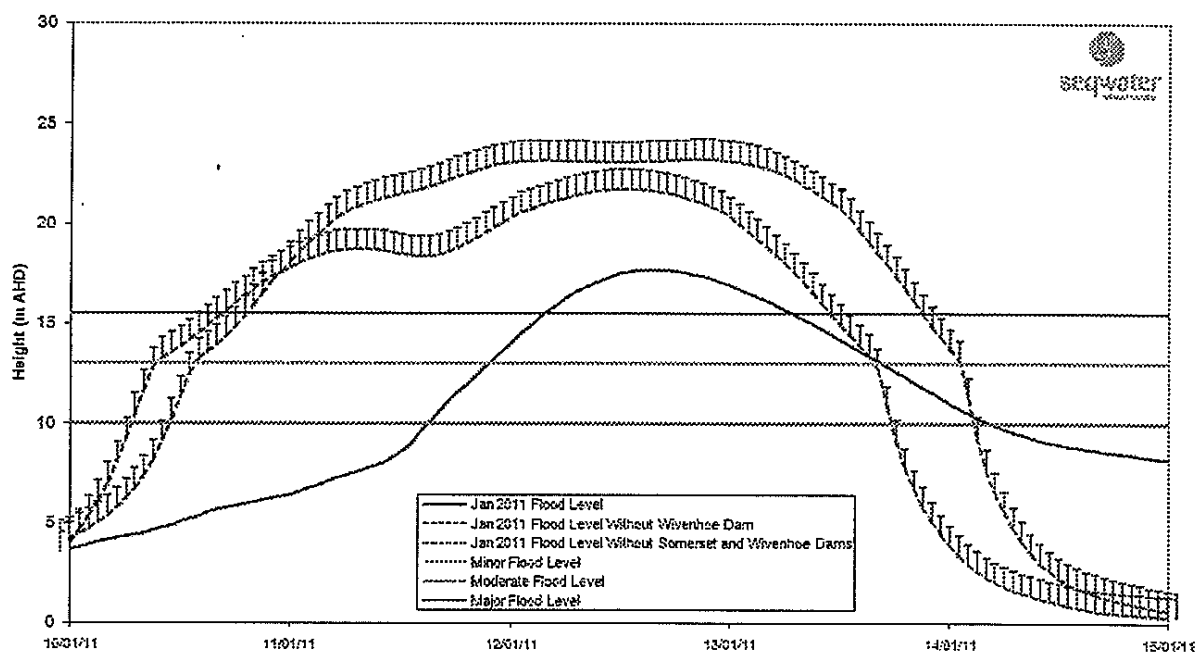
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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 notion is supported by BOM.

Blue line of graph – Breakdown the component of % of Wivenhoe Dam release and downstream inflows. As per briefing note comment.

## 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.
- 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:
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  - 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.
  - Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties—or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
  - 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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**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. COMPLIANCE WITH MANUAL**

**6. 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.

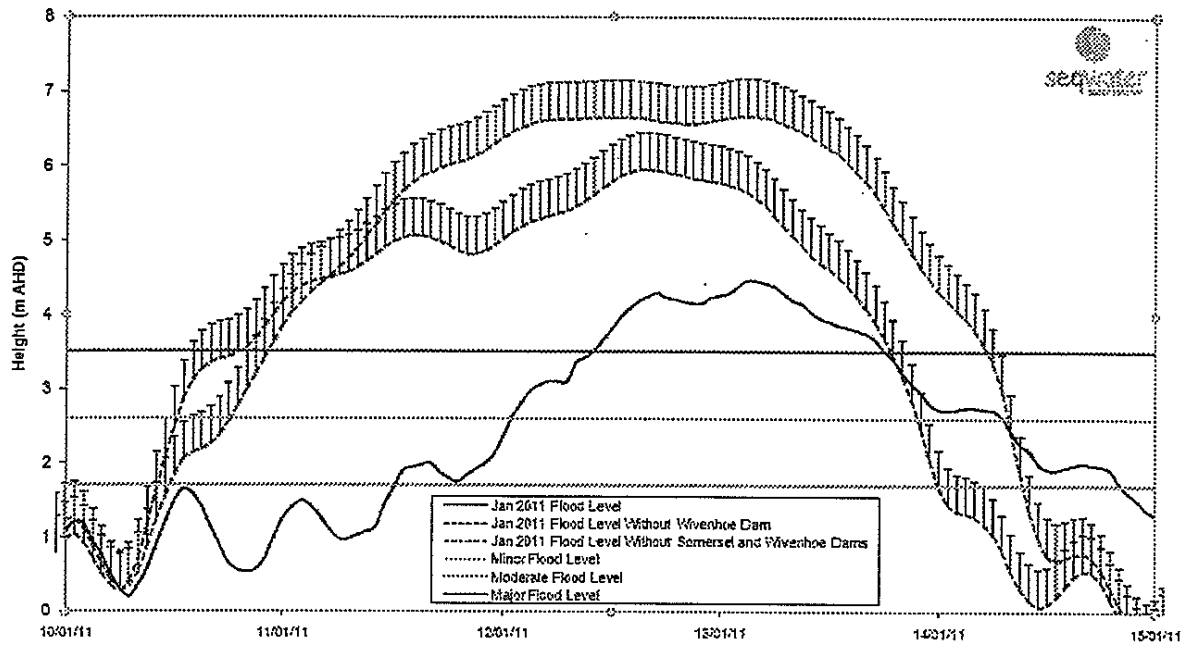
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

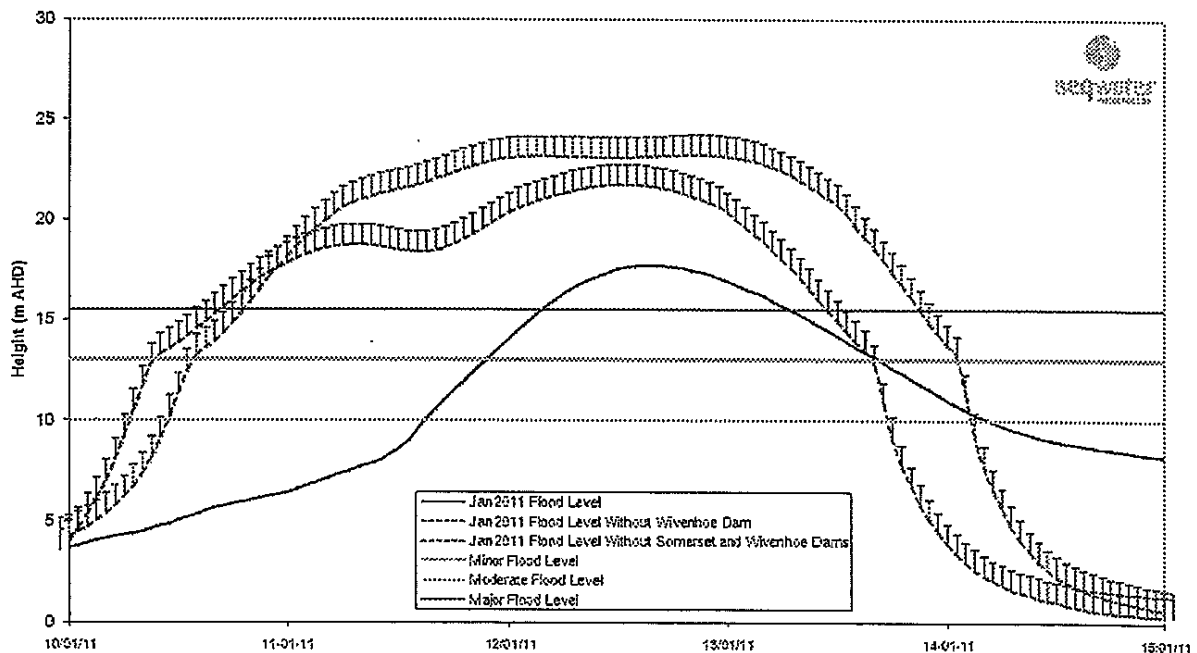
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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



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## 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 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. 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 (Provided by Peter Allen and unedited)

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??): "...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## 5 COMPLIANCE WITH THE MANUAL

(To be provided)

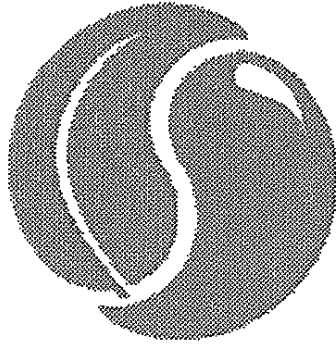
## 6 SEQWATER REPORT

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

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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?
  - 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**

12-01-11

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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.

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.

The primary objectives of the procedures contained in the flood 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. 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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

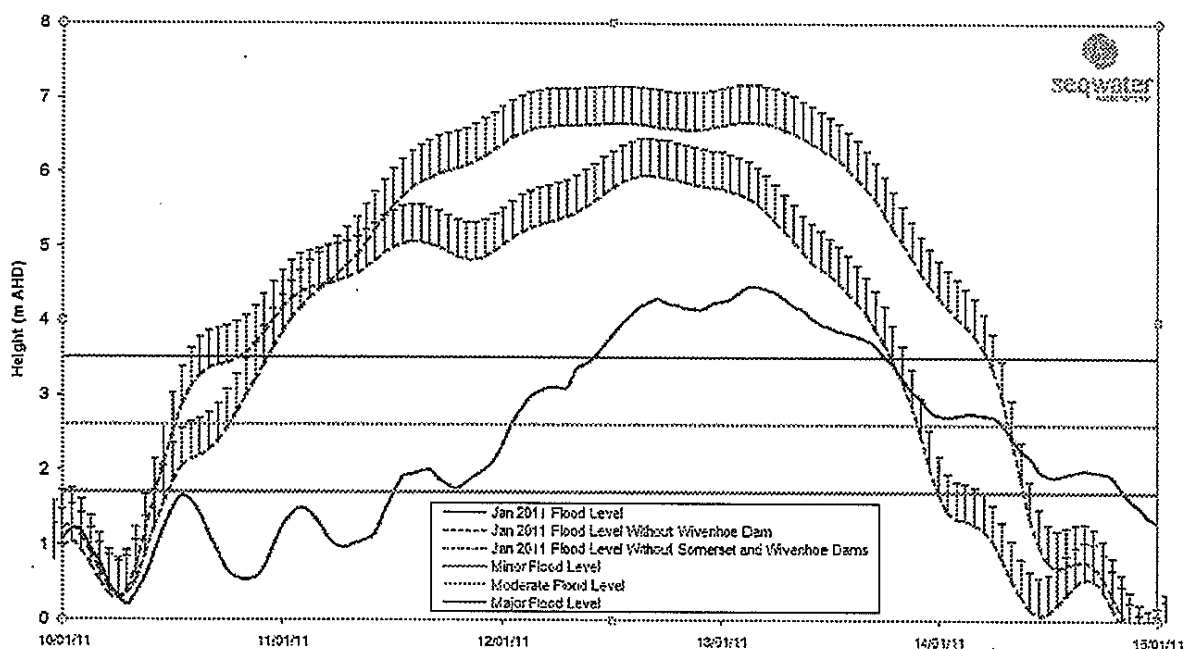
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

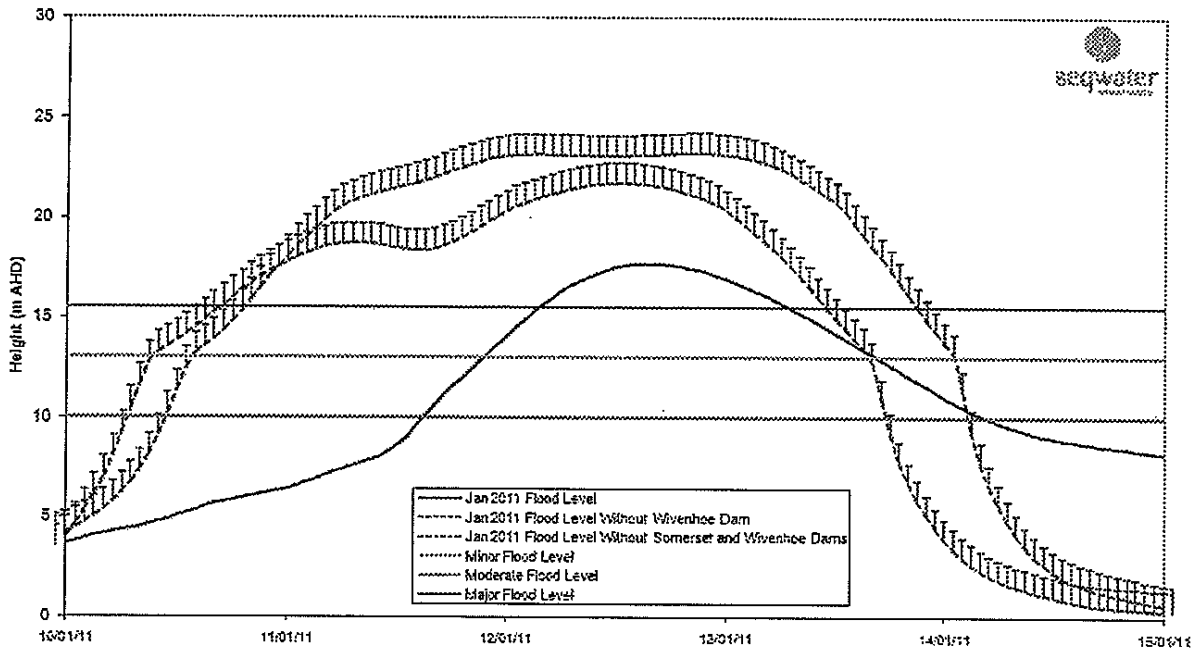
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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.
- 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.
  - 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.

## ***Appendix A***

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

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**From:** Barry Dennien <Barry.Dennien[REDACTED]>  
**Sent:** Sunday, January 16, 2011 9:39 PM  
**To:** Elaina Smouha <elainam[REDACTED]>  
**Subject:** Fwd: Cabinet in confidence - Ministerial brief outline  
**Attach:** WGM Brief with replies.docx; ATT00001.htm; WGM Report with replies.docx; ATT00002.htm; Ministerial Briefing Note January 17 2011 Final Draft for distribution.doc; ATT00003.htm; Jan 2011 Flood Event\_Ver 1\_draft for distribution.docx; ATT00004.htm

---

Regards  
Barry Dennien

Begin forwarded message:

**From:** "Peter Borrows" <pborrows[REDACTED]>  
**To:** "Barry Dennien" <Barry.Dennien[REDACTED]>  
**Cc:** "Peter Borrows" <pborrows[REDACTED]>, "Rob Drury" <rdrury[REDACTED]>, "Duty Seq" <dutyseq[REDACTED]>  
**Subject:** Fw: Cabinet in confidence - Ministerial brief outline

Barry, a lot of the extra questions will have to be picked up after the event in an interim or final report.

Sorry it has taken so long.

I think everyone is taking longer now.

Peter

---

**From:** Rob Drury  
**To:** Peter Borrows  
**Cc:** John Tibaldi; Paul Bird  
**Sent:** Sun Jan 16 21:20:33 2011  
**Subject:** FW: Cabinet in confidence - Ministerial brief outline

Peter,

- ? Below is a reply to Bob covering most of his comments. Some have been included in the updated Brief and Report and others explained.
- ? Attached is an updated copy of the Report and the Brief with some minor changes. Most changes are in the fuse plugs and the Report section at the end
- ? Copies of the WGM comments named appropriately with our comments in red as to whether we made changes or reasons why we didn't. If we said reasons why we couldn't, we did not change the brief or Report in that area.

Rob

Robert Drury

Dam Operations Manager

Water Delivery

Queensland Bulk Water Supply Authority trading as Seqwater

Seqwater\_No-Lifeguards-Here\_email\_strap

cid:image001.png@01CA24E1.BD

E rdruy

Wivenhoe Dam, Brisbane Valley Highway, via Fernvale Q4306 Australia  
PO Box 37, Fernvale QLD 4306

Website | [www.seqwater.com.au](http://www.seqwater.com.au)

---

**From:** Peter Borrows  
**Sent:** Sunday, 16 January 2011 6:06 PM  
**To:** Rob Drury  
**Cc:** John Tibaldi; Paul Bird; Jim Pruss; Peter Borrows  
**Subject:** Fw: Cabinet in confidence - Ministerial brief outline

Have a look.

I'll call in a while. You'll have to get input from John T I think.

---

**From:** Kathy Reilly <threereillys>  
**To:** Reilly Bob <Bob.Reilly>; Peter Borrows; john.bradley  
<john.bradley>; barry.dennien <barry.dennien>  
dan.spiller <dan.spiller>; peter.allen  
<peter.allen>  
**Sent:** Sun Jan 16 17:59:36 2011  
**Subject:** Re: Cabinet in confidence - Ministerial brief outline

Hi Peter

Peter Allen will provide you with some technical commentary, so I will concentrate on the wider issues. In the interests of time, I have not checked my comments with Peter Allen so he and your staff can feel to correct me if I have got my facts wrong.

#### Dam failure versus fuse plug activation

In the current event, the critical issue we were trying to avoid was activation of the fuse plugs, with the first one being activated at (I recall) 75.6 metres--not sure what this was in terms of percentage of capacity. As well as the adverse impacts of such activation cited in the text, the practical effect would also have been to increase, I understand, flood heights by about 0.5 metres in Brisbane. So, we had to avoid this outcome. (Also what the 0.5 metres been worth in terms of avoided property damage?)

This is not necessarily correct, the main reasons are as per the document rather than a 0.5m increase as we could shut

down gates, although this again increases the levels to make up for the fuse plug flow.

Personally, I would emphasise more the arguments around what we had to do to avoid this outcome.

### Reducing the peak flood in brisbane--last paragraph p.3

This is an important point. However the argument would be strengthened if you more comprehensively explained the reasoning behind the statement. For example, are we saying that because seqwater reduced the flow from 6,000 cumecs to 2,500 cumecs, then this was the outcome, and that the only reason we could do that was because we were still 0.5 metres or so below fuse plug activation (and thus had a buffer if there was an unexpected surge in inflows?) We really did this because we managed to stop the increase in the dam rising. Did try to cover this in the report.

Also what is the 1 metre worth in terms of reduced property damage? Haven't been able to quantify this yet.

### Section 2.4

Playing the devil's advocate for a moment with respect to the table on p.7, could someone convincingly argue that if the starting level had been 50% of FSL, you would have had the ability to reduce the releases from Wivenhoe below 2,500 cumecs at the height of the flood event, and thus further reduce the peak height in Brisbane /Ipswich?

Possibly, but at no stage had 50% reduction in Wivenhoe been seriously canvassed by Govt nor could we have probably got to 50% after every event.

### Seqwater report (p.13)

The specific additional issues that I suggest we include are:

- whether it is worth investigating increasing the flood capacity of Wivenhoe--I know a fair bit of work has been done on this issue
- 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.

Included in report.

I also suggest the review be undertaken by an independent expert and that an expert panel be formed to provide review of the report and identification of any additional issues requiring investigation--this is important if you are picking up possible improvement by other agencies.

Left out of report as a decision not by Seqwater.

### Minor points.

- throughout the text can we be clear what we mean by the term "failure"--to the Minister I suspect this means the dam will collapse and I do not think this is what meant in some cases.
- the spillway upgrade in 2035 is not intended to improve flood mitigation capacity, I understand (p.2)
- the first few paragraphs in section 2.1 refer to the scenario where Wivenhoe did not exist--could this be made clearer in the text?
- Finally, could we make the point that Wivenhoe/Somerset does not control Lockyer/Bremer and that the flood flow at

the river peak was compromised of x % from these sources. In the last few days, I have explained to many people around Milton/Auchenflower (where there was significant flooding) this point and they are always surprised. There appears to be a strong view in the community that Wivenhoe was supposed to stop any repetition of the 1974 flood and therefore it "failed" in this task given what has happened.

Most of these comments included but we cannot split up what source contributes what levels downstream without serious analysis of the whole system. Best estimate the BoM came up with was 50% but that was just an estimate however we agree.

Bob

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

**From:** Reilly Bob

**To:** threereillys [REDACTED]

**Sent:** Sunday, January 16, 2011 4:33 PM

**Subject:** Fw: Cabinet in confidence - Ministerial brief outline

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

**From:** Peter Borrows <pborrow@[REDACTED]>

**To:** Reilly Bob; Rob Drury <rdrury@[REDACTED]>; Duty Seq <dutyseq@[REDACTED]>; Bradley John; Dennien Barry [REDACTED]

SEQWGM; spiller daniel [REDACTED]

**Cc:** Lyons Michael [REDACTED]; Mike Foster <mifoster@[REDACTED]>; Elaina Smouha <elainam@[REDACTED]>; Allen Peter

**Sent:** Sun Jan 16 16:28:29 2011

**Subject:** Cabinet in confidence - Ministerial brief outline

Please see attached draft with attachment.

In relation to the draft contents outline sent yesterday, the following is a cross reference FYI.

The attached Ministerial Briefing Note addresses the questions contained in the Ministerial Information Request as follows:

1) Design of Dam □ Storages/Spillway upgrade

Refer Section 1

2) □ The Flood Event □ Q&A

a. Chronology - High level time step of events and significant decision making/changes □ more detailed time step information for Tuesday afternoon (i.e. what was the BOM forecast at the time, narrow peak etc.)

Refer Section 2.5

b. How does Wivenhoe Dam work as a flood mitigator?

Refer Sections 2.1, 2.3 and 3.1

c. What are the factors being balanced when making decisions about the amount of dam releases? To what extent does information from the Bureau of Meteorology/rain gauges influence decisions? How reliable is this information?

Refer Sections 3.1 and 3.2

d. Statistics on how much did Wivenhoe Dam knock off the flood peak.

Refer Section 2.1

e. What would have happened if Wivenhoe Dam had not been built and we only had Somerset Dam? What damage would have been caused compared to what has currently been experienced (damage statistics)?

Refer Sections 2.1 and 2.2

f. If we have undertaken pre-emptive dam releases to bring Wivenhoe Dam's full supply level down to lower than what we had maintained (i.e. 60%), what would have been the river height for the period that this flood event occurred?

Refer Section 2.4

g. If pre-emptive dam releases would not have made a difference, why? (i.e. why did we not release earlier?)

Refer Section 2.4

h. Why was Wivenhoe Dam only allowed to rise up to 191% and not 230%?

Refer Section 2.2

i. What is the fuse plug and why did it need to be maintained?

Refer Section 2.3

j. What damage or town isolation occurred during the Wivenhoe Dam releases that occurred since October 2010?

Refer Section 2.4

k. Did Seqwater have time to reduce the dam level between the 5 events? If so, would it have made a difference to this flood event?

Refer Section 2.4

### 3) The Flood Mitigation Manual

Refer Section 3.1

a. Describe the decision making framework - Four strategies

Refer Section 3.2

b. How is the Manual designed to work?

Refer Section 3.2

c. History of Flood Mitigation Manual updates and peer review □ who was on the panels, studies that fed into previous versions of the Manual and who was involved in these studies?

Refer Section 3.1

### 4) Regulatory context - Water Supply (Safety and Reliability) Act 2008 (Information provider: Peter Allen - DERM)

Refer Section 4

Regards, Peter.

Peter Borrows

Chief Executive Officer

[REDACTED] E pborrows [REDACTED]  
 [REDACTED] Margaret St, Brisbane City QLD 4000  
 PO Box 16146, City East QLD 4002  
 Website | [www.seqwater.com.au](http://www.seqwater.com.au) <<http://www.seqwater.com.au>>

Dear All

To assist, attached is a Ministerial brief outline as per our recent teleconference, for Monday's Emergency Cabinet meeting. It also records those who will be providing information for the Background and Flood Mitigation Manual report process.

As discussed, the brief needs to be provided to Minister Robertson tomorrow (Sunday, 16 January 2011).

Regards

Elaina

Elaina Smouha  
Director, Governance and Regulatory Compliance  
SEQ Water Grid Manager  
Phone: [REDACTED]  
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**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. COMPLIANCE WITH MANUAL**

**6. 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. Would it have made any difference to the current flood event?

Was it relevant to this event i.e any di? Would water have been released through it? Would the Flood Mitigation Manual decision levels changed?

Such an upgrade is only for dam security for PMF not flood mitigation. Changed some wording to reflect this.

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 of up to 2.5 metres in the City area and up to 5.5 metres in the Moggill area further upstream.

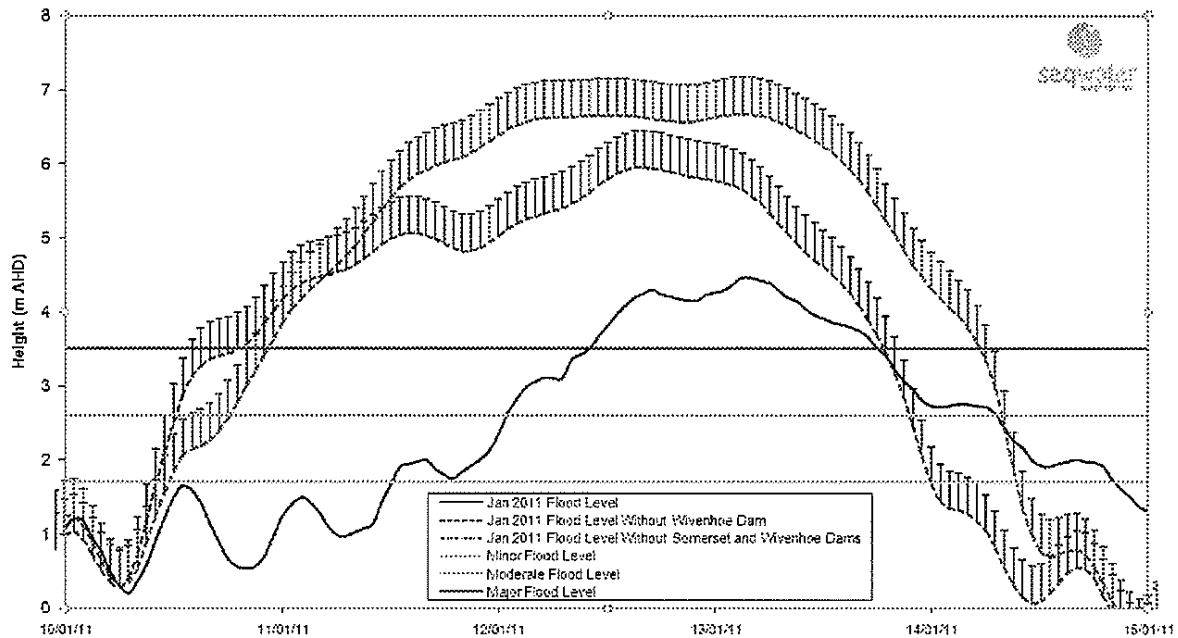
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

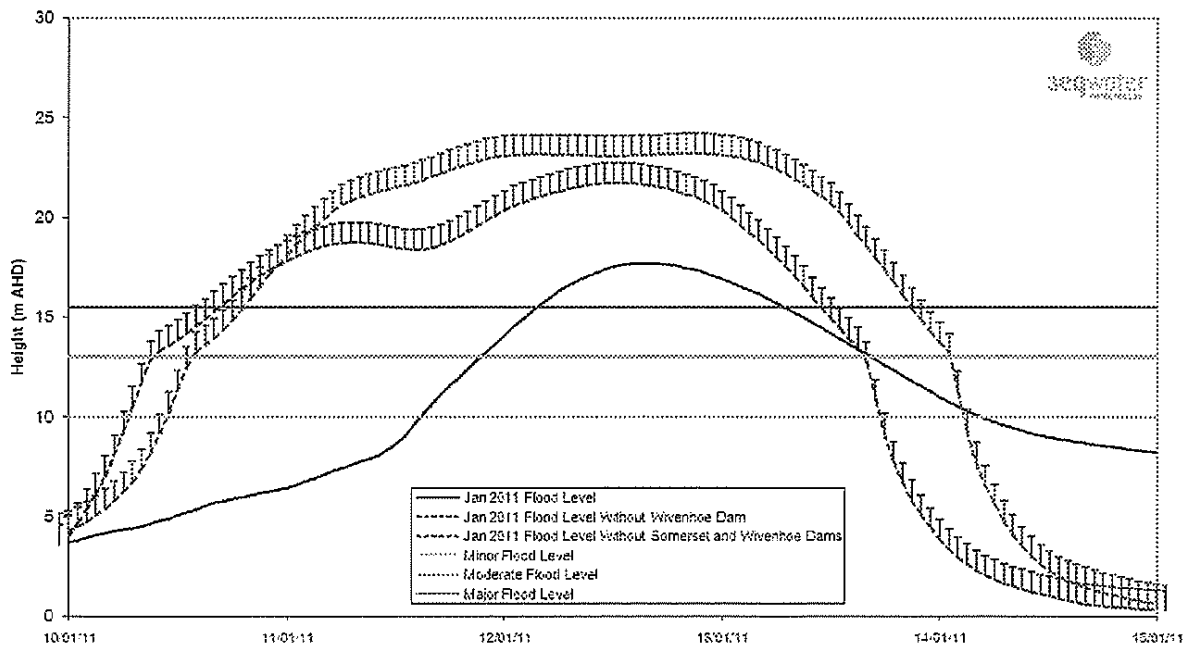
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

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



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



**Blue line of graph – Breakdown the component of % of Wivenhoe Dam release and downstream inflows. Seqwater will undertake this work with the BoM but will take some time.**



## 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.

**Why didn't we let the first fuse plug go? Why not 200%? Why not 205%?**

**Dam is rock core etc. See below reasons for not allowing fuse plugs to go.**

## 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.

Detail specific impacts – which bridges knocked out, how long people isolated, which towns impacted, how many people impacted? This will take quite some time to collate even in terms of times bridges are out, we are still in the middle of a release. Numbers of people will come from council but these details cannot be collated at the moment. Will attempt to do in the next week or so during meetings planned with Councils over the next few weeks.

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.

What are the assumptions in terms of the releases at different levels? Don't fully understand, can address at a later date.

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 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. 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.

Can we attach CV of experts? Note Colin Apelt chaired the Brisbane Flood Study and chairs the current Brisbane Flood taskforce Not available at the moment and would not be the CV when he was involved in 1992.

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 (Provided by Peter Allen and unedited)**

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??): "...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

See Peter Allen

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## **5 COMPLIANCE WITH THE MANUAL**

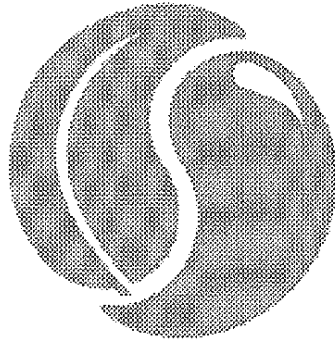
(To be provided)

## 6 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

- Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
- 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 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.

**Inconsistent with statement on page 8?** No, in general the system worked well, the fact that a high intensity event could happen where we do not have stations can occur regardless of how many you have, it could happen over the lake and the only way to really monitor is lake rise.

### 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.

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.

The primary objectives of the procedures contained in the flood 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. 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. River flows at Moggill? Not releases? True, but we have just inserted straight from the manual rather than add too much detail, but it is true that there is a relationship to Moggill.
- **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. River flows at Moggill? Not releases? True, but we have just inserted straight from the manual rather than add too much detail, but it is true that there is a relationship to Moggill.
- **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 Should this be 370,000 as per teleconference?
3	26/12/2010	02/01/2011	470,000

Leave as 150,000 as we believe this is correct, will confirm if 350,000 was based on some other numbers.

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.

**Assumptions for model?** The model was developed by the Expert Panel as part of the Manual review in 2009, we did not include this in the report as we should check with the panel first.

**Is it a dual or triple peak? Should we explain in detail why is it so unique?** It is a dual peak, we have removed unique as all are unique.

## 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.

**Weather forecasts were consistently less than actual. Emphasise reliance on BOM advice.**

**Need to specify BOM forecasts and actual rainfall experienced for each time step.**

We will need to do significant investigation into this and discussions with the BoM before we make any claims regarding forecast accuracy. The BoM issues a variety of forecasts both qualitative and quantitative.

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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

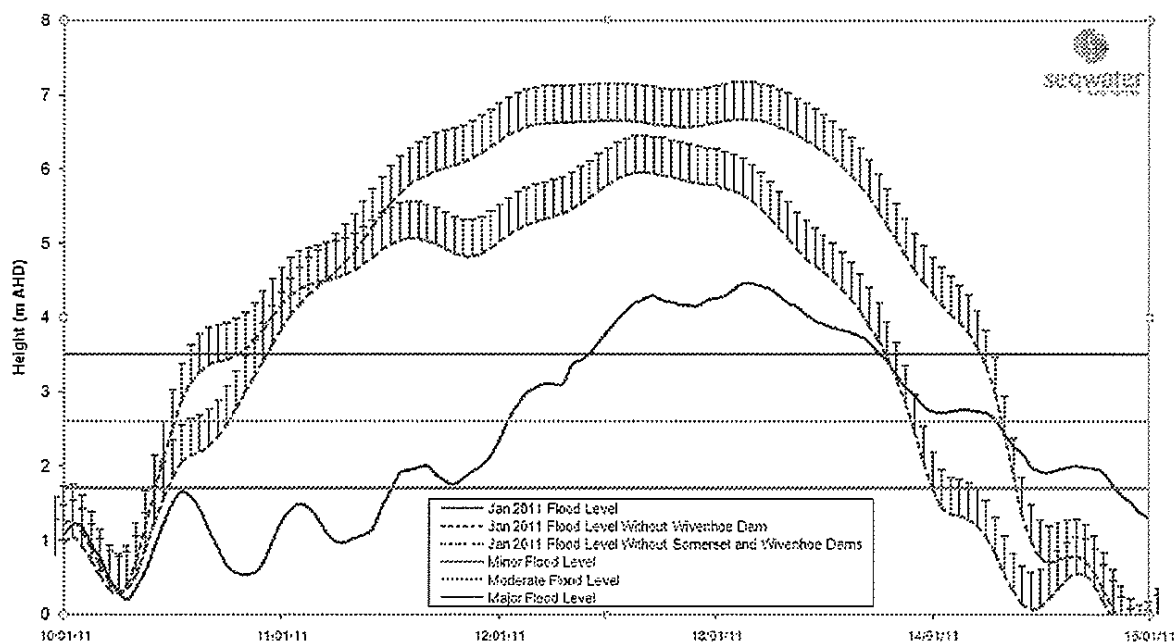
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

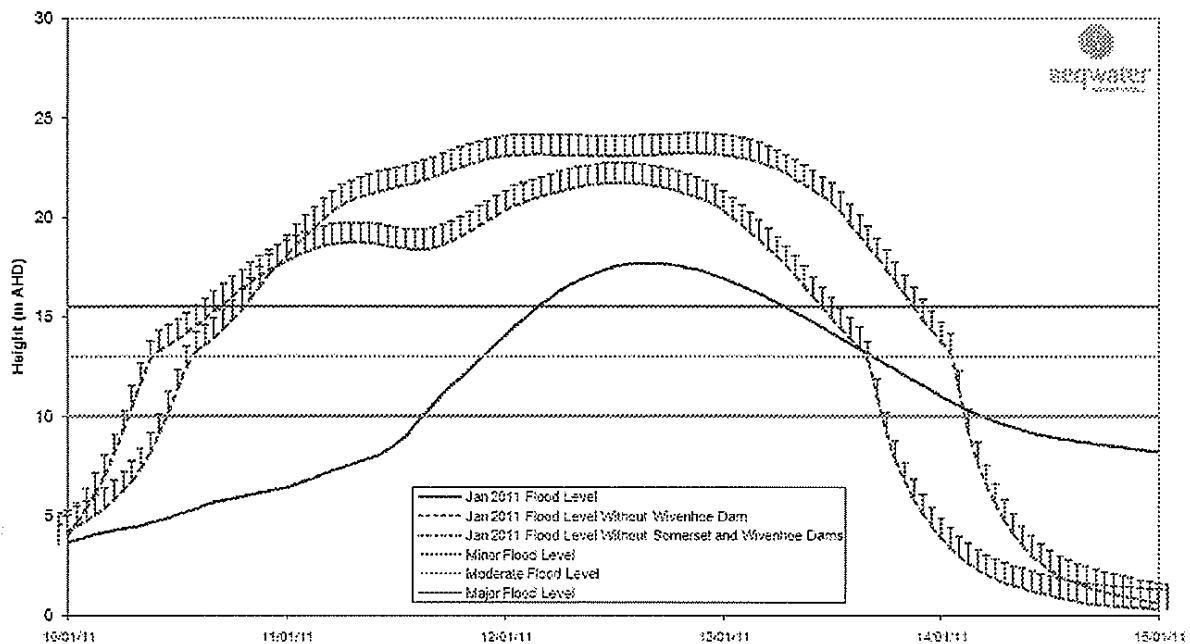
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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 notion is supported by BOM.

**Blue line of graph – Breakdown the component of % of Wivenhoe Dam release and downstream inflows. As per briefing note comment.**

## 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.
- 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.
  - Are changes to the facilities or work practices of other organisations desirable to improve Seqwater's abilities to manage these events? If so, what are they and their implications? (For example, would it be worth funding Brisbane River crossing upgrades so that floodwater could be released faster, while not adversely affecting access to properties--or maybe alternative strategies e.g. resupply operations could be put in place to achieve similar outcomes?)
  - 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.

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

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## **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. COMPLIANCE WITH MANUAL**

### **6. 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.

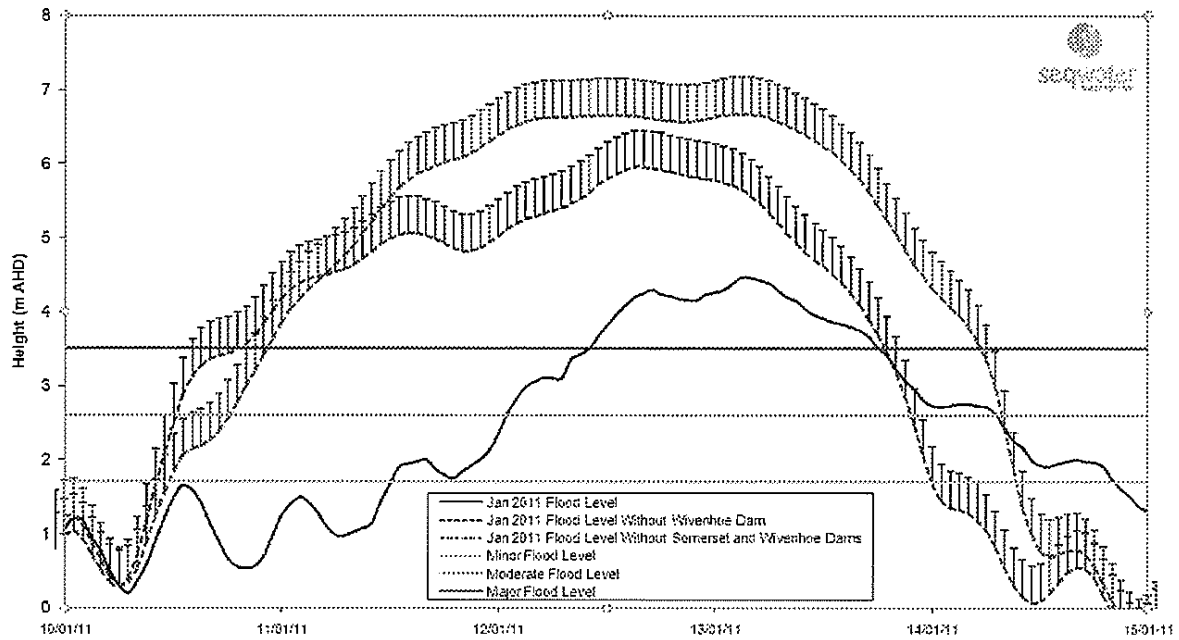
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam. (Source: Flood Damage Tables provided to Seqwater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

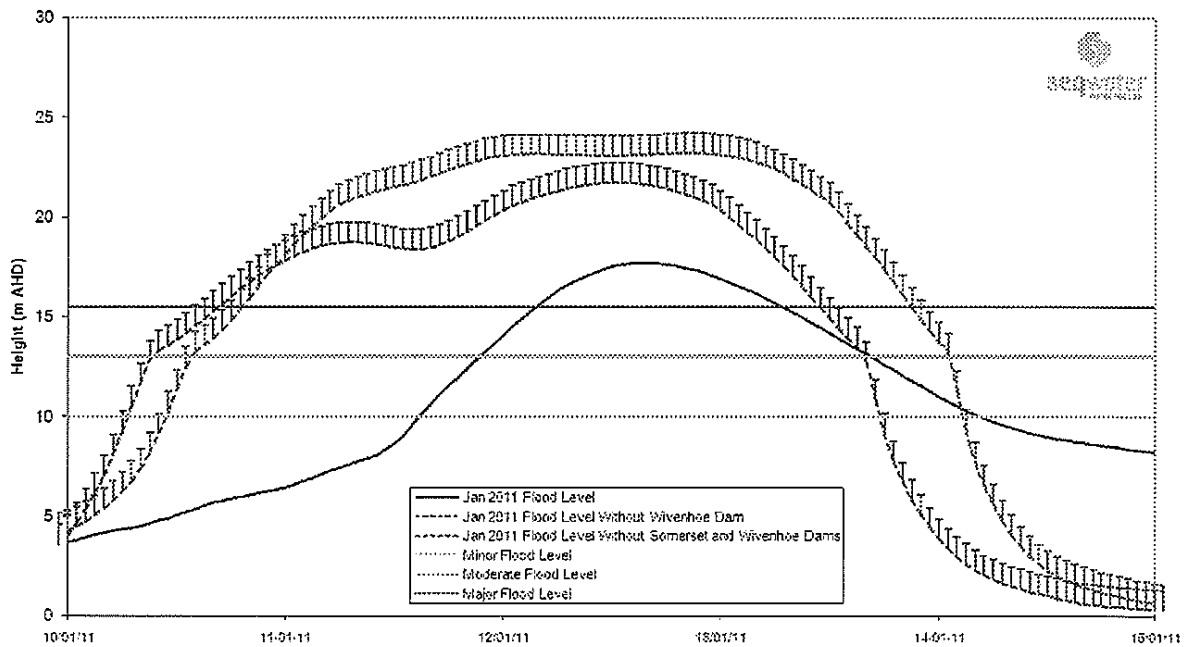
Depending on the nature of the event, the presence of Wivenhoe Dam could also potentially increase flood warning times to impacted areas. How these times may have been increased during the current event is presently difficult to quantify, but discussions will be held with BOM on this issue at a later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

These are contained in the Flood Mitigation Manual (manual) approved under sections 370 to 374 of the *Water Supply (Safety and Reliability) Act 2008*. The Chief Executive Officer (CEO) of DERM (or his delegate) approves the 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 Act for the CEO to take into account when approving the manual.

The manual for the dams requires, amongst other matters:

1. Flood operations to be conducted in accordance with manual's provisions. (There is an approval process specified in the manual, if Seqwater considers a different flood release strategy is desirable to deal with a particular flood event. This was not used in the January 2011 flood event)
2. Flood operations to be under the control of CEO-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. For this flood event, the Queensland Government engaged Mr Brian Cooper, an independent consulting engineer, to review compliance with the manual. Mr Cooper concluded (Attachment??):  
"...The strategies in the Flood Mitigation Manual have been followed, allowing for the discretion given to make 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 these responsible for flood operations and the way events unfolded..." (p.3 of the final report or other appropriate reference??)

The manual is separate from a draft communication protocol (Insert name) between the Local, State and Commonwealth government agencies that are affected by the dams' flood operations. This protocol is not binding on the parties to it 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. None of them are involved in any of the regulatory decisions concerning the dams or are members of the work unit (Office of the Water Supply Regulator) which undertakes the CEO's regulatory functions.

## **5 COMPLIANCE WITH THE MANUAL**

(To be provided)

## 6 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
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  - 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

- 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.

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.

The primary objectives of the procedures contained in the flood 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. 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 released expected to cease on Wednesday 19 January 2011 unless further rainfall is experienced.

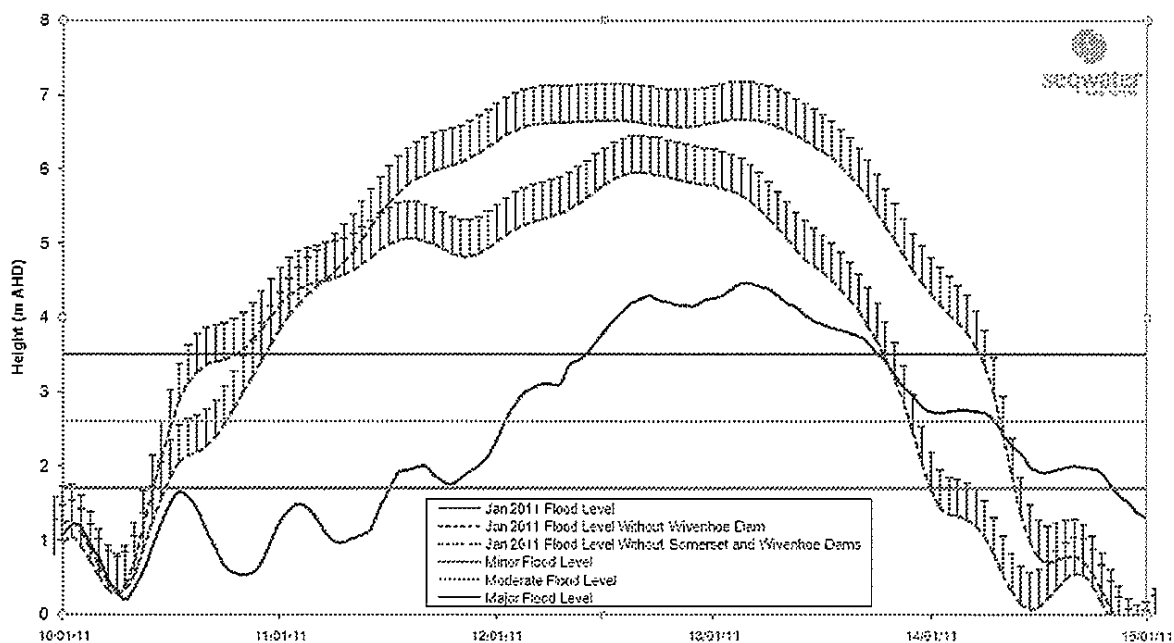
### 4.3 Flood Mitigation Benefits of Wivenhoe Dam

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.

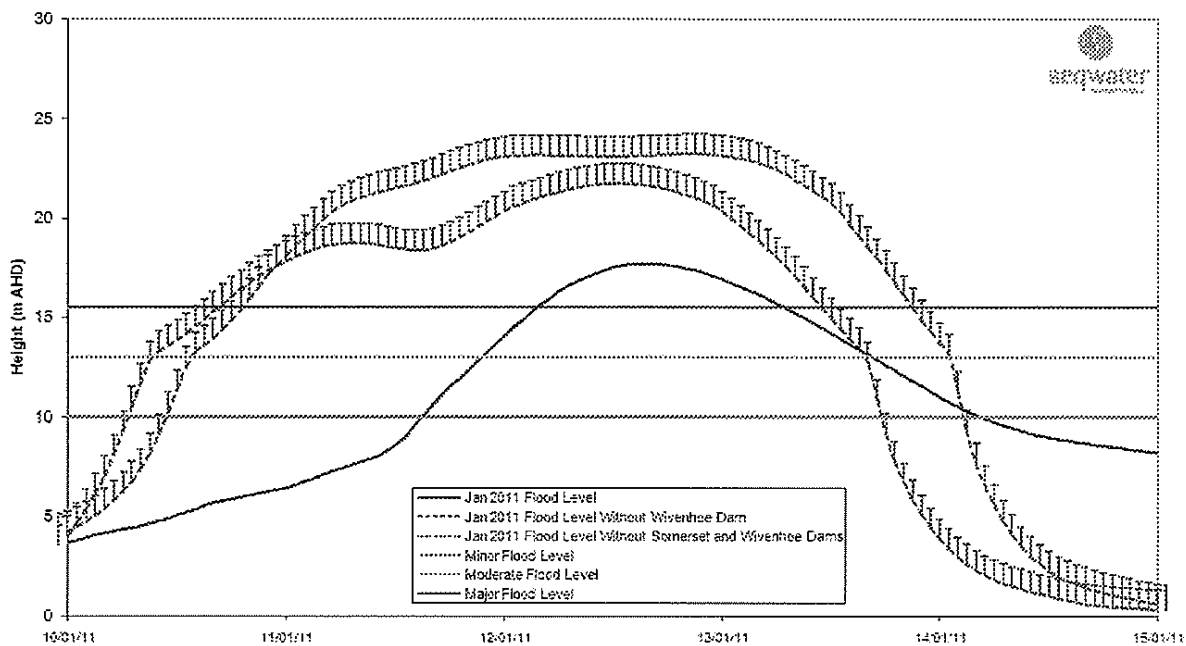
This equates to significant reduction in the potential for loss of life as well as saving in damages in the order of up to \$1.6 billion based on current damage curves. Up to 13,000 more properties would have been impacted by the event without the Dam.

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 Brisbane City



### 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.
- 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.
  - 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.

## ***Appendix A***

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

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## Suzie Emery

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**From:** Elaina Smouha [elainami [REDACTED]]  
**Sent:** Sunday, 16 January 2011 10:14 PM  
**To:** john.bradley [REDACTED]  
**Cc:** Barry Dennien; Dan Spiller; WaterGridMedia; debbie.bes [REDACTED]; pborrows  
**Subject:** Cabinet in confidence - Ministerial brief - Flood event and Wivenhoe Dam  
**Attachments:** Letter\_from\_Stephen\_Robertson\_MP\_RE\_Release\_of\_Water\_from\_Key\_Storage[1].pdf; Letter\_to\_Minister\_-\_flood\_management[1].docx; BrianCooperCV09122010.pdf; Brian Cooper - final report.docx; Brian Cooper - final report attachment.xlsx; Seqwater Ministerial\_Briefing\_Note\_January\_17\_2011\_Final\_Draft\_for\_distribution[1].docx; Seqwater Jan\_2011\_Flood\_Event\_Ver\_1\_draft\_for\_distribution[1].docx; FINAL Ministerial\_Brief\_-\_Wivenhoe\_Operations[3].docx; Talking points\_Wivenhoe Dam releases.docx

John

Attached is the Ministerial Brief and accompanying attachments for the Emergency Cabinet meeting scheduled on 17 January 2011.

 Regards

Elaina

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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

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.

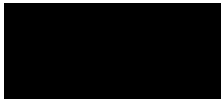
*Conclusions:*

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

**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
<p>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:</p> <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>Flood Strategies for Wivenhoe Dam:</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

## Suzie Emery

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**From:** Elaina Smouha [elainami[REDACTED]]  
**Sent:** Sunday, 16 January 2011 10:14 PM  
**To:** john.bradley[REDACTED]  
**Cc:** Barry Dennien; Dan Spiller; WaterGridMedia; debbie.bes[REDACTED]; pborrows  
**Subject:** Cabinet in confidence - Ministerial brief - Flood event and Wivenhoe Dam  
**Attachments:** Letter\_from\_Stephen\_Robertson\_MP\_RE\_Release\_of\_Water\_from\_Key\_Storages[1].pdf; Letter\_to\_Minister\_-\_flood\_management[1].docx; BrianCooperCV09122010.pdf; Brian Cooper - final report.docx; Brian Cooper - final report attachment.xlsx; Seqwater Ministerial\_Briefing\_Note\_January\_17\_2011\_Final\_Draft\_for\_distribution[1].docx; Seqwater Jan\_2011\_Flood\_Event\_Ver\_1\_draft\_for\_distribution[1].docx; FINAL Ministerial\_Brief\_-\_Wivenhoe\_Operations[3].docx; Talking points\_Wivenhoe Dam releases.docx

John

Attached is the Ministerial Brief and accompanying attachments for the Emergency Cabinet meeting scheduled on 17 January 2011.

 Regards

Elaina

**Elaina Smouha**  
Director, Governance and Regulatory Compliance  
SEQ Water Grid Manager  
[REDACTED]

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P.O. Box 205, BELROSE WEST NSW 2085  
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ABN: 56154707619

brian  
cooper  
consulting

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.

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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

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.

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Regards,



Brian Cooper

## ATTACHMENT A

### Action Requirements extracted from the Flood Mitigation Manual:

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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
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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
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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

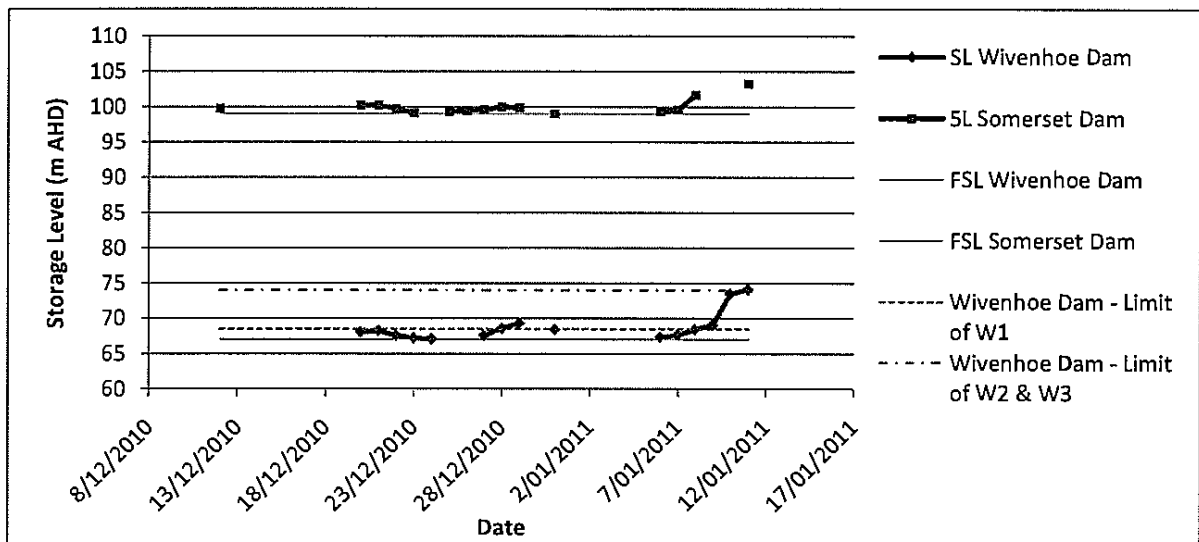
*Note1: For a number of the above actions, given the short time frame for the review on compliance of actual flood operations with the Flood Mitigation Manual, it was not possible to source some of the information required to confirm that requirements had been fulfilled. These actions will be audited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

Action	Comment
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<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

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	emphasis was given to satisfying this requirement
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The bottom edge of the radial gates must always be at least 500mm below the release flow surface.	See Note 1 above

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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

Wivenhoe & Somerset Dams – Storage Level Behaviour (as presented in Technical Situation Reports)



[REDACTED]

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.

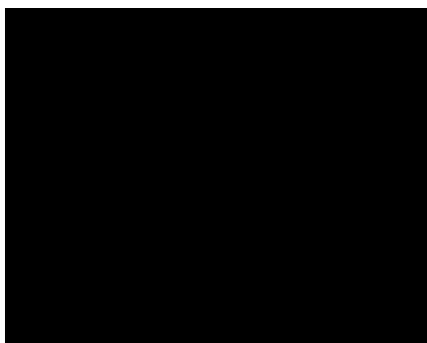
The SEQ Water Grid Manager has assessed the water security implications of the release to be negligible, having no impact on our ability to meet the risk criteria specified in the System Operating Plan or our ability to meet our supply obligations to Grid Customers. From a water security perspective, 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 [REDACTED] or by email on [dan.spiller@\[REDACTED\]](mailto:dan.spiller@[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 suitability 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.



# 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

resumé

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 Mardi 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

Tel: [REDACTED]  
Mobile: [REDACTED]  
Email: [brian.cooper.consult@brian.cooper.consult](mailto:brian.cooper.consult@brian.cooper.consult) [REDACTED]



Queensland  
Government

25 OCT 2010

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

RECEIVED

23 OCT 2010

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.



**Queensland  
Government**

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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 [REDACTED].

Yours sincerely

[REDACTED]

**STEPHEN ROBERTSON MP**

[REDACTED]

Date	Time	TSR	Regulators		Wivenhoe Dam Release (m³/s)		Gate No.	Opening (m)	Storage Level	Rainfall (mm)
			Hydro	Gates	Total					

12/12/2010	1400 W1									
13/12/2010	1300 W2		10	290	300					
15/12/2010	1800 W3									
16/12/2010	1600 W4			0						
17/12/2010	1200 W5									
17/12/2010	1800 W6	Closed								
	1830		13	Opening Op. Initiated	50	63	3	0.5		Large storms yesterday pm and night; 20-50 forecast tonight 20-50 forecast o/n
18/12/2010	0700 W7									
19/12/2010	0700 W8				350	350	3	3.5		40-50 since 16/12/2010 20-30 upper Brisbane R.
19/12/2010	1800 W9				300	300	3	3		
20/12/2010	0700 W10									68 expected this afternoon
20/12/2010	0900 W11									peak 68.24 (0400); currently 68.22 (112% cap.) falling slowly
20/12/2010	0900 W12				peak 1.280 (0500)					currently @ 67.61 (107% cap.) falling slowly
21/12/2010	0730 W13									none since 300 on 20/12/2010
22/12/2010	0830 W14									
22/12/2010	1600 W15			Closing sequence						
23/12/2010	0800 W16			All gates expected to be closed by 1500						When gates closed, will be 67.2 (0.2m > FSL) & 50mm <gate opening trigger level
23/12/2010	1430 W17				350		3	3.5		10-30 in CA over last 24 hrs.; further heavy rain expected to start on 29/12/2010
24/12/2010	0630 W18			All gates expected to be closed by 1300						67.07 expected when all gates closed
24/12/2010	1330 W19		4,200M/day from reg. & Hydro	Radial gate ops ceased @ 1300			3	zero		little or no rainfall
25/12/2010	0930 W20									10-20 over last 24 hrs

26/12/2010	0800 W21		Rel. minor over last 24 hrs.	
27/12/2010	0800 W22		40-50 over dam CA last 24 hrs.	
28/12/2010	0700 W23	347 (initially) then back to 46	20-40 over dam CA's, just 24 hrs	
29/12/2010	0700 W24		69.26 (@ 0600) - aim is to return to FSL by 21/12/2011 69.33 peak yesterday @ 1200 (2.3m > FSL) 69.07 this am	No/very little in last 24 hrs.
30/12/2010	0700 W25	Wivenhoe+Lockyer = 1,600m <sup>3</sup> /s		No/very little in last 24 hrs.
31/12/2010	0700 W26 W27	Wivenhoe+Lockyer = 1,600m <sup>3</sup> /s	68.4 @ 0500	No/very little in last 24 hrs.
06/01/2011	1200 W28	Commence opening RG @ 1800 & ramp up to 300m <sup>3</sup> /s by 2200	20-30 widespread with up to 50 on dam CA's 67.31 @ 0700	
07/01/2011	0700 W29		30-50 with isolated falls up to 75; signif. Rain on Lock. Ck. 67.64 @ 0600	
07/01/2011	1500 W30	Release started 1500 to be incr. slowly to ~1,200m <sup>3</sup> /s by 1400 tomorrow		
08/01/2011	0700 W31	~890	Widespread rain 20-40 over dam CA's since 0900 yesterday; further high rainfall predicted for next 4 days 68.45 @ 0600 rising steadily	
09/01/2011	0700 W32 W33	1,343	All (5) RG's open Currently 68.58 (falling slowly) For last 12 hrs. av. of 40 for Somerset CA & <10 for Wivenhoe CA	
09/01/2011	2100 W34	1,400	Very heavy rainfall -totals for 24 hrs 100 - 300; Severe weather warning for heavy rainfall Currently @ 69.1;	

W35  
W36  
W37

11/01/2011 0630 W38

2,750 since 1930 on  
10/1/2011

All (5) gates

73.51 rising @  
25mm/hr.

20-60 last 12 hrs in Lockyer CA; 30 in  
Bremer R.; Isol. Falls of 125 in upper  
Brisbane R. & widespread falls of 40 - 70  
in Somerset CA

11/01/2011 1200 W39

3,970

74.1 (179.5% cap.)  
rising @ 25mm/hr.

45,000ML from Somerset; WL Somerset to peak at 99.7 on 13/12/2010; 150m<sup>3</sup>/s expected through Brisbane; 30,000ML expected into Wivenhoe from upper Brisbane R.; peak WL in Wivenhoe expected to be 67.6; Releases expected from Wivenhoe on afternoon of 13/12/2010 ramping up to 300m<sup>3</sup>/s; Reg. will be closed & Gate 3 opened to 3m to get WL back to 67.25; Incr. release will impact on 3 crossings; Dam Regulator Informed

138m<sup>3</sup>/s from Somerset;

Releases from Wivenhoe will cease on 16/12/2010; Hydro will continue during fish recovery ops.

Gate closed 1000

Decision to commence a release tonight was made this am by Duty Flood Engineers to provide as much notice to impacted Councils as possible; 60,000ML needs to be released from Wivenhoe & Somerset to maintain FSL

Need to release >60,000ML from Wivenhoe & Somerset to achieve FSL

Releases could increase to 300m<sup>3</sup>/s;

100,000ML to be drained in next 4 days; Q[Brisbane R. to be maintained at 300-350m<sup>3</sup>/s; Transfer from Somerset via 2 reg.; Wivenhoe Q incr. to 150m<sup>3</sup>/s o/n; Will incr. further to 300m<sup>3</sup>/s as Q[Lock.Ck. Subside over next 24 hrs.; Q[Lock.Ck. Currently 130m<sup>3</sup>/s

12,000ML/day from Somerset; Release expected until 22/12/2010;

Somerset rel. steady [Q[reg.=140m<sup>3</sup>/s]; Q[Wivenhoe to be maintained at 300m<sup>3</sup>/s (Lock.Ck. Permitting) to allow Burtons Bridge to remain open; WL[Wivenhoe expected to incr. to 67.4 over next 2 days;

Somerset risen to 100.2 - sluice gate releases to be made until am of 22/12/2010 when FSL expected; WL[Wivenhoe at 68 expected this pm; Q[Wivenhoe expected to be >1,200m<sup>3</sup>/s - discuss with impacted Cnds.- strategy decision by 10000; Wivenhoe inflows exd.

Q[Somerset peak tomorrow at 1800m<sup>3</sup>/s

Inflow to Somerset to peak today at 700m<sup>3</sup>/s; Somerset & Wivenhoe currently storing 140,000ML above FSL; further inflows occurring; releases to be incr. o/n to ~1,200m<sup>3</sup>/s; various Cnds. Given heads up; BOM advised

Same as W11

410m<sup>3</sup>/s from Somerset sluice gates; Somerset peaked @100.43 (1300 on 20/12/2010), currently @ 100.23 (114% of cap.); 110,700ML inflow to Somerset; 67,500ML discharged into Wivenhoe; Wivenhoe inflow (excl. Somerset releases) = 157,900ML; 103,000ML released; Total inflow to both dams ~310,000ML; Continued gate operations may be necessary if forecast rainfall results in subsequent river rises

410m<sup>3</sup>/s from Somerset sluice gates; Somerset currently @ 99.68 (108% cap.); 121,500ML inflow to Somerset; 103,000ML released to Wivenhoe; Gate Ops. @ Wivenhoe: High tides expected to coincide with peak levels in Brisbane R.

BOM aware of all releases

1 sluice open @ Somerset to be closed @ 0900 - WL will be 0.1m> FSL; Est. Inflow to Somerset 135,000ML, majority discharged into Wivenhoe; Gate closure ops @ Wivenhoe in progress; Wivenhoe inflow (excl. Somerset inflow) = 204,000ML; A total of 324,000ML has been released; Contd. gate ops may be necessary if forecast rain results in river rises; Gate closure ops sequence to be reviewed

Somerset gate ops ceased @ 0900, WL @ 99.1; Gate closure sequence extended to pm of 24/12/2010; Contd. Gate ops may be necessary if forecast rainfall gives incr. river levels

Gate ops @ Somerset ceased yesterday, reg. to be opened to bring lake to FSL; Gate ops continuing @ Wivenhoe - 1 gate incr. every 5-6 hrs to ensure Brisbane R. Q not incr. due to incr. Lock. Ck. Outflows & maintain Burtons Bridge open;

Flood Centre to monitor o/n & consider options tomorrow am based on inflows & rainfall; further gate ops may be necessary in coming days  
Somerset WL incr. from 99.18 yesterday @ 0600 to 99.33 @ 0730 today; 99.5 tomorrow if no gate ops.; Wivenhoe currently 4,200ML through hydro & reg.; 15,000ML expected just from upper Brisbane R. in next few days; WL cont. to fall in Lock. Ck; Small rises expected in Bremer & Warrill systems; WL in Wivenhoe incr. to 67.28 @ 600

Gate release will impact on 3 crossings

Would impact Twin Bridges, Savages Crossing, Colleges Crossing

Twin Bridges & Savages Crossing currently closed; Colleges Crossing to be impacted in afternoon  
Twin Bridges, Savages Crossing, Colleges Crossing currently closed  
Twin Bridges, Savages Crossing and Colleges Crossing are closed; closing of Burtons Bridge and Kholo Bridge will be considered if more rain or inflows

Both Burtons and Kholo bridges likely to be inundated

Wivenhoe releases reduced slightly to keep Burtons Bridge open - then incr. releases after Somerset ReglCnd Inform residents affected by Burtons Bridge

Kholo Bridge is also expected to be inundated by mid-morning; in accordance with the adopted operational strategy these bridges should be back in service by late Thursday and all bridges (with the possible exception of Twin Bridges) should be trafficable for Christmas providing no further rainfall occurs.

Burtons Bridge & Kholo Bridge expected to be back in service by 23-24/12/2010; All bridges expected to be trafficable by Xmas provided no further rain

Gate closing sequence to allow bridges to be accessible

Projected crossing openings: Burtons Bridge - 18:00 Thursday 23 December 2010.

Savages Crossing - 19:00 Thursday 23 December 2010

Kholo Bridge - 21:00 Thursday 23 December 2010

Colleges Crossing - 08:00 Friday 23 December 2010

Projected crossing openings: Burtons Bridge - 18:00 Thursday 23 December 2010, Kholo Bridge - 21:00 Thursday 23 December 2010; Other bridges expected to remain closed until Xmas Day

Twin Bridges, Savages Crossing and Colleges Crossing are currently closed and should remain so for some time due in part to current outflows into the Brisbane River from Lockyer Creek that will peak in excess of 200 cumecs late today.

Twin Bridges, Savages Crossing and Colleges Crossing may still be affected by flows from the Lockyer.

Twin Bridges, Savages and Colleges Crossing remain impacted by Wivenhoe releases and Lockyer and local runoff. Burtons and Kholo Bridges would be currently unaffected. Kholo will no doubt still be closed by Council regarding repairs.

Crossings downstream of the dam are currently impacted primarily by non-controlled river flows only (no RG releases from Wivenhoe). Lockyer Creek outflows into the Brisbane River are currently in the order of 60m<sup>3</sup>/s. Twin Bridges, Savages and Colleges Crossings will be inundated but the plan is to release around 300-350m<sup>3</sup>/s depending on flows downstream so as to not impact Burtons Bridge.

Twin Bridges, Savages Crossing and Colleges Crossing currently closed; Burtons Bridge is currently open, but will be closed later today/tomorrow; Kholo Bridge remains unserviceable due to flood damage; No current expectation that either Mt Crosby Weir Bridge or Fernvale Bridge will be impacted by the current event; An updated estimate of the time of closure of Burtons Bridge this afternoon will be provided to Council RG discharge dropped back to 48m<sup>3</sup>/s to ensure Burtons Bridge can remain open; Twin Bridges, Savages Crossing, Colleges Crossing, Burtons Bridge and Kholo Bridge are currently closed; No current expectation that either Mt Crosby Weir Bridge or Fernvale Bridge will be impacted by the current event; Lockyer Creek outflows being closely monitored and may come close to impacting upon the Mt Crosby Weir Bridge; England Creek access is not impacted yet

Twin Bridges, Savages Crossing, Colleges Crossing, Burtons Bridge and Kholo Bridge are currently closed; no current expectation that Mt Crosby Weir Bridge or Fernvale Bridge will be impacted by current event. At this stage, estimated that the flow at Burtons Bridge will fall below the bridge deck on Sunday morning.

Twin Bridges, Savages Crossing, Colleges Crossing, Burtons Bridge and Kholo Bridge are currently closed to inundation

Not included  
Lockyer Ck peak or about 100m<sup>3</sup>/s Friday afternoon. This will take out twin bridges and nearby inundate Savages Crossing. Colleges Crossing could be taken out by a combined Lockyer and local runoff. Current strategy is to keep Burton Bridge free. Gate release would limit mid-Brisbane Q to 400m<sup>3</sup>/s ((Burtons capacity 450m<sup>3</sup>/s).

Q|Lockyer may be of sufficient magnitude to inundate Burtons Bridge; Somerset Regional Council, Ipswich City Council and Brisbane City Council have been advised of the potential for gate operations during the next 24 hours; The relatively high Lockyer flows will adversely impact upon Twin Bridges, Savages Crossing, and Colleges Crossing for several days, may also later impact upon Burtons Bridge & Kholo Bridge; not expected to be any adverse impacts upon Fernvale Bridge or Mt Crosby Weir Bridge; Councils have been advised of this strategy and are contacting residents

All of the crossings downstream of Wivenhoe with the exception of Fernvale and Mt Crosby Weir Bridge will be adversely impacted; Councils have been advised of this strategy and are contacting residents

The projected Wivenhoe release of 1,200m<sup>3</sup>/s combined with Lockyer flows and local runoff will mean that all crossings downstream of Wivenhoe (Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing) will be adversely impacted for several days. At this stage Fernvale and Mt Crosby Weir Bridge are not expected to be affected but they could potentially be affected if the predicted rainfall totals eventuate.

The current Wivenhoe Dam release combined with Lockyer flows and local runoff will mean that all low level crossings downstream of Wivenhoe (Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing) will be adversely impacted until at least Wednesday 12 January. At this stage Fernvale and Mt Crosby Weir Bridge are not expected to be affected, but this may be revised if the predicted rainfall totals eventuate and higher releases from Wivenhoe Dam are considered necessary. Councils advised of Wivenhoe op strategy

The projected Wivenhoe Dam releases combined with Lockyer flows and local runoff will mean that all crossings downstream of Wivenhoe (Twin Bridges, Fernvale, Savages Crossing, Burtons Bridge, Kholo Bridge, Mt Crosby Weir and Colleges Crossing) will be adversely impacted until at least Saturday 15 January in varying degrees; Water levels in the lower Brisbane R will be impacted by the combined flows of Lockyer Ck, Bremer River, local runoff and releases from Wivenhoe Dam

BOM issued severe weather warning @ 0.445; Somerset WL incr. to 99.46 (0.46m > FSL) - 2 regs. To be opened today (140m<sup>3</sup>/s); Wivenhoe WL incr. to 67.37 (0.37m > FSL); RG to be opened later today following discussions with local authorities; further gate ops may be necessary if rainfall incr. river levels

BOM continues with severe weather warning & widespread rainfall over dam CA's; 2 regs. @ Somerset giving 139m<sup>3</sup>/s release, lake contd. To rise to 99.6 (0.6m > FSL); RG ops @ Wivenhoe commenced yesterday @ 0900, WL contd. To rise to 67.57 (0.57m > FSL); Q|Wivenhoe reduced o/n because of incr. Q|Lockyer to ensure Burtons Bridge remains open; RG @ Wivenhoe wound back as Q|Lockyer incr. > 250m<sup>3</sup>/s; Q|Lockyer expected to peak > 500m<sup>3</sup>/s later today/tomorrow - will inundate Burtons Bridge; When this happens, Q|Wivenhoe will be incr. to get WL back to FSL; further gate ops may be necessary in coming days

Sever weather warning no longer current; Somerset release through regs' ~ 208m<sup>3</sup>/s; WL|Somerset incr. to 99.96 (0.96m > FSL) - inflows decreasing; RG opening dependent on Q|Lockyer; Wivenhoe WL currently @ 68.55 (1.55m > FSL); inflows to Wivenhoe decr.

Further 2 sluices opened @ Somerset; WL @ Somerset 99.83 & falling slowly, 2 sluices to be dosed @ 1200; intended to incr. Wivenhoe releases so Q|Wivenhoe+Q|Lockyer maintained @ 1,600m<sup>3</sup>/s (similar Q to mid Oct & mid Dec 2010)

2 sluices @ Somerset remain open (405m<sup>3</sup>/s) - FSL expected by 6/1/2011; RG closing sequence expected to start mid tomorrow - RG expected to be closed on 2/1/2011

WL @ Somerset 99.01 (falling from peak of 100.0 - 1200 28/12/2010) - currently 2 regs;

Somerset @ 99.34 (0.34m > FSL) & rising slowly; Wivenhoe 67.31 (0.31m > FSL) & rising slowly; Gates will be opened in next 24 hrs; Lockyer Ck peak of about 100m<sup>3</sup>/s Friday afternoon

100-200mm rain forecast for SE Qld next 5 days; Somerset WL @ 99.58 (0.58m > FSL) rising slowly - currently releasing 35m<sup>3</sup>/s; Wivenhoe WL @ 67.64 (0.64m > FSL & > gate trigger level) rising slowly; U/s of dam river levels peaked @ Unville and Gregors Ck gauges; A peak of about 470 cumecs is expected from Lockyer Creek by mid-afternoon; Wivenhoe gate releases will occur after the impact of Lockyer flows on Burtons Bridge has been ascertained and flood levels in the lower Lockyer subside Q|Wivenhoe may be as high as 1,200m<sup>3</sup>/s

Somerset releasing 35m<sup>3</sup>/s; 50,000ML into Somerset; Gate release @ Wivenhoe - strategy to be reviewed tomorrow (dependent on further rainfall)

Somerset WL @ 100.42 & rising (0500) - 1 open sluice gate; Water temp. held in Wivenhoe - strategy may need to be reviewed (depend. on confidence in estimates of Wivenhoe inflows); intended to ramp Wivenhoe up to 1,200m<sup>3</sup>/s by 1200 - likely to be incr. next week; since 2/1/2011, ~200,000ML has flowed into Wivenhoe (incl. Somerset releases), further 180,000ML expected based on recorded rainfall; ~ 50,000ML released via reg. & hydro (@50m<sup>3</sup>/s)

Somerset currently @ 100.27 - 60mm rain in last 2 hrs will cause significant inflow later today; 405m<sup>3</sup>/s being released into Wivenhoe; maintain combined Q of 1,600m<sup>3</sup>/s in mid-Brisbane R.

Not included

Somerset @ 101.68 rising quickly; 5 sluice gates open releasing ~1,100m<sup>3</sup>/s; WL expected to reach 103.5 by am 11/1/2011; River levels u/s Wivenhoe rising fast; Q|Brisbane R. @ Gregors Ck @ 6,700m<sup>3</sup>/s; Wivenhoe expected to reach 73.0 by 11/1/2011 - need to incr. Q|Wivenhoe am of 10/1/2011 - crank up to 2,600m<sup>3</sup>/s by am 11/1/2011; Attempt to keep combined Q < 3,500m<sup>3</sup>/s - < limit of urban damages in the City

Not included  
Not included  
Not included

Somerset WL @ 103.27 & falling slowly ; currently 1,400m<sup>3</sup>/s released to Wivenhoe- to be reduced to 500m<sup>3</sup>/s later in the day - to ensure flood mitigation of Somerset & Wivenhoe are maximized; BOM provided advice on flash flooding in Lockyer Ck.; WL in Wivenhoe will reach 74 by evening; May need to increase Q further - may result in Q[lower Brisbane R. >5,000m<sup>3</sup>/s

Somerset @ 103.3 & rising; Outflows into the Brisbane River from both Lockyer Creek and the Bremer River are also increasing; if no further rain, can hold @ 74.8 -- aim is to prevent fuse plug triggering, situation assessed every 3 hrs.; Heavy rainfall continues throughout South East Queensland and the situation could deteriorate over the next 24 hours. The flood operation centre will continue to monitor the situation and provide situation reports every six hours until the situation stabilizes.

The projected Wivenhoe Dam releases combined with Lockyer Creek flows and local runoff will mean that all crossings downstream of Wivenhoe (Twin Bridges, Fernvale, Savages Crossing, Burtons Bridge, Kholo Bridge, Mt Crosby Weir and Colleges Crossing) will be adversely impacted; Water levels in the lower Brisbane River will be impacted by the combined flows of Lockyer Creek, Bremer River, local runoff and releases from Wivenhoe Dam.

## Suzie Emery

---

**From:** Bradley John [John.Bradley [REDACTED]]  
**Sent:** Sunday, 16 January 2011 10:35 PM  
**To:** Elaina Smouha  
**Cc:** Barry Dennien; Dan Spiller; Best Debbie; pborrows; Reilly Bob  
**Subject:** RE: Cabinet in confidence - Ministerial brief - Flood event and Wivenhoe Dam

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Many thanks to all for thier hard work at the end of an exceptionally long week,

I have sent to Minister and look forward to seeing Barry/Dan, Peter Borrows and Bob Reilly at 9 am in Minister Robertson's office,

thanks  
John B

---

**From:** Elaina Smouha [mailto:elainamir [REDACTED]]  
**Sent:** Sunday, 16 January 2011 10:14 PM  
**To:** Bradley John  
**Cc:** Dennien Barry [REDACTED]; spiller daniel [REDACTED] WaterGridMedia; Best Debbie; pborrows  
**Subject:** Cabinet in confidence - Ministerial brief - Flood event and Wivenhoe Dam

John

Attached is the Ministerial Brief and accompanying attachments for the Emergency Cabinet meeting scheduled on 17 January 2011.

Regards

Elaina

**Elaina Smouha**  
Director, Governance and Regulatory Compliance  
SEQ Water Grid Manager

Email: [elaina.smouha](mailto:elaina.smouha) [REDACTED]  
Visit: Level 15, 53 Albert Street Brisbane  
Post: PO Box 16205, City East QLD 4002  
ABN: 14783 317 630

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Gina O'Driscoll

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**From:** Barry Dennien  
**Sent:** Tuesday, 25 January 2011 4:32 PM  
**To:** john.bradley [REDACTED]  
**Cc:** Dan Spiller; elaina.smouha [REDACTED]; pborrows [REDACTED]; Reilly Bob  
**Subject:** Public inquiry discussion points - brief - Cabinet in confidence  
**Attachments:** Public inquiry strategy - brief.docx

**Importance:** High

John

Attached are some discussion points in preparation for the 2pm teleconference about Monday's Emergency Cabinet meeting.

Regards

Barry

## Discussion points for teleconference

### What is the objective?

- a) Ensuring public transparency
- b) To answer the State's questions on the performance of Wivenhoe Dam operations
- c) Preparation for a public inquiry
- d) Normal and logical course of conduct after the occurrence of a major flood event – Review requirement under the Flood Mitigation Manual

### Background

- 1) Design of Dam – Storages/Spillway upgrade (Responsible: Seqwater)
- 2) How does Wivenhoe Dam work as a flood mitigator? Stats on how much did Wivenhoe Dam knock off the flood peak? [Priority to get out to the public] (Responsible: Seqwater)
- 3) Development of Flood Mitigation Manual (Responsible: Seqwater/DERM)
  - a. Four strategies
  - b. History of Flood Mitigation Manual updates and peer review
- 4) Responsibility under the *Water Supply (Safety and Reliability) Act 2008* (Responsible: DERM)
  - a. What is the formal reporting process following a major flood event?
- 5) "The Event" – operation of Wivenhoe Dam (Responsible: Seqwater)
  - a. Event report under the Flood Mitigation Manual
- 6) "The Event" – management of the Water Grid emergency under the SEQ Water Grid Emergency Response Plan (Responsible: SEQ Water Grid Manager)
- 7) What next?
  - a. SWOT
    - i. Community feedback
    - ii. A significant (from a national perspective)

### Seqwater report

Flood Mitigation Manual requires a report to the Chief Executive after a significant flood event, on the effectiveness of the operational procedures:

- Get more comprehensive report from Brian Cooper? – review appropriateness of trigger levels – take into account the accuracy of rainfall forecasts provided by BOM at the time – reliability of weather forecasts.
- Set up expert panel for Flood Mitigation Manual review
- Communication Protocol and incorporation into the Flood Mitigation Manual (revisit in the next fortnight)

Seqwater to procure review.

Urgent accelerated review due to anticipated further rainfall.

**From:** Dan Spiller <dan.spiller[REDACTED]>  
**Sent:** Monday, March 7, 2011 6:19 PM  
**To:** 'Bradley John' <John.Bradley[REDACTED]>;  
'Debbie.Best[REDACTED]'; 'Reilly Bob' <Bob.Reilly[REDACTED]>  
**Cc:** Barry Dennien <Barry.Dennien[REDACTED]>  
**Subject:** Summary report  
**Attach:** January flood event\_Summary of information released\_FINAL.PDF

---

All,

Report as provided to Stark and CM.

Dan

**Daniel Spiller**  
Director, Operations  
SEQ Water Grid Manager  
Phone: [REDACTED]  
Email: [daniel.spiller\[REDACTED\]](mailto:daniel.spiller[REDACTED])  
Visit: Level 15, 53 Albert Street Brisbane  
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# **January 2011 flood event Summary of dam operations**

**January 2011**

safe | secure | sustainable

# 1.0 Introduction

A flood event occurred in South East Queensland in January 2011.

Throughout this event, the Water Grid provided regular updates on the levels of key storages and the management of releases. The releases were provided to media outlets and Councils, and made available on the Water Grid website ([www.watergrid.com.au](http://www.watergrid.com.au)). The updates released during the flood event have been collated under **Attachment 1**.

Updates focused on the four dams in South East Queensland that are gated, with the ability to control the rate of release of floodwater. These are Wivenhoe, Somerset, North Pine and Leslie Harrison dams.

The updates include information about the storage levels of each dam and releases from those dams. They also contain most general information about:

- flows from the Lockyer and Bremer, which enter the Brisbane River downstream of Wivenhoe Dam
- impacts on downstream bridges, based on advice from the Councils that own those bridges
- rainfall forecasts, based on advice from the Bureau of Meteorology.

Information about the regulatory framework for the management of Wivenhoe and Somerset dams is contained in Section 2.

Information about the operation of Wivenhoe and Somerset dams is summarised in Section 3.

Information about the operation of North Pine and Leslie Harrison dams is summarised in Section 4. Information on Hinze Dam releases are also included.

All of these dams are owned and operated by Seqwater. The information provided in the updates was based on information provided by Seqwater.

As outlined in Section 5, more detailed information about the impact of dam releases on river levels is being prepared by the Bureau of Meteorology and responsible Councils.

## 2.0 Regulatory framework

Detailed operational procedures have been approved for each of the gated dams.

Seqwater is the owner and operator of Wivenhoe and Somerset Dams.

Under Section 370 of the *Water Supply (Safety and Reliability) Act 2008*, it is required to prepare a flood mitigation manual for approval by the Dam Safety Regulator.

Seqwater's approved *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam* (Operations Manual) can be viewed at [www.derm.qld.gov.au](http://www.derm.qld.gov.au). At the request of Seqwater, some sections of the published version Operations Manual have been deducted for security reasons relating to critical infrastructure.

The Operations Manual sets out clear priorities for the strategies to manage water supplies in the dams.

The Operations Manual lists the structural safety of the dam as the highest priority, particularly in extreme weather events where there is the threat of the dam overtopping which could lead to damage to the dam wall.

With the structural safety of the dam secure, the next objectives in order of priority are to provide optimum protection of urbanised areas from inundation, minimise disruption to rural life in the valley of the Brisbane and Stanley Rivers, provide full water supply storage after the flood, and minimise impacts to riparian flora and fauna during the drain down phase of the flood event.

The operational procedures outlined in the Operations Manual have been developed and progressively refined over many years, and have been reviewed by Australia's leading water experts.

They include Professor Colin Apelt, Head of Department, Department of Civil Engineering and Chair of the Brisbane City Council flood taskforce; University of Queensland and Mr Eric Lesleighter, Principal Hydraulic Engineer and Chief Engineer Water Resources, Snowy Mountains Engineering Corporation.

The Operations Manual in its current form was developed in 1992 and has had six revisions since this time, with the latest review taking place in 2009, and finalised in January 2010.

More general information about the operation of Wivenhoe Dam is contained in a factsheet at **Attachment 2**.

TRIM reference:

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2

G151

### 3.0 Wivenhoe and Somerset dams

**Table 1** summarises the information released during the event, including the dam levels and release rates. For some days, dam levels are not specified. For those days, levels were not specified in the releases or updated on the Seqwater website.

On 13 February 2010, Seqwater announced that Wivenhoe Dam would be reduced to 75 per cent of its full supply level. This is an interim measure for the remainder of the summer, with the longer term approach to be shaped by the Commission of Inquiry's outcomes. Seqwater advises that a reduction in Wivenhoe Dam storage level to 75 per cent of its Full Supply Level will provide appreciable flood mitigation benefits ahead of any major rain events in the remainder of the wet season.

The operational decision reflects current circumstances, rather than issues which likely to be considered by the Commission of Inquiry into the recent floods. The Commission of Inquiry will continue to assess dam operations during the January flood event and whether any changes to the long term framework are required.

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**Table 1: Wivenhoe and Somerset dam operation**

Update	Wivenhoe Dam		Somerset Dam		Bridges inundated					Key statements from updates	
	Level	Releases	Level	Releases into Wivenhoe Dam	Twin	Savages	Burtons	Khola	Colleges	Fernvale	Wit Crosby
Saturday 1 January	-	130,000 ML/day	-	Through regulator valve	X	X	X	X	X		
Sunday 2 January	-	All five gates closed Sunday morning	-	Through regulator valve	X	X					
Monday 3 January	-	-	-	-	X						
Tuesday 4 January	102%	Through regulator valve	103%	Through regulator valve							
Wednesday 5 January	102%	Through regulator valve	103%	Through regulator valve							
Thursday 6 January	103%	Through regulator valve. Gate operations will be required	104%	Through regulator valve	X	X	X	X	X		
Friday 7 January	106%	Through regulator valve. Gate operations will be required at 130,000 ML/day	107%	Through regulator valve	X	X	X	X	X		
Saturday 8 January	-	100,00 ML/day through all 5 gates	-	Through one gate	X	X	X	X	X		
Sunday 9 January	-	116,000 ML/day	-	Through sluice gates	X	X	X	X	X		

- The gradual gate closure sequence at Wivenhoe began overnight and by sometime Sunday all gates will be closed.

- All five gates were fully closed this morning.

- No update

- No update

- No update

- Gate operations at Wivenhoe Dam will be required. To minimise downstream impacts, these releases will commence when flood levels in the lower Lockyer Creek subside.

- Local flows, and the expected Wivenhoe Dam release, may impact upon Twin Bridges, Savages Crossing, Burtons Bridge, Khola Bridge and Colleges Crossing for several days.

- To minimise downstream impacts, these releases will commence when flood levels in the lower Lockyer Creek subside. The rate of release will be similar to last week, at up to 130,000 megalitres per day.

- Releases will be reviewed and may change depending on rainfall, inflows into the dam and river flows.

- Gate operations will continue to be reviewed and may change at short notice depending on rainfall, inflows into the dam and river flows.

- These releases are expected to continue until next week.

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Update	Wivenhoe Dam		Somerset Dam		Bridges Inundated						Key statements from updates	
	Level	Releases	Level	Releases into Wivenhoe Dam	Twin	Savages	Burtens	Kholo	Colleges	Fernvale		Mt Crosby
Monday 10 January (Morning)	140%	170,000 ML/day	150%	Through sluice gates	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>Overnight, Fernvale and Mt Crosby Weir Bridges together with a number of local roads became Inundated. They joined the others already Impacted, Including Twin Bridges, Savages Crossing, Burtens Bridge, Kholo Bridge and Colleges Crossing.</li><li>In order to relieve the quickly filling flood storage compartment, and with more rain forecast, controlled releases from the dam have been increased today from 116,000 megalitres per day to 170,000 megalitres per day. These releases are a necessity.</li><li>Releases are being reviewed in consultation with the Bureau of Meteorology and local councils, utilising a strategy to limit Impacts where possible downstream.</li></ul>
Monday 10 January (Evening)	154%	Increasing to 240,000 ML/day	158%	Through sluice gates	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>In order to relieve the quickly filling flood storage compartment, and with more rain forecast, controlled releases from the dam have been Increased today from 116,000 megalitres per day to 172,000 megalitres per day. Further increases to the release rate are planned, to approximately 240,000 megalitres per day by midnight.</li><li>These releases are a necessity as, at the peak, Wivenhoe Dam was receiving more than twice the volume of Sydney Harbour each day.</li><li>Releases are continually being reviewed in consultation with the Bureau of Meteorology and local councils, utilising a strategy to limit Impacts where possible downstream.</li></ul>
Tuesday 11 January (Morning)	173%	Further increases today	160%	Through sluice gates	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>Significant rainfall received across catchments has caused waterways upstream of Somerset and Wivenhoe Dams to rise quickly overnight.</li><li>Controlled releases through the five gates have been</li></ul>

TRIM reference:

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Update	Wivenhoe Dam		Somersey Dam		Bridges inundated							Key statements from updates
	Level	Releases	Level	Releases into Wivenhoe Dam	Twin	Savages	Burtons	Kholo	Colleges	Fernvale	Mt Crosby	
Tuesday 11 January (Evening 5.19PM)	190%	490,000 ML/day	176%	176,000 ML/day through sluice gates	x	x	x	x	x	x	x	held at around 236,000 megalitres since early last night but will need to be increased further today.  • Controlled releases through Wivenhoe's five radial gates have now been increased to around 490,000 megalitres per day. This is expected to increase.  • While substantial amounts of water are being released into Wivenhoe from Somerset Dam, water levels in Somerset are expected to continue to rising today and areas around Kilcoy are likely to be impacted by these rising dam levels.
Tuesday 11 January (Evening 10.30PM)	190%	645,000 ML/day	183%	Releases ceased, but expected to recommence overnight	x	x	x	x	x	x	x	• At 10pm Wivenhoe Dam was at 190 per cent with water levels falling slowly.  • Controlled releases through Wivenhoe's five radial gates of 645,000 megalitres per day are expected to reduce slightly overnight due to easing rainfall.  • Somerset Dam is at 183 per cent and releases into Wivenhoe are expected to recommence overnight however high upstream levels are expected to continue to affect Kilcoy.
Wednesday 12 January (Morning)	190%	205,000 ML/day, down from an overnight peak of 645,000 ML/day	190%	Through sluice gates	x	x	x	x	x	x	x	• Wivenhoe's five radial gates are currently releasing 205,000 megalitres per day, down from 370,000 megalitres and an overnight peak of 645,000 megalitres.  • This strategy is to allow for the Bremer and Lockyer Rivers to subside.  • After the expected downstream peak in the lower Brisbane River has passed, releases will need to be increased to 301,000 megalitres per day.  • However, this increase is unlikely to cause a second significant rise in the river.

TRIM reference:

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Update	Wivenhoe Dam		Somersey Dam		Bridges indicated						Key statements from updates	
	Level	Releases	Level	Releases into Wivenhoe Dam	Twin	Savages	Burtons	Kholo	Colleges	Fernvale		N/E Crosby
Wednesday 12 January (Evening)	189%	215,000 ML/day	186%	123,000 ML/day	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>These controlled releases must continue in order to relieve Wivenhoe Dam's swollen flood storage compartment in order to create space for further rainfall and inflows.</li><li>Wivenhoe's five radial gates continue to release 215,000 megalitres per day. This is considerably down from an overnight peak of 645,000 megalitres and will remain at this level to allow for the Bremer and Lockyer Rivers to subside.</li><li>After the expected downstream peak in the lower Brisbane River has passed, releases will be increased to 301,000 megalitres per day, however, this increase is unlikely to cause a second significant rise in the river.</li></ul>
Thursday 13 January (Morning)	187%	215,000 ML/day	174%	121,000 ML/day	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>Wivenhoe Dam is at 187 per cent, and is dropping gradually with controlled releases through all five gates of 215,000 megalitres per day.</li><li>The dam's slow recession is due in part to inflows of 121,000 megalitres per day via a sluice gate from Somersset Dam. Somersset is at 174 per cent.</li></ul>
Thursday 13 January (Evening)	186%	228,000 ML/day	167%	120,000 ML/day	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>Wivenhoe Dam is at 186 per cent, and is dropping gradually with controlled releases through all five gates of 228,000 megalitres per day.</li></ul>
Friday 14 January (Morning)	179%	301,000 ML/day	151%	111,800 ML/day	x	x	x	x	x	x	x	<ul style="list-style-type: none"><li>Wivenhoe Dam is at 179 per cent, and continues to drop steadily. Releases have been graduated to 301,000 megalitres per day in a 7 day strategy designed to draw down the flood storage compartment with no noticeable effects downstream.</li><li>The continuing releases are necessary in order to prepare Wivenhoe for any future weather events</li></ul>

TRIM reference:

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Update	Wivenhoe Dam		Somerset Dam		Bridges inundated					Key statements from updates	
	Level	Releases	Level	Releases into Wivenhoe Dam	Twin	Savages	Burtons	Rhilo	Colleges	Fernvale	Mt Crosby
Friday 14 January (Evening)	172%	301,000 ML/day	140%	111,800 ML/day	X	X	X	X	X	X	X
Saturday 15 January (Morning)	163%	301,000 ML/day	129%	79,000 ML/day	X	X	X	X	X	X	X
Saturday 15 January (Evening)	154%	301,000 ML/day	121%	79,000 ML/day	X	X	X	X	X	X	X
Sunday 16 January	138%	299,000 ML/day	106%	70,500 ML/day	X	X	X	X	X	X	X
Monday 17 January	123%	299,000 ML/day	100%	Small discharges	X	X	X	X	X	X	X
Tuesday 18 January	107%	176,000 ML/day and reducing with the gate closing sequence	99%	Small discharges	X	X	X	X	X	X	X
Wednesday 19 January	99%	Gate closing sequence expected to be completed by Thursday	100%	Sluice gates closed	X	X	X	X	X	X	X

should they occur.

- Wivenhoe Dam is at 172 per cent, and continues to drop steadily.

- Inflows and water levels in the Brisbane and Pine catchments are being continually monitored.

- Wivenhoe Dam is at 163 per cent, and continues to drop steadily.

- Wivenhoe Dam is at 154 per cent, and continues to drop steadily.

- Wivenhoe Dam is at 138 per cent, and continues to drop steadily. Releases continue at around 299,000 megalitres per day. This flow will be maintained to drain the flood storage compartment this week.

- Wivenhoe Dam is at 123 per cent capacity and continues to drop steadily. Releases continue at around 299,000 megalitres per day.

- Somerset Dam is at 100 per cent with small discharges through the cone valves into Wivenhoe.

- Wivenhoe Dam is at 107 per cent and continues to drop steadily.

- Releases remained constant overnight at around 176,000 megalitres per day and are now reducing with the commencement of the gate closing sequence which began at 9am this morning.

- Wivenhoe Dam is at 99.3 per cent with the gate closing sequence expected to be complete by late afternoon today.

TRIM reference:

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Update	Wivenhoe Dam Level Releases	Somerset Dam Level Releases into Wivenhoe Dam	Bridges Inundated						Key statements from updates
			Twin	Savages	Burtons	Khola	Colleges	Fernvale	Mt Crosby
Thursday 20 January	99.6% One gate partially open	100.8% Sluice gates closed	x						<ul style="list-style-type: none"> <li>Somerset Dam is at 100 per cent capacity with all sluice gates currently closed. Depending on inflows into the catchment, further releases into Wivenhoe Dam may be made over the next 24 hours.</li> <li>Last night's storms over the catchment have resulted in one gate being partially opened at Wivenhoe Dam this morning. This will see a small controlled release over the course of today to maintain the dam at or near 100%.</li> </ul>

TRIM reference:

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## 4.0 Other dams

Controlled releases were made from North Pine, Leslie Harrison and Hinze dams. These releases are summarised in **Table 2**.

**Table 2: Other dam operation**

Update	North Pine		Hintze		Leslie Harrison	
	Dam level	Releases	Dam level	Releases	Dam level	Releases
Thursday 30 December	99.9%	-	100.0%	Minor releases	97.6%	-
Friday 31 December	100.2%	-	100.0%	Minor releases	97.8%	-
Saturday 1 January	-	Minor releases underway	-	Minor releases	-	-
Sunday 2 January	-	Minor release overnight, gates closed early morning	-	Minor releases	-	-
Monday 3 January	-	-	-	-	-	-
Tuesday 4 January	99.0%	-	99.6%	-	98.8%	-
Wednesday 5 January	99.1%	-	99.6%	-	98.8%	-
Thursday 6 January	100.0%	Releases expected today	99.9%	-	98.8%	Releases commenced
Friday 7 January	-	Spillway operations commenced	100.0%	-	96.2%	Releases underway
Saturday 8 January	-	Minor releases underway	-	Releases predicted	-	Releases underway
Sunday 9 January	-	Release operations being reviewed	-	Minor releases underway	-	Releases ceased
Monday 10 January am	103.9%	5 gates open releasing 43,000 ML/day	100.0%	Minor releases 1,200 ML/day	100.0%	Releases underway
Tuesday 11 January am	105.3%	5 gates open releasing 15,000 ML/day	100.0%	Minor releases 1,200 ML/day	96.8%	Releases underway
Wednesday 12 January am	101.8%	5 gates open, releasing 6,800 ML/day	112.1%	Minor releases 8,000 ML/day	96.1%	Releases underway
Thursday 13 January am	100.4%	5 gates open. Expected to close Friday	-	Minor releases 8,000 ML/day	96.9%	Releases ceased
Friday 14 January am	-	Releases ceased	100.0%	Minor releases 8,000 ML/day	97.3%	-
Saturday 15 January am	-	-	-	Minor releases 8,000 ML/day	-	-
Sunday 16 January	96.0%	-	-	Minor releases 8,000 ML/day	-	-
Monday 17 January	99.4%	-	99.8%	Minor releases 6,800 ML/day	97.7%	-

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## 5.0 Additional information

A range of modelling is required to be undertaken to ascertain the precise downstream impact of releases from Wivenhoe Dam during the January 2011 flood event.

Compiling this technical information requires the following tasks:

- validation the water outflows from Wivenhoe Dam
- calculation and validation Brisbane River levels as a result of the water outflows
- determination of the impact of inundation based on those Brisbane River levels.

Seqwater has responsibility for providing and validating water outflows over the event.

Both the Bureau of Meteorology and the Brisbane City Council have developed models for determining Brisbane River levels for various water outflows from Wivenhoe Dam. This includes taking into account flows down both the Lockyer and Bremer rivers and other localised flows. Brisbane City Council has developed the modelling to determine the impact of Brisbane River levels on the flooding properties and households.

Seqwater dam levels and water outflows during the January event are required to be validated and provided to the Dam Safety Regulator as part of a comprehensive report into the event. This report will also be provided to the Commission of Inquiry into the Queensland floods which is now underway.

In addition, Bureau of Meteorology has agreed to be the clearing house for all data requests in relation to either river or rainfall gauges across the region in relation to the January flood event. Any request for this data should be directed to [climate.qld@bom.gov.au](mailto:climate.qld@bom.gov.au)

## Attachment 1: Update

TRIM reference:

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 1/01/11 10:45am
<b>Title :</b> MEDIA UPDATE - 01.01.11	
<b>Summary:</b> Dam safety for South East Queensland over holiday season, Most recreation facilities open	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

**MEDIA UPDATE  
1 January 2011**

**Dam safety for South East Queensland over holiday season**

Controlled floodwater releases over several days will see Wivenhoe Dam return to full supply level this weekend.

With the flood compartment empty, Wivenhoe Dam will be ready for more rain forecast next week.

Over the last week, Wivenhoe Dam's flood storage compartment has significantly reduced the flood risk for Brisbane and Ipswich.

The gradual gate closure sequence at Wivenhoe began overnight and by sometime Sunday all gates will be closed.

Water Grid operators continue to work closely with councils regarding dam releases and Twin Bridges, Savages Crossing, Colleges Crossing, Kholo and Burton Bridges will continue to be inundated until Sunday.

Somerset Dam continues to make minor releases into Wivenhoe.

A minor release is being made from North Pine Dam however no impact on Youngs Crossing is expected.

No releases are currently being made from Leslie Harrison Dam

Hinze Dam continues to discharge flood waters and this is expected to continue until early next week. There is no public access to the spillway.

For information on local flood impacts, including road closures, members of the public should always contact the local council.

For recorded information on current dam releases in South east Queensland, call [REDACTED]

**Most recreation facilities open**

Lower dam levels mean that both Somerset and Wivenhoe Dams are now open to water based activities.



Media updates issued during  
the January flood event

All recreation sites are now open, except for:

- River access at Atkinson's Crossing
- Billies Bay/Hay's Landing

For further information on the Water Grid: [www.watergrid.com.au](http://www.watergrid.com.au)

## **ENDS**

Notes to the editor

### **About the SEQ Water Grid**

Established in June 2008 in response to the crippling Millennium Drought, the SEQ Water Grid represents one of Australia's largest investments in water infrastructure.

Through a network of climate resilient water sources, treatment facilities, new two-way pipes and existing pipelines, the SEQ Water Grid gives the South East Queensland region the ability to support water demands, water quality, economic prosperity and lifestyle - regardless of climate change and population growth.

For further details contact the SEQ Water Grid Communications Unit on:

Ph: [REDACTED]

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TRIM reference: D/	Date and time: 2/01/11 9:50am
Title : MEDIA UPDATE - 02.01.11	
Summary: Dam safety for South East Queensland over holiday season, Most recreation facilities open	
Note: Issued to all key media and stakeholders in South East Queensland	

**MEDIA UPDATE  
2 January 2011****Dam safety for South East Queensland over holiday season**

All five gates at Wivenhoe Dam were fully closed on Sunday morning.

This means the flood compartment at Wivenhoe Dam is ready for more rain forecast next week.

Councils have been advised and they will make decisions about opening Twin Bridges, Savages Crossing, Colleges Crossing, Kholo and Burton Bridges as inundation levels drop.

Somerset Dam continues to make minor releases into Wivenhoe.

A minor release was made overnight at North Pine Dam with gates closed early Sunday morning.

No releases are being made from Leslie Harrison Dam

Flood water releases from Hinze Dam will reduce during today and the gate is expected to close sometime tomorrow. There is no public access to the spillway.

For information on local flood impacts, including road closures, members of the public should always contact the local council.

For recorded information on current dam releases in South East Queensland, call [REDACTED]

**Most recreation facilities open**

Both Somerset and Wivenhoe Dams are open to water based activities.

All recreation sites are now open, except for:

- River access at Atkinson's Crossing
- Billies Bay/Hay's Landing

which are both expected to re-open sometime today.



Media updates issued during  
the January flood event

Due to the ground being saturated, care should be taken around all recreation sites. Vehicles must only be parked in designated parking areas and should not be driven on off roads or onto grassed areas.

For further information on the Water Grid: [www.watergrid.com.au](http://www.watergrid.com.au)

#### **ENDS**

Notes to the editor

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**For further details contact the SEQ Water Grid Communications Unit on:**



<b>TRIM reference:</b> D/	<b>Date and time:</b> 6/01/11 4:13pm
<b>Title :</b> SEQ dam release and flooding update - 06.01.11	
<b>Summary:</b> Dam releases, Recreation update, Gold Coast Desalination Plant update	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 06.01.11

**MEDIA RELEASE - 6 JANUARY 2011**

### **Dam Releases**

With recent heavy rainfall across South East Queensland and the forecast of more to come, releases are being made from some of the region's water storages.

Gate operations at Wivenhoe Dam will be required. To minimise downstream impacts, these releases will commence when flood levels in the lower Lockyer Creek subside.

Local flows, and the expected Wivenhoe Dam release, may impact upon Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing for several days. Local councils should be consulted for detailed information on road crossing closures and other impacts.

At this stage, no impacts are expected for Fernvale Bridge or Mt Crosby Weir Bridge.

Water from Somerset Dam is being released into Wivenhoe Dam through a regulator valve, which may increase later today.

A release through the gate at North Pine Dam is expected to commence later today.

A release from Leslie Harrison is underway and may continue until the weekend.

No water is currently being released from Hinze Dam.

The Water Grid is working with local councils regarding the current releases and the likely impacts, which are being managed in accordance with approved flood management plans.

### **Recreation update**

Dams are currently open for water-based recreational activities, however this may change depending on the weather. Visitors should check the Water Grid website for additional information for each recreation site.

### **Gold Coast Desalination Plant**



Media updates issued during  
the January flood event

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.

The Gold Coast Desalination facility is now operating at 33 per cent capacity to ensure the highest water quality for the South East Queensland region.

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED] This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on **potential impacts in their local areas including road closures** should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
[REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 7/01/11 10:03am
<b>Title :</b> SEQ dam release and flooding update - 07.01.11	
<b>Summary:</b> Dam releases, Recreation update, Gold Coast Desalination Plant update	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 07.01.11

**MEDIA RELEASE - 7 JANUARY 2011**

#### **Dam releases**

With recent heavy rainfall across South East Queensland and the forecast of more to come, releases are being made from some of the region's water storages.

Water from Somerset Dam is being released into Wivenhoe Dam through a regulator valve. The releases may be increased to utilise sluice gates later today or over the weekend.

Gate operations at Wivenhoe Dam will be required. To minimise downstream impacts, these releases will commence when flood levels in the lower Lockyer Creek subside. The rate of release will be similar to last week, at up to 130,000 megalitres per day.

Local flows, and the expected Wivenhoe Dam release, may impact upon Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing for several days. Local councils should be consulted for detailed information on road crossing closures and other impacts.

At this stage, no impacts are expected for Fernvale Bridge or Mt Crosby Weir Bridge.

Spillway gate operations commenced yesterday evening at North Pine Dam. These releases may continue until next week, depending upon further rainfall.

A release from Leslie Harrison is underway and may continue until the weekend.

No water is currently being released from Hinze Dam.

The Water Grid is working with local councils regarding the current releases and the likely impacts, which are being managed in accordance with approved flood management plans.

**Telephone** - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

**Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.**

### Recreation update

Due to water levels, Wivenhoe Dam is **closed** to all water based recreational activities as of this morning. The closure will most likely extend over the weekend.

At this stage Lake Somerset is open to all water based recreational activities, however this may change with short notice.

Lake Baroon has also been closed to all water based recreational activities but is open for picnics and barbeques. Care should be taken at the recreation sites, and vehicles must be parked in designated parking areas only.

Moogerah and Maroon Dam remains open, but swimming and skiing should be avoiding.

The following recreational sites are currently **closed** to the public –

- O'Sheas Crossing
- Hamon Cove
- Logan inlet
- Captain Logan Camp
- River access at Atkinson's Crossing
- Billies Bay and Hays Landing

Visitors should check the Water Grid website for additional information for each recreation site.

### Gold Coast Desalination Plant

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels may present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.

The Gold Coast Desalination facility is now operating at 33 per cent capacity to ensure the highest water quality for the South East Queensland region.

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

For further details contact the Water Grid Communications Unit on:

[REDACTED]

TRIM reference: D/	Date and time: 7/01/11 4:42pm
Title : SEQ dam release and flooding update - 07.01.11	
Summary: Friday Grid Update, Dam releases	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 07.01.11

**WEEKLY GRID UPDATE  
FRIDAY 7 JANUARY 2011**

**DAM RELEASES**

Gate operations have commenced at Wivenhoe Dam and releases are expected to reach around 100,000 megalitres a day by tomorrow afternoon. Releases will be reviewed and may change depending on rainfall, inflows into the dam and river flows.

Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing may be inundated for several days. Local councils should be consulted for detailed information on road crossing closures and other impacts.

At this stage, no impacts are expected for Fernvale Bridge or Mt Crosby Weir Bridge.

Water from Somerset Dam is being released into Wivenhoe Dam through a regulator valve. The releases may increase to utilise sluice gates later today or over the weekend to manage rainfall and inflows.

Spillway gate operations commenced yesterday evening at North Pine Dam. These releases may continue into next week, depending upon further rainfall. The local council has been advised that Youngs Crossing Road may be inundated.

A release from Leslie Harrison Dam is underway and may continue until next week.

A release through the emergency gates at Hinze Dam is expected during the weekend.

The Water Grid is working with local councils regarding the current releases and the likely impacts, which are being managed in accordance with approved flood management plans.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

## RECREATION UPDATE

Due to high water levels, Lake Wivenhoe is currently closed to all water based recreational activities. The closure will most likely extend over the next few days.

The following recreation sites at Wivenhoe are currently closed due to submerged infrastructure, or dangerous conditions:

- O'Sheas Crossing
- Hamon Cove
- Logan inlet
- Captain Logan Camp
- River access at Atkinson's Crossing
- Billies Bay and Hays Landing

Other recreation areas at Wivenhoe are open for land based activities. The Spillway Lookout recreation area is open, however visitors are advised that there may be long delays due to the number of people visiting the site. Security staff and traffic controllers will be on site and all visitors will need to follow their directions.

Lake Somerset will be temporarily closed to all water based recreational activities from 6pm tonight and is expected to remain closed over the weekend and possibly into next week.

Access to Lake Borumba is not available as Yabba Creek Road between Imbil and Borumba Dam is currently closed. Access is expected to remain closed for several days.

Lake Baroon has also been closed to all water based recreational activities but is open for picnics and barbeques. Care should be taken at the recreation sites, and vehicles must be parked in designated parking areas only.

Lake Maroon remains closed to water skiing and swimming but remains open to boating and fishing.

Visitors should check the Water Grid website ([www.watergrid.com.au](http://www.watergrid.com.au)) for additional information on each recreation site.

## GOLD COAST DESALINATION PLANT

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels may

present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.

The Gold Coast Desalination facility is now operating at 33 per cent capacity to ensure the highest water quality for the South East Queensland region.

#### GRID TWELVE

The current supply capacity of the **Grid Twelve** is **100.0 %**, no change from last week. The Grid Twelve makes up nearly 90 % of South East Queensland's total water storage volume. See below for further breakdowns:

Dam	Current capacity (%)	Change in capacity on last week (%)	Rainfall (mm over past seven days)
Wivenhoe	100%	No change	72mm
Somerset	100%	No change	74mm
North Pine	98.4%	1.8% ↓	82mm
Hinze	100%	No change	72mm
Baroon Pocket	100%	No change	95mm
Leslie Harrison	96.2%	1.6% ↓	121mm
Ewen Maddock	100%	No change	105mm
Cooloolabin	100%	No change	92mm
Lake Kurwongbah	100%	No change	82mm
Lake MacDonald	100%	No change	90mm
Little Nerang	100%	No change	72mm
Wappa	100%	No change	92mm

The current supply capacity of the **Grid Three 3 (Wivenhoe, Somerset and North Pine)** is **100 %**, no change from last week.

Note: The Grid Twelve and Grid Three % full is calculated by dividing the combined current storage volume of the dams in the group by the combined full storage volume.



Media updates issued during  
the January flood event

#### DID YOU KNOW?

By maintaining the Gold Coast Desalination Plant in standby mode, the Water Grid can ensure that the plant is online and available at any stage. This ensures water quality issues can be addressed without compromising water security for the South East Queensland region. The flexibility of the Water Grid allows us to safely isolate, transfer and blend water from multiple sources across the region.

**Notes to the Editor:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:** Please direct the community to contact telephone [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on **potential impacts in their local areas should direct inquiries to their local councils.**

**About the Water Grid:** Established in June 2008 in response to the crippling Millennium Drought, the Water Grid represents one of Australia's largest investments in water infrastructure.

Through a network of climate resilient water sources, treatment facilities, new two-way pipes and existing pipelines, the Water Grid gives the South East Queensland region the ability to support water demands, water quality, economic prosperity and lifestyle - regardless of climate change and population growth.

#### CONTACT DETAILS

Please direct all media enquiries to the Water Grid Communications Unit:

Phone [REDACTED]  
Email: [media@watergrid.com.au](mailto:media@watergrid.com.au)  
Website: [www.watergrid.com.au](http://www.watergrid.com.au)

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TRIM reference: D/	Date and time: 8/01/11 10:26am
Title : SEQ dam release and flooding update - 08.01.11	
Summary: Dam releases, Recreation update, Gold Coast Desalination Plant update	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 08.01.11

MEDIA RELEASE - 8 JANUARY 2011

#### Dam releases

With recent heavy rainfall across South East Queensland and the forecast of more to come, releases are being made from some of the region's water storages.

Water from Somerset Dam is being released into Wivenhoe Dam through one gate.

At Wivenhoe Dam, all five gates are now open. Releases are expected to reach around 100,000 megalitres a day by this afternoon. Releases will be reviewed and may change depending on rainfall, inflows into the dam and river flows.

Wivenhoe Dam releases may impact upon Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing for several days. Local councils should be consulted for detailed information on road crossing closures and other impacts.

At this stage, no impacts are expected for Fernvale Bridge or Mt Crosby Weir Bridge, although this may change depending on rainfall.

Spillway gate operations commenced during the evening of Thursday 6 January 2011. These releases may continue until next week, depending upon further rainfall.

A release from Leslie Harrison is underway and may continue until the weekend.

Releases through the emergency gates of Hinze Dam is expected to occur sometime over the weekend.

The Water Grid is continuing to work with local councils regarding the current releases and the likely impacts, which are being managed in accordance with approved flood management plans.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

Recreation update



Media updates issued during  
the January flood event

Due to water levels, Wivenhoe Dam and Somerset Dam are closed for all water based recreational activities and is expected to remain closed for some days.

The following recreational sites are currently closed to the public –

- O'Sheas Crossing
- Hamon Cove
- Logan inlet
- Captain Logan Camp
- River access at Atkinson's Crossing
- Billies Bay and Hays Landing
- The Spit
- Lake Somerset Holiday Park Kirkleagh (Boat ramps only)

Other recreation areas at Wivenhoe are open for land based activities. The Spillway Lookout recreation area is open, however visitors are advised that there may be long delays due to the number of people visiting the site. Security staff and traffic controllers will be on site and all visitors will need to follow their directions.

Access to Borumba Dam is currently not available as Yabba Creek Road between Imbil and Borumba Dam is closed.

Lake Baroon has also been closed to all water based recreational activities but is open for picnics and barbeques. Care should be taken at the recreation sites, and vehicles must be parked in designated parking areas only.

Lake Maroon remains closed to water skiing and swimming but remains open to boating and fishing.

Visitors should check the Water Grid website for additional information for each recreation site.

#### **Gold Coast Desalination Plant**

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels may present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.

The Gold Coast Desalination facility is now operating at 33 per cent capacity to ensure the highest water quality for the South East Queensland region.

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

#### **Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number

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Media updates issued during  
the January flood event

has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on potential impacts in their local areas including road closures should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
[redacted] | Email: media [redacted]

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G177

<b>TRIM reference:</b> D/	<b>Date and time:</b> 9/01/11 9:29am
<b>Title :</b> SEQ dam release and flooding update - 9.01.11	
<b>Summary:</b> Dam releases, Recreation update, Gold Coast Desalination Plant update	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 09.01.11

**MEDIA RELEASE - 9 JANUARY 2011**

#### **Dam releases**

With recent heavy rainfall across South East Queensland and the forecast of more to come, releases are being made from some of the region's water storages. Based on current forecasts, all release operations may change at short notice.

Water from Somerset Dam is being released into Wivenhoe Dam through the sluice gates.

At Wivenhoe Dam, releases commenced during the evening of Thursday 6 January 2011, with all five gates opened by Saturday 8 January 2011. Releases have reached around 116,000 megalitres a day. Gate operations will continue to be reviewed and may change at short notice depending on rainfall, inflows into the dam and river flows.

Wivenhoe Dam releases may impact upon Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing for several days. Local councils should be consulted for detailed information on road crossing closures and other impacts.

At this stage, no impacts are expected for Fernvale Bridge or Mt Crosby Weir Bridge, although this may change depending on rainfall.

These releases are expected to continue until next week.

Release operations at North Pine Dam are being reviewed and may result in the closure of gates later today or tomorrow, however this action is dependent on whether further rainfall is received in the catchment.

Releases from Leslie Harrison Dam have now ceased, however further inflows received may see gate operations re-occur at short notice.

Minor releases through the emergency gates of Hinze Dam have commenced.

The Water Grid is continuing to work with local councils regarding the current releases and the likely impacts, which are being managed in accordance with approved flood management plans.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

#### Recreation update

Due to water levels, Wivenhoe Dam and Somerset Dam are closed for all water based recreational activities and is expected to remain closed into next week.

The following recreational sites are currently closed to the public –

- O'Sheas Crossing
- Hamon Cove
- Logan inlet
- Captain Logan Camp
- River access at Atkinson's Crossing
- Billies Bay and Hays Landing
- The Spit
- Lake Somerset Holiday Park Kirkleagh (Boat ramps only)

Other recreation areas at Wivenhoe are open for land based activities. The Spillway Lookout recreation area is open, however visitors are advised that there may be long delays due to the number of people visiting the site. Security staff and traffic controllers will be on site and all visitors will need to follow their directions.

Access to Borumba Dam is currently not available as Yabba Creek Road between Imbil and Borumba Dam is closed.

Lake Baroon has also been closed to all water based recreational activities but is open for picnics and barbeques. Care should be taken at the recreation sites, and vehicles must be parked in designated parking areas only.

Lake Maroon remains closed to water skiing and swimming but remains open to boating and fishing.

Visitors should check the Water Grid website for additional information for each recreation site.

#### Gold Coast Desalination Plant

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels may present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.



Media updates issued during  
the January flood event

The Gold Coast Desalination facility is now operating at 33 per cent capacity to ensure the highest water quality for the South East Queensland region.

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED] This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on **potential impacts in their local areas including road closures** should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
[REDACTED]

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G180

TRIM reference: D/	Date and time: 10/01/11 7:15am
Title : SEQ dam release and flooding update - 10.01.11 AM	
Summary: Wivenhoe Dam releases	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 10.01.11 AM

MEDIA RELEASE - 10 JANUARY 2011

#### Wivenhoe Dam releases

Significant rainfall received across catchments has lifted Wivenhoe Dam's level to above 140 per cent and Somerset Dam to above 150 per cent. Although releases are being made, significant quantities of water have been held back to manage impacts downstream and allow for inflows which have occurred below Wivenhoe Dam.

Overnight, this weather has inundated Fernvale Bridge and Mt Crosby Weir bridge together with a number of local roads. They join a number of other bridges already impacted, including Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing.

In order to relieve the dam's flood storage compartment and with more rain forecast, controlled releases are being increased today from 116,000 megalitres per day to 150,000 megalitres per day. This will be done in consultation with the Bureau of Meteorology and local councils, utilising a strategy to limit impacts where possible downstream, noting that these releases are a necessity.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

**ENDS**

**Note to the Editor:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:** Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.



Media updates issued during  
the January flood event

**About the SEQ Water Grid:** Established in June 2008 in response to the crippling Millennium Drought, the SEQ Water Grid represents one of Australia's largest investments in water infrastructure.

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For further information on the Water Grid: [www.watergrid.com.au](http://www.watergrid.com.au)

**For further details contact the SEQ Water Grid Communications Unit on:**



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G182

<b>TRIM reference:</b> D/	<b>Date and time:</b> 10/01/11, 10:42am
<b>Title :</b> SEQ dam release and flooding update - 10.01.11 AM	
<b>Summary:</b> Dam releases, Recreation update, Gold Coast Desalination Plant update	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 10.01.11 AM

MEDIA RELEASE - 10 JANUARY 2011

#### Dam releases

Significant rainfall across the catchment has lifted Wivenhoe Dam's level to above 140 per cent and Somerset Dam to above 150 per cent.

Although releases are being made, large quantities of water continue to flow into the dams and are being held back in order to manage impacts downstream and allow for other inflows from urban runoff, and the Lockyer and Bremer Rivers to subside.

Overnight, Fernvale and Mt Crosby Weir Bridges together with a number of local roads became inundated. They joined the others already impacted, including Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing.

In order to relieve the quickly filling flood storage compartment, and with more rain forecast, controlled releases from the dam have been increased today from 116,000 megalitres per day to 170,000 megalitres per day. These releases are a necessity.

Releases are being reviewed in consultation with the Bureau of Meteorology and local councils, utilising a strategy to limit impacts where possible downstream.

Water from Somerset Dam is being released into Wivenhoe Dam through the sluice gates.

Spillway gate operations are continuing at North Pine Dam, with all five gates open. These releases may continue until next week, depending upon further rainfall.

At Leslie Harrison Dam, gate releases are underway. A minor release of around 1200 megalitres a day is being made through the emergency gates of Hinze Dam.

The Water Grid is working with local councils regarding the current releases and the likely impacts, which are being managed in accordance with approved flood management plans.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

**Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.**

#### **Recreation update**

Due to water levels, both Wivenhoe and Somerset are closed to all recreational activities, and will remain so for some days.

The following recreation sites are closed –

- O'Sheas Crossing
- Hamon Cove
- Logan Inlet
- Captain Logan Camp
- Lumley Hill
- Spillway Common/ Atkinson's Crossing
- Cormorant Bay
- Branch Creek
- Billies Bay/Hays Landing
- The Spit
- Lake Somerset Holiday Park Kirkleagh

Numerous roads are cut including the highway at Kilcoy and Fernvale, and conditions are extremely dangerous.

Moogerah and Maroon Dam remains open, however, swimming and skiing should be avoiding.

Access to Borumba Dam is currently not available as Yabba Creek Road between Imbil and Borumba Dam is closed.

Lake Baroon has also been closed to all water based recreational activities but is open for picnics and barbeques. Care should be taken at the recreation sites, and vehicles must be parked in designated parking areas only.

Visitors should check the Water Grid website for additional information for each recreation site.

#### **Gold Coast Desalination Plant**

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels may present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.

With Mt Crosby now back to normal the Gold Coast Desalination facility has now been reduced to 33 per cent capacity.



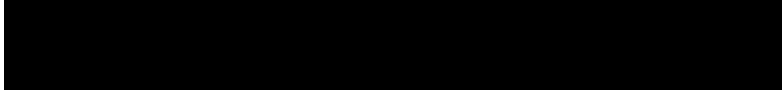
Media updates issued during  
the January flood event

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on **potential impacts in their local areas including road closures** should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:



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G185

<b>TRIM reference:</b> D/	<b>Date and time:</b> 10/01/11 4:50pm
<b>Title :</b> SEQ dam release and flooding update - 10.01.11 PM	
<b>Summary:</b> Dam releases, Recreation update, Gold Coast Desalination Plant update	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 10.01.11 PM

**MEDIA RELEASE - 10 JANUARY 2011**

### **Dam releases**

**Significant rainfall in the catchments has lifted Wivenhoe Dam's level to 154 per cent and Somerset Dam to 158 per cent, despite continuing releases.**

Although releases are being made, large quantities of water continue to flow into the dams. Water is being held back in order to manage impacts downstream and allow for other inflows from urban runoff, the Lockyer and Bremer Rivers to subside.

Overnight, Fernvale and Mt Crosby Weir Bridges together with a number of local roads became inundated. They joined the others already impacted, including Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge and Colleges Crossing.

In order to relieve the quickly filling flood storage compartment, and with more rain forecast, controlled releases from the dam have been increased today from 116,000 megalitres per day to 172,000 megalitres per day. Further increases to the release rate are planned, to approximately 240,000 megalitres per day by midnight.

These releases are a necessity as, at the peak, Wivenhoe Dam was receiving more than twice the volume of Sydney Harbour each day.

Releases are continually being reviewed in consultation with the Bureau of Meteorology and local councils, utilising a strategy to limit impacts where possible downstream.

Water from Somerset Dam is being released into Wivenhoe Dam through the sluice gates.

Spillway gate operations are continuing at North Pine Dam, with all five gates open, releasing around 43,000 megalitres a day. These releases may continue until Wednesday 12 January 2011.

At Leslie Harrison Dam, gate releases are underway. A minor release of around 1200 megalitres a day is being made through the emergency gates of Hinze Dam.

The Water Grid is working with local councils regarding the current releases and the likely impacts. Releases are being managed in accordance with approved flood management plans.



Media updates issued during  
the January flood event

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

#### Recreation update

Due to water levels, both Wivenhoe and Somerset are closed to all recreational activities, and will remain so for some days.

The following recreation sites are closed -

- O'Sheas Crossing
- Hamon Cove
- Logan Inlet
- Captain Logan Camp
- Lumley Hill
- Spillway Common/ Atkinson's Crossing
- Cormorant Bay
- Branch Creek
- Billies Bay/Hays Landing
- The Spit
- Lake Somerset Holiday Park Kirkleagh

Numerous roads are cut including the highway at Kilcoy and Fernvale, and conditions are extremely dangerous.

Moogerah and Maroon Dam remains open, however, swimming and skiing should be avoiding.

Access to Borumba Dam is currently not available as Yabba Creek Road between Imbil and Borumba Dam is closed.

Lake Baroon has also been closed to all water based recreational activities but is open for picnics and barbeques. Care should be taken at the recreation sites, and vehicles must be parked in designated parking areas only.

Visitors should check the Water Grid website for additional information for each recreation site.

#### Gold Coast Desalination Plant

Even though the regions dams are at or near full capacity, recent heavy rains have resulted in high sediment levels in the Brisbane River. These increased levels may present challenges for water treatment plants like those at Mt Crosby, which are the main supply for Brisbane.

The Gold Coast Desalination facility was recently brought up to full capacity to address the flood associated issues at Mt Crosby without compromising water security or quality for Brisbane.

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Media updates issued during  
the January flood event

With Mt Crosby now back to normal the Gold Coast Desalination facility has now been reduced to 33 per cent capacity.

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on **potential impacts in their local areas including road closures** should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:



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G188

TRIM reference: D/	Date and time: 11/01/11 8:39am
Title : SEQ dam release and flooding update - 11.01.11 AM	
Summary: Unprecedented Wivenhoe Dam releases, Residents urged to conserve water supply, Upper Somerset townships urged to conserve water	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 11.01.11 AM

MEDIA RELEASE - 11 JANUARY 2011

### UNPRECEDENTED WIVENHOE DAM RELEASES

**NOTE:** All SEQ dams are safe, stable and operating within their design specifications.

Significant rainfall received across catchments has caused waterways upstream of Somerset and Wivenhoe Dams to rise quickly overnight.

Wivenhoe Dam is currently at 173% and rising. Somerset Dam is at 160%.

Controlled releases through the five gates have been held at around 236,000 megalitres since early last night but will need to be increased further today.

These releases will are being made in consultation with the Bureau of Meteorology and local councils and aim to limit downstream impacts where possible.

Note these large releases are necessary for the safe management of the dam.

Release levels will be progressively reviewed depending on rainfall across the catchments today.

Local Councils have been advised that as a result of Lockyer Creek flows, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at Sunday 16 January.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites today.

While substantial amounts of water is being released into Wivenhoe from Somerset Dam, water levels in Somerset are expected to continue to rising today and areas around Kilcoy are likely to be impacted by these rising dam levels.

Five gates are open at North Pine Dam, releasing around 15,000 megalitres a day and will continue until at least Wednesday 12 January.

The local Council is being kept informed regarding Youngs Crossing.

Gate releases at Leslie Harrison Dam are underway due to rainfall and inflows.

A minor release of around 1200 megalitres a day is being made through the emergency gates at Hinze Dam. There is no access to the spillway.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking detailed information on **potential impacts in their local areas including road closures should direct inquiries to their local councils.**

#### **RESIDENTS URGED TO CONSERVE WATER SUPPLY**

All Somerset, Scenic Rim and Lockyer Valley residents are being urged to conserve water due to the impacts of local flooding on water infrastructure.

Water Grid spokesperson Dan Spiller said vital water infrastructure in these regions has been damaged by flood waters, cutting off the raw water supply.

"Although we have a limited supply in the local reservoirs, we are unable to get tankers in to replenish this supply due to flooded roads. We are also facing issues with loss of power at some water treatment plants.

"We are therefore urging residents to restrict all non-essential use until further notice.

The Water Grid Manager, Queensland Urban Utilities and Emergency Management Queensland are working closely to gain access to the plants and to rectify all situations.

"We are working urgently to find ways for tankers to get in and replenish supplies. We are also considering options for getting bottled water in to those areas," said Mr Spiller.

**Residents with further enquiries can contact the local water retailer, Queensland Urban Utilities on [REDACTED], or for emergencies please call [REDACTED].**

#### **UPPER SOMERSET TOWNSHIPS URGED TO CONSERVE WATER**

Residents in the upper Somerset townships of Kilcoy, Jimna and Linville are being urged to conserve water due to the impacts of local flooding on water infrastructure.



Media updates issued during  
the January flood event

Water Grid spokesperson Dan Spiller said vital water infrastructure in these regions has been damaged by flood waters, cutting off the raw water supply.

"We have a limited supply in local reservoirs that is expected to last one to three days. However, we will ensure that critical supplies are maintained. In the meantime we are asking people to conserve water while we repair equipment and organise alternate supplies," he said.

The power is currently down at the main water treatment plant in Kilcoy, with flood water restricting access to rectify the situation.

In Jimna and Linville rising waters have impacted infrastructure that supports the region's supply.

Approximately 1,000 residents on town water across these three areas are impacted.

"We are asking people to restrict non-essential water use, including limiting shower times and considering alternative water supplies where possible," said Mr Spiller.

The Water Grid Manager is working closely with Emergency Management Queensland to gain access to the plants and to rectify all situations. Current demand and supply levels are being closely monitored and alternate water supplies are being considered.

"We are looking at trucking in tankers to fill the reservoirs and are also considering the supply of bottled water if necessary. Obviously we cannot truck in water while roads are closed," said Mr Spiller.

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on potential impacts in their local areas including road closures should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
Ph: [REDACTED]

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TRIM reference: D/	Date and time: 11/01/11 5:19pm
Title : SEQ dam release and flooding update - 11.01.11 PM	
Summary: Increased controlled releases from Wivenhoe	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 11.01.11 PM

MEDIA RELEASE - 11 JANUARY 2011

### Increased controlled releases from Wivenhoe Dam

NOTE: All SEQ dams are safe, stable and operating within their design specifications.

Wivenhoe Dam is currently at 190 per cent and rising. Somerset Dam is at 176 per cent and also rising.

Controlled releases through Wivenhoe's five radial gates have now been increased to around 490,000 megalitres per day. This is expected to increase. Releases are being made in consultation with the Bureau of Meteorology and local councils and an effort to limit downstream impacts where possible. Note these large releases are necessary for the safe management of the dam.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January. Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, **we will not be able to facilitate any land-based media access to our sites today.**

While substantial amounts of water is being released into Wivenhoe from Somerset Dam, water levels in Somerset are expected to continue to rising today and areas around Kilcoy are likely to be impacted by these rising dam levels.

Five gates are open at North Pine Dam, releasing around 15,000 megalitres a day and will continue until at least Wednesday 12 January. The local Council is being kept informed regarding Youngs Crossing.

Gate releases at Leslie Harrison Dam are underway due to rainfall and inflows.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity this morning.



Media updates issued during  
the January flood event

A minor release of around 6,600 megalitres a day is being made through the emergency gates at Hinze Dam, which is likely to increase to around 8,000 megalitres per day by 6.00 pm Tuesday 11 January .

**For detailed information on road crossing closures and other potential impacts, always contact your local council.**

**ENDS**

**Note to the Editor:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:** Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on **potential impacts in their local areas** should **direct inquiries to their local councils**.

**About the SEQ Water Grid:** Established in June 2008 in response to the crippling Millennium Drought, the SEQ Water Grid represents one of Australia's largest investments in water infrastructure.

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For further information on the Water Grid: [www.watergrid.com.au](http://www.watergrid.com.au)

**For further details contact the SEQ Water Grid Communications Unit on:**



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TRIM reference: D/	Date and time: 11/01/11 10:30pm
Title : SEQ dam release and flooding update - 11.01.11 PM	
Summary: Controlled releases from Wivenhoe Dam decreasing	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 11.01.11 PM

MEDIA RELEASE - 11 JANUARY 2011

### Controlled releases from Wivenhoe Dam decreasing

NOTE: All SEQ dams remain safe, stable and operating within their design specifications.

At 10pm Wivenhoe Dam was at 190 per cent with water levels falling slowly.

Controlled releases through Wivenhoe's five radial gates of 645,000 megalitres per day are expected to reduce slightly overnight due to easing rainfall.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort to limit downstream impacts where possible is being made. Note that these large releases are necessary for the continued safe management of the dam.

Somerset Dam is at 183 per cent and releases into Wivenhoe are expected to recommence overnight however high upstream levels are expected to continue to affect Kilcoy.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January. Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, **we will not be able to facilitate any land-based media access to our sites today.**

Five gates are open at North Pine Dam and will continue until at least Wednesday 12 January. The local Council is being kept informed regarding Youngs Crossing.

Gate releases at Leslie Harrison Dam are underway due to rainfall and inflows.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity this morning.



Media updates issued during  
the January flood event

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam. There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

#### **ENDS**

**Note to the Editor:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:** Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking information on **potential impacts in their local areas** should **direct inquiries to their local councils.**

**About the SEQ Water Grid:** Established in June 2008 in response to the crippling Millennium Drought, the SEQ Water Grid represents one of Australia's largest investments in water infrastructure.

Through a network of climate resilient water sources, treatment facilities, new two-way pipes and existing pipelines, the SEQ Water Grid gives the South East Queensland region the ability to support water demands, water quality, economic prosperity and lifestyle - regardless of climate change and population growth.

For further information on the Water Grid: [www.watergrid.com.au](http://www.watergrid.com.au)

**For further details contact the SEQ Water Grid Communications Unit on:**



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TRIM reference: D/	Date and time: 12/01/11 8:39am
Title : SEQ dam release and flooding update - 12.01.11 AM	
Summary: Controlled releases from Wivenhoe Dam decreasing	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 12.01.11 AM

MEDIA RELEASE - 12 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM DECREASING

**NOTE:** All SEQ dams are safe, stable and operating within their design specifications.

Currently, Wivenhoe Dam is at 190 per cent down from 191 per cent overnight.

This reflects the current ease in the weather. Somerset Dam is now at 190 per cent.

Wivenhoe's five radial gates are currently releasing 205,000 megalitres per day, down from 370,000 megalitres and an overnight peak of 645,000 megalitres.

This strategy is to allow for the Bremer and Lockyer Rivers to subside.

After the expected downstream peak in the lower Brisbane River has passed, releases will need to be increased to 301,000 megalitres per day.

However, this increase is unlikely to cause a second significant rise in the river.

These controlled releases must continue in order to relieve Wivenhoe Dam's swollen flood storage compartment in order to create space for further rainfall and inflows.

They are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites today.



Media updates issued during  
the January flood event

Five gates are open at North Pine Dam, however with no further rainfall, the gates are expected to close today or tomorrow. The local Council is being kept informed regarding Youngs Crossing.

Gate releases at Leslie Harrison Dam are underway due to rainfall and inflows, however these may cease later today.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity yesterday morning.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam. There is no public access to the spillway.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

Members of the public seeking detailed information on **potential impacts in their local areas including road closures should direct inquiries to their local councils.**

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking detailed information on **potential impacts in their local areas including road closures should direct inquiries to their local councils.**

For further details contact the Water Grid Communications Unit on:  
[REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 12/01/11 12:47pm
<b>Title :</b> SEQ dam release and flooding update - 12.01.11 PM	
<b>Summary:</b> Controlled releases from Wivenhoe Dam are continuing	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 12.01.11 PM

MEDIA RELEASE - 12 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM ARE CONTINUING

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Currently, Wivenhoe Dam is at 189 per cent, down from 191 per cent overnight. This reflects the current ease in the weather. Somerset Dam is now at 186 per cent, discharging 123,000 megalitres per day into Wivenhoe Dam via a sluice gate.

Wivenhoe's five radial gates continue to release 215,000 megalitres per day. This is considerably down from an overnight peak of 645,000 megalitres and will remain at this level to allow for the Bremer and Lockyer Rivers to subside.

After the expected downstream peak in the lower Brisbane River has passed, releases will be increased to 301,000 megalitres per day, however, this increase is unlikely to cause a second significant rise in the river.

These controlled releases must continue in order to relieve Wivenhoe Dam's swollen flood storage compartment in order to create space for further rainfall and inflows, should they occur.

They are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites today.



Media updates issued during  
the January flood event

Five gates are open at North Pine Dam releasing 6,800 megalitres per day, however with no further rainfall, the gates are expected to close in the next coming days. The local Council is being kept informed regarding Youngs Crossing.

Gate releases at Leslie Harrison Dam are underway due to rainfall and inflows.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity yesterday morning.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam. There is no public access to the spillway.

Telephone - [REDACTED] has been established for members of the public seeking information on which dams are spilling in South East Queensland.

For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.

**ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to watergridmedia [REDACTED]

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
[REDACTED]

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TRIM reference: D/	Date and time: 13/01/11 8:30am
Title : SEQ dam release and flooding update - 13.01.11 AM	
Summary: Controlled releases from Wivenhoe Dam continue	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 13.01.11 AM

MEDIA RELEASE - 13 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 187 per cent, and is dropping gradually with controlled releases through all five gates of 215,000 megalitres per day. This is down from the peak of 645,000 megalitres earlier in the week.

The dam's slow recession is due in part to inflows of 121,000 megalitres per day via a sluice gate from Somerset Dam. Somerset is at 174 per cent.

After the expected downstream peak in the lower Brisbane River has passed, releases will be increased to 301,000 megalitres per day.

This increase is unlikely to cause a second significant rise in the river and is necessary in order to relieve Wivenhoe Dam's swollen flood storage compartment in order to create space for further rainfall and inflows, should they occur.

All releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites today.

Five gates are open at North Pine Dam, however are expected to close Friday. The local Council is being kept informed regarding Youngs Crossing.

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Media updates issued during  
the January flood event

Gate releases at Leslie Harrison Dam have now ceased.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity yesterday morning.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam. There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

**ENDS**

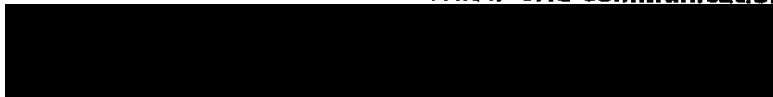
Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

**For further details contact the Water Grid Communications Unit on:**



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TRIM reference: D/	Date and time: 13/01/11 5:30pm
Title : SEQ dam release and flooding update - 13.01.11 PM	
Summary: Controlled releases from Wivenhoe Dam continue	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 13.01.11 PM

MEDIA RELEASE - 13 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 186 per cent, and is dropping gradually with controlled releases through all five gates of 228,000 megalitres per day. This is down from the peak of 645,000 megalitres earlier in the week.

The dam's slow recession is due in part to inflows of 120,000 megalitres per day via a sluice gate from Somerset Dam. Somerset is at 167 per cent.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites today.

Five gates are open at North Pine Dam, however, are expected to close Friday. The local Council is being kept informed regarding Youngs Crossing.

Gate releases at Leslie Harrison Dam have now ceased.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity earlier this week.



Media updates issued during  
the January flood event

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam. There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

**ENDS**

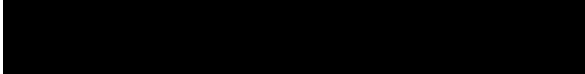
Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

**For further details contact the Water Grid Communications Unit on:**



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TRIM reference: D/	Date and time: 14/01/11 8:00am
Title : SEQ dam release and flooding update - 14.01.11 AM	
Summary: Controlled releases from Wivenhoe Dam continue	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 14.01.11 AM

MEDIA RELEASE - 14 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 179 per cent, and continues to drop steadily. Releases have been graduated to 301,000 megalitres per day in a 7 day strategy designed to draw down the flood storage compartment with no noticeable effects downstream.

The continuing releases are necessary in order to prepare Wivenhoe for any future weather events should they occur. Somerset Dam is at 151 percent and also dropping steadily with 111,800 megalitres per day being released into Wivenhoe via the sluice gates.

Inflows and water levels in the Brisbane and Pine catchments are being continually monitored.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until at least Sunday 16 January.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are **closed**, and given the dam levels and the need for safety around spillways, we **will not be able to facilitate any land-based media access to our sites today**.

People are advised not to travel to any recreation sites during the flood crisis, even if the roads are open.

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Media updates issued during  
the January flood event

Recreation sites may need to remain closed until they can be properly inspected and any public safety issues assessed.

All five gates at North Pine Dam closed this morning.

Gate releases at Leslie Harrison Dam have ceased.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity earlier this week.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam.

This release may reduce slowly over the next few days but will continue until next week. There is no public access to the spillway.

For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.

**ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
[REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 14/01/11 4:00pm
<b>Title :</b> SEQ dam release and flooding update - 14.01.11 PM	
<b>Summary:</b> Non-flood affected residents urged to use water wisely	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 14.01.11 PM

MEDIA RELEASE - 14 JANUARY 2011

### NON-FLOOD AFFECTED RESIDENTS URGED TO USE WATER WISELY

Despite significant operational challenges caused by flooding, the major water supplies remain reliable in the Water Grid supplying Brisbane, Ipswich and the Gold Coast.

Deputy Premier Paul Lucas said that the region's major water treatment plant at Mount Crosby had been partly flooded and impacted by poor water quality in the Brisbane River.

"While production is increasing, some of our water treatment infrastructure was impacted by floods and the output is still being affected by turbidity in the Brisbane and North Pine Rivers.

"One of Mount Crosby's two water treatment plants, East Bank, was flooded resulting in substantial mechanical damage to large pumps moved by the force of the water.

"Both Mt Crosby plants are now back on line and gradually being brought up to maximum production.

"We are also using the desalination plant and transfers across the Water Grid to resupply local water reservoirs where water levels declined while Mount Crosby was off line."

Mr Lucas urged residents and businesses in Brisbane, Logan and Ipswich who had not been affected by floods to use only what they need for the next few days.

"Our key priority in these areas is maintaining sufficient water for those households and businesses who need to use more in the immediate flood recovery.

"Flood affected residents and businesses will need to use a lot more water than normal, so its important that people who haven't been affected try to use water wisely," he said.

"In suburbs not directly, affected like Wynnum and Manly, we don't need to use a lot of water, so I'd ask every one to do their part in the Queensland tradition."



Media updates issued during  
the January flood event

Water Grid Manager CEO Barry Dennien said that people who haven't been affected by the flood can help by using the same cautious water use practices that saw us through the drought. These include:

- take only short 4 minute showers
- don't water gardens
- don't hose buildings, driveways and footpaths
- delay washing your cars
- don't fill pools
- only use dishwashers when you have a full load
- turn-off taps when you don't need water

"During the drought South East Queenslanders showed how well we could conserve water. This latest crisis means residents and businesses outside the directly flooded affected areas need to do the same again" Mr Dennien said.

"I can assure everyone who has not been directly impacted by flooding that by conserving valuable water over the next few days you will make a real and important contribution to the flood recovery effort" said Mr Dennien.

The Water Grid is working closely with local councils to prioritise water use for the cleanup of key roads first, followed by other areas later after water treatment plants are operating normally again.

#### **ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

#### **Community Assistance:**

Please direct the community to contact telephone - [REDACTED] This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on: [REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 14/01/11 6:00pm
<b>Title :</b> SEQ dam release and flooding update - 14.01.11 PM	
<b>Summary:</b> Controlled releases from Wivenhoe Dam continue	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 14.01.11 PM

MEDIA RELEASE - 14 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 172 per cent, and continues to drop steadily. Releases have been graduated to 301,000 megalitres per day in a 7 day strategy designed to draw down the flood storage compartment without contributing to further flooding.

The continuing releases are necessary in order to prepare Wivenhoe for any future weather events should they occur.

Somerset Dam is at 140 per cent and also dropping steadily with 111,800 megalitres per day being released into Wivenhoe via the sluice gates. Inflows and water levels in the Brisbane and Pine catchments are being continually monitored.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until the middle of next week.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites.

People are advised not to travel to any recreation sites during the flood crisis, even if the roads are open.

Recreation sites may need to remain closed until they can be properly inspected and any public safety issues assessed.



Media updates issued during  
the January flood event

All five gates at North Pine Dam closed this morning.

Gate releases at Leslie Harrison Dam have ceased.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity earlier this week.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam. This release may reduce slowly over the next few days but will continue until next week. There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

**ENDS**

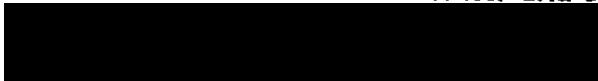
Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

**For further details contact the Water Grid Communications Unit on:**



<b>TRIM reference:</b> D/	<b>Date and time:</b> 15/01/11 9:30am
<b>Title :</b> SEQ dam release and flooding update - 15.01.11 AM	
<b>Summary:</b> Controlled releases from Wivenhoe Dam continue, Water quality	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 15.01.11 AM

MEDIA RELEASE - 15 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 163 per cent, and continues to drop steadily. Releases continue at around 301,000 megalitres per day as part of a strategy designed to draw down the flood storage compartment by mid-next week without contributing to further flooding.

The continuing releases are necessary in order to prepare Wivenhoe for any future weather events should they occur.

Somerset Dam is at 129 per cent and also dropping slowly with about 79,000 megalitres per day being released into Wivenhoe via the sluice gates.

Inflows and water levels in the Brisbane and Pine catchments are being continually monitored.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until the middle of next week.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites.

People are advised not to travel to any recreation sites during the flood crisis, even if the roads are open.



Media updates issued during  
the January flood event

Recreation sites may need to remain closed until they can be properly inspected and any public safety issues assessed.

All five gates at North Pine Dam closed this morning.

Gate releases at Leslie Harrison Dam have ceased.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent earlier this week.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam.

This release may reduce slowly over the next few days but will continue until next week.

There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

#### **RESIDENTS AND BUSINESSES STRONGLY URGED TO USE WATER WISELY**

The connected Water Grid continues to maintain safe and secure water supplies in the face of unprecedented flooding impacts.

Water Treatment Plants across the connected Water Grid are producing at maximum rates however very high demand associated with the clean-up of flood impacts is expected over the weekend.

Given the critical need to ensure adequate water supplies for the clean-up, residents and businesses in areas not directly impacted by flooding are strongly urged to use water wisely.

Within areas affected by flooding, residents should use what water is needed to clean-up immediate flood impacts.

Sensible water conservation practices are strongly encouraged such as using a high pressure hose or trigger nozzle.

Outside immediately impacted areas, residents and businesses are urged to conserve water by adopting the same water use practices that saw us through the drought. These include:

- take only short 4 minute showers
- don't water gardens
- delay washing your cars
- don't fill pools
- only use dishwashers when you have a full load
- turn-off taps when you don't need water

safe secure sustainable



Media updates issued during  
the January flood event

## **WATER QUALITY**

Water across Brisbane and the Sunshine and Gold Coasts remains safe to drink. While some people may see minor discolouration of their tap water, they should not be concerned.

Water Grid suppliers are continually monitoring water quality across the network as well working closely with Queensland Health.

While Queensland Urban Utilities have a precautionary Boiled Water Alert currently in place for Marburg, water in the Ipswich area is also safe to drink.

Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

## **ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

### **Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on: [REDACTED]

safe secure sustainable

TRIM reference: D/	Date and time: 15/01/11 6:00pm
Title : SEQ dam release and flooding update - 15.01.11 PM	
Summary: Controlled releases from Wivenhoe Dam continue, Water Quality	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 15.01.11 PM

MEDIA RELEASE - 15 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 154 per cent, and continues to drop steadily. Releases continue at around 301,000 megalitres per day as part of a strategy designed to draw down the flood storage compartment by mid-next week without contributing to further flooding.

The continuing releases are necessary in order to prepare Wivenhoe for any future weather events should they occur.

Somerset Dam is at 121 per cent and also dropping slowly with about 79,000 megalitres per day being released into Wivenhoe via the sluice gates.

Inflows and water levels in the Brisbane and Pine catchments are being continually monitored.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until the middle of next week.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, **we will not be able to facilitate any land-based media access to our sites.**

People are advised not to travel to any recreation sites during the flood crisis, even if the roads are open.



Media updates issued during  
the January flood event

Recreation sites may need to remain closed until they can be properly inspected and any public safety issues assessed.

All five gates at North Pine Dam closed this morning.

Gate releases at Leslie Harrison Dam have ceased.

As at 7:00am today, 1,693 megalitres was passing over the spillway at Wyaralong Dam. This represents a water depth of 0.19m over the spillway.

A minor release of around 8,000 megalitres a day is being made through the emergency gates at Hinze Dam.

This release may reduce slowly over the next few days but will continue until next week.

There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

#### **RESIDENTS AND BUSINESSES STRONGLY URGED TO USE WATER WISELY**

The connected Water Grid continues to maintain safe and secure water supplies in the face of unprecedented flooding impacts.

Water Treatment Plants across the connected Water Grid are producing at maximum rates however very high demand associated with the clean-up of flood impacts is expected over the weekend.

Given the critical need to ensure adequate water supplies for the clean-up, residents and businesses in areas not directly impacted by flooding are strongly urged to use water wisely.

Within areas affected by flooding, residents should use what water is needed to clean-up immediate flood impacts.

Sensible water conservation practices are strongly encouraged such as using a high pressure hose or trigger nozzle.

Outside immediately impacted areas, residents and businesses are urged to conserve water by adopting the same water use practices that saw us through the drought. These include:

- take only short 4 minute showers
- don't water gardens
- delay washing your cars
- don't fill pools
- only use dishwashers when you have a full load
- turn-off taps when you don't need water

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Media updates issued during  
the January flood event

## **WATER QUALITY**

Water across Brisbane and the Sunshine and Gold Coasts remains safe to drink. While some people may see minor discolouration of their tap water, they should not be concerned.

Water Grid suppliers are continually monitoring water quality across the network as well working closely with Queensland Health.

While Queensland Urban Utilities have a precautionary Boiled Water Alert currently in place for Marburg, water in the Ipswich area is also safe to drink.

Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

## **ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

### **Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

**For further details contact the Water Grid Communications Unit on:**  
[REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 15/01/11 3:30pm
<b>Title :</b> SEQ dam release and flooding update - 15.01.11	
<b>Summary:</b> Water Grid gears-up for the clean-up	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 15.01.11

MEDIA RELEASE - 15 JANUARY 2011: Issued at 3:30pm

### Water Grid gears-up for the clean-up

The expected spike in water use this weekend has started with every asset in the Water Grid currently in use.

Real-time bulk water consumption data from LinkWater today showed water use increasing rapidly due to the big clean-up across Brisbane and Ipswich now taking place.

Water Grid spokesperson Barry Dennien said typically Brisbane and Ipswich areas use about 700 megalitres over a weekend period, but already these areas had reached 215 megalitres by mid morning today.

"We've noticed a rapid rise in water use over the last few hours and expect the total to reach over 950 megalitres by tomorrow evening," said Mr Dennien.

"If people see minor discolouration of their tap water, they should not be concerned - Brisbane's water is absolutely safe to drink.

"A precautionary boil water notice has been issued for Marburg, however water across Ipswich and the Sunshine and Gold Coasts also remains safe to drink," he said.

Seqwater maintenance and operations staff are working around the clock to get major water treatment plants back to full production.

"A large spike in water demand so soon after flooding presents a real challenge - but it's a challenge that with the communities help we are up to," he said.

Brisbane's biggest water treatment plant at Mt Crosby is now stretching production to 410 megalitres per day after recovering from significant flood impacts.

The Gold Coast Desalination Plant currently at 66% or 88 megalitres per day is also making an important contribution.



Media updates issued during  
the January flood event

The enormous demand means that within areas affected by flooding, residents should sensibly use whatever water is needed.

Outside flood impacted areas, consumers are also asked to make an extra effort to conserve water by adopting the same water use practices that saw us through the drought.

Together the Water Grid and Queensland Urban Utilities have been working to ensure Lowood, Gatton, Helidon, Fernvale and Laidley are resupplied with drinking water as fast as possible.

Lowood's severely affected pump station and water treatment plant are back on line and are about to supply Lowood, Gatton, Helidon, Fernvale and Laidley.

Queensland Urban Utility crews, who worked through the night, remain on site repairing the town's reticulation system.

"These crews have done a tremendous job to get water supply to these local communities back on line so quickly after some considerable damage" said Mr Dennien.

For more information on boil water notices in the Queensland Urban Utilities supply area, including Somerset and Lockyer Valley, go to [www.urbanutilities.com.au](http://www.urbanutilities.com.au).

**ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on: [REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 16/01/11
<b>Title :</b> SEQ dam release and flooding update - 16.01.11	
<b>Summary:</b> Controlled releases from Wivenhoe Dam continue	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 16.01.11

MEDIA RELEASE - 16 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 138 per cent, and continues to drop steadily. Releases continue at around 299,000 megalitres per day. This flow will be maintained to drain the flood storage compartment this week.

The continuing releases are necessary in order to prepare Wivenhoe for any future weather events should they occur.

Inflows and water levels continue to be monitored in the Brisbane and Pine catchments.

Somerset Dam is at 106 per cent and also dropping slowly with about 70,500 megalitres per day being released into Wivenhoe via the sluice gates.

Water levels in Somerset will fall slowly in the next 24 hours.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge, Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until the middle of next week.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are closed, and given the dam levels and the need for safety around spillways, we will not be able to facilitate any land-based media access to our sites.



Media updates issued during  
the January flood event

People are advised not to travel to any recreation sites during the flood crisis, even if the roads are open.

Recreation sites may need to remain closed until they can be properly inspected and any public safety issues assessed.

North Pine Dam is at 96 per cent and all five gates remain closed.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity earlier this week.

A minor release of around 6,800 megalitres a day is being made through the emergency gates at Hinze Dam. This release may reduce slowly over the next few days but will continue until next week.

There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

#### **RESIDENTS AND BUSINESSES STRONGLY URGED TO USE WATER WISELY**

The connected Water Grid continues to maintain safe and secure water supplies in the face of unprecedented flooding impacts.

Water Treatment Plants across the connected Water Grid are producing at maximum rates however very high demand associated with the clean-up of flood impacts is expected over the weekend.

Given the critical need to ensure adequate water supplies for the clean-up, residents and businesses in areas not directly impacted by flooding are strongly urged to use water wisely.

Within areas affected by flooding, residents should use what water is needed to clean-up immediate flood impacts.

Sensible water conservation practices are strongly encouraged such as using a high pressure hose or trigger nozzle.

Outside immediately impacted areas, residents and businesses are urged to conserve water by adopting the same water use practices that saw us through the drought. These include:

- take only short 4 minute showers
- don't water gardens
- delay washing your cars
- don't fill pools
- only use dishwashers when you have a full load
- turn-off taps when you don't need water

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Media updates issued during  
the January flood event

## WATER QUALITY

Water across Brisbane and the Sunshine and Gold Coasts remains safe to drink. While some people may see minor discolouration of their tap water, they should not be concerned.

Water Grid suppliers are continually monitoring water quality across the network as well working closely with Queensland Health.

While Queensland Urban Utilities have a precautionary Boiled Water Alert currently in place for Marburg, water in the Ipswich area is also safe to drink.

Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

## ENDS

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**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

### Community Assistance:

Please direct the community to contact [REDACTED] This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

For further details contact the Water Grid Communications Unit on:  
[REDACTED]

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 17/01/11 11:05am
<b>Title :</b> SEQ dam release and flooding update - 17.01.11	
<b>Summary:</b> Controlled releases from Wivenhoe Dam continue, Water Quality	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 17.01.11

MEDIA RELEASE - 17 JANUARY 2011

### CONTROLLED RELEASES FROM WIVENHOE DAM CONTINUE

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 123 per cent capacity and continues to drop steadily. Releases continue at around 299,000 megalitres per day and this flow will be maintained to drain the flood storage compartment.

The continuing releases are necessary in order to prepare Wivenhoe for any future weather events should they occur. It is expected that releases from Wivenhoe Dam will cease mid-week.

Inflows and water levels continue to be monitored in the Brisbane and Pine catchments.

Somerset Dam is at 100 per cent with small discharges through the cone valves into Wivenhoe.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Due to a combination of Lockyer Creek, local runoff and Wivenhoe releases, Twin Bridges, Savages Crossing, Burtons Bridge, Kholo Bridge, Colleges Crossing, Fernvale Bridge, and Mt Crosby Weir Bridge may be inundated until the middle the week.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

All recreations areas around Somerset and Wivenhoe are **closed**, and given the dam levels and the need for safety around spillways, **we will not be able to facilitate any land-based media access to our sites.**

People are advised not to travel to any recreation sites during the flood crisis, even if the roads are open.

Recreation sites may need to remain closed until they can be properly inspected and any public safety issues assessed.

North Pine Dam is at 99 per cent and all five gates remain closed.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity earlier last week.

A minor release of around 6,800 megalitres a day is being made through the emergency gates at Hinze Dam. This release may reduce slowly over the next few days but will continue until mid-week. There is no public access to the spillway.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

#### **WATER QUALITY**

Water across Brisbane and the Sunshine and Gold Coasts remains safe to drink. While some people may see minor discolouration of their tap water, they should not be concerned.

Water Grid suppliers are continually monitoring water quality across the network as well working closely with Queensland Health.

While Queensland Urban Utilities have a precautionary Boiled Water Alert currently in place for Marburg, water in the Ipswich area is also safe to drink.

Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

#### **ENDS**

Owing to technical issues caused by the flood, a temporary email contact is in use. Please email to [watergridmedia@seqwatergrid.com.au](mailto:watergridmedia@seqwatergrid.com.au)

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

#### **Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

TRIM reference: D/	Date and time: 18/01/11 11:45am
Title : SEQ dam release and flooding update - 18.01.11	
Summary: Gate closure commenced at Wivenhoe	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 18.01.11

MEDIA RELEASE - 18 JANUARY 2011

#### GATE CLOSURE COMMENCED AT WIVENHOE DAM

**NOTE:** All SEQ dams remain safe, stable and operating within their design specifications.

Wivenhoe Dam is at 107 per cent and continues to drop steadily. Releases remained constant overnight at around 176,000 megalitres per day and are now reducing with the commencement of the gate closing sequence which began at 9am this morning.

The five radial gates are expected to be shut by Thursday to allow for the high tides that have been predicted for later this week.

Subject to weather, it is expected that the dam's flood storage compartment will have been returned to near zero from Thursday with any smaller excesses discharged via a smaller cone valve.

Inflows and water levels continue to be monitored in the Brisbane and Pine catchments.

Somerset Dam is at 99 per cent with small discharges through the cone valves into Wivenhoe.

All sluice gates at Somerset are closed.

Releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

Residents are urged to contact local councils for detailed information on road crossing closures and other impacts.

Recreation areas around Somerset and Wivenhoe remain closed until further notice due to safety.

People are advised not to travel to any recreation sites during the flood situation, even if the roads are open.



Media updates issued during  
the January flood event

North Pine Dam is at 99 per cent and all five gates remain closed.

The gates at Hinze Dam closed this morning.

**For detailed information on river levels, road and crossing closures and other potential impacts, always contact your local council.**

A single dam update will now be issued mid-morning each day.

**ENDS**

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 19/01/11 10:00am
<b>Title :</b> SEQ dam release and flooding update - 19.01.11	
<b>Summary:</b> Dam update, Water quality	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 19.01.11

MEDIA RELEASE - 19 JANUARY 2011

#### **DAM UPDATE**

Wivenhoe Dam is at 99.3 per cent with the gate closing sequence expected to be complete by late afternoon today.

Inflows and water levels continue to be monitored in the Brisbane and Pine catchments, with more than 20mm of rain received in the Wivenhoe Dam catchment over the last 24 hours.

Small excesses will continue to be released through the cone valve at the base of the Wivenhoe Dam wall once all gates are closed.

Somerset Dam is at 100 per cent capacity with all sluice gates currently closed. Depending on inflows into the catchment, further releases into Wivenhoe Dam may be made over the next 24 hours.

All dam releases are being made in consultation with the Bureau of Meteorology and local councils and every effort is being made to limit downstream impacts where possible.

**Residents should contact local councils for detailed information on road crossing closures and other impacts.**

Recreation areas around Somerset and Wivenhoe dams remain closed until further notice due to safety.

Further releases from North Pine Dam were made overnight, to cater for the inflows from yesterday's storms. All gates at North Pine Dam were closed at 5.00am this morning.

There have been no further releases from Hinze Dam or Leslie Harrison Dam.

#### **WATER QUALITY**



Media updates issued during  
the January flood event

Water across Brisbane and the Sunshine and Gold Coasts remains safe to drink. Water Grid suppliers are continually monitoring water quality across the network and are working closely with Queensland Health.

While Queensland Urban Utilities have a precautionary Boil Water Alert currently in place for Marburg, water in the Ipswich area is also safe to drink.

Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

A single dam update will now be issued mid-morning each day.

**ENDS**

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

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<b>TRIM reference:</b> D/	<b>Date and time:</b> 20/01/11 10:42am
<b>Title :</b> SEQ dam release and flooding update - 20.01.11	
<b>Summary:</b> Small releases from Wivenhoe Dam after overnight storms	
<b>Note:</b> Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 20.01.11

MEDIA RELEASE - 20 JANUARY 2011

### **SMALL RELEASES FROM WIVENHOE DAM AFTER OVERNIGHT STORMS**

Last night's storms over the catchment have resulted in one gate being partially opened at Wivenhoe Dam this morning. This will see a small controlled release over the course of today to maintain the dam at or near 100 per cent.

The Bureau of Meteorology has forecast showers and possible thunderstorms later today meaning water releases will be reassessed over the next 24 hours.

Somerset Dam is just over 100 per cent capacity with all sluice gates currently closed. Depending on catchment inflows, further releases into Wivenhoe Dam may be made over the next 24 hours.

The Flood Operations Centre continues to monitor rainfalls and water levels throughout the Brisbane and Pine River catchments and consult with the Bureau of Meteorology and local councils to limit downstream impacts where possible.

While Twin Bridges remains inundated, overnight rainfall in the Lockyer catchment may affect inundation of Savages and Colleges Crossing in coming days. Residents should always contact the local council for detailed information on road crossing closures and other impacts.

Further releases from North Pine Dam began overnight to cater for the inflows from last night's storms. All five gates are currently open and are expected to operate throughout the day.

There have been no further releases from Hinze Dam or Leslie Harrison Dam.

**Recreation areas around Somerset and Wivenhoe dams remain closed until further notice due to safety.**

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity on Tuesday 11 January 2011.

### **WATER QUALITY**

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Media updates issued during  
the January flood event

Water across Brisbane and the Sunshine and Gold Coasts remains safe to drink. Water Grid suppliers are continually monitoring water quality across the network and are working closely with Queensland Health.

While Queensland Urban Utilities have a precautionary Boil Water Alert currently in place for Marburg, water in the Ipswich area is also safe to drink.

Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

A single dam update will now be issued mid-morning each day.

**ENDS**

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

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TRIM reference: D/	Date and time: 20/01/11 12:30pm
Title : SEQ dam release and flooding update - 20.01.11	
Summary: Gates now closed at Wivenhoe Dam, Water quality	
Note: Issued to all key media and stakeholders in South East Queensland	

SEQ dam release and flooding update - 20.01.11

MEDIA RELEASE - 20 JANUARY 2011

### GATES NOW CLOSED AT WIVENHOE DAM

All gates are now closed at Wivenhoe Dam, after last night's small water release in the wake of storms.

The Bureau of Meteorology has forecast showers and possible thunderstorms later today meaning water releases will be reassessed over the next 24 hours.

Somerset Dam is just over 100 per cent capacity with all sluice gates currently closed. Depending on catchment inflows, further releases into Wivenhoe Dam may be made over the next 24 hours.

The Flood Operations Centre continues to monitor rainfalls and water levels throughout the Brisbane and Pine River catchments and consult with the Bureau of Meteorology and local councils to limit downstream impacts where possible.

While Twin Bridges remains inundated, overnight rainfall in the Lockyer catchment may affect inundation of Savages and Colleges Crossing in coming days. Residents should always contact the local council for detailed information on road crossing closures and other impacts.

Further releases from North Pine Dam began overnight to cater for the inflows from last night's storms. All five gates are currently open and are expected to operate throughout the day.

There have been no further releases from Hinze Dam or Leslie Harrison Dam.

Recreation areas around Somerset and Wivenhoe dams remain closed until further notice due to safety.

Water has spilled from Wyaralong Dam after it exceeded 100 per cent capacity on Tuesday 11 January 2011.

### WATER QUALITY



Media updates issued during  
the January flood event

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Boil water alerts are in place for locations in the Lockyer Valley and Somerset council areas and residents and businesses are urged to visit the Queensland Urban Utilities website [www.urbanutilities.com.au](http://www.urbanutilities.com.au) for more details.

A single dam update will now be issued mid-morning each day.

**ENDS**

**PLEASE NOTE:** While releases are being made from the region's water storages, routine updates will be provided.

**Community Assistance:**

Please direct the community to contact telephone - [REDACTED]. This number has been established for members of the public seeking information on which dams are spilling in South East Queensland. Members of the public seeking information on potential impacts in their local areas should direct inquiries to their local councils.

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## Attachment 2: Wivenhoe Dam factsheet

TRIM reference:

3

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G231

# Wivenhoe and Somerset Dams

Providing water supply and flood control for South East Queensland

## A FEW FACTS

Wivenhoe Dam was built in response to the 1974 floods and is an award-winning feat of hydrological and structural engineering.

Connected to Wivenhoe Dam, Somerset Dam was completed in 1959. In the event of heavy rains, which may cause Somerset Dam to reach capacity, water is released downstream from Somerset to Wivenhoe Dam.

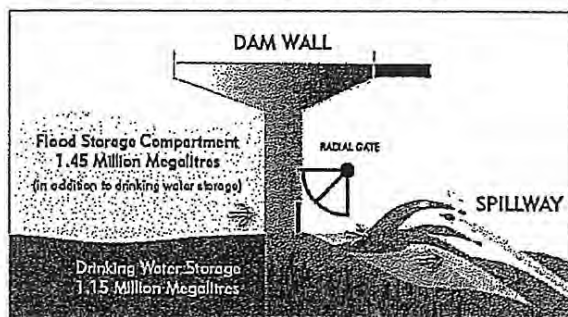
On top of storing 1.15 million megalitres of precious drinking water, Wivenhoe Dam can also store an additional 1.45 million megalitres, equal to 2.5 times the volume of Sydney Harbour. This additional space is known as the dam's flood storage compartment and works to hold back the flood waters which gather in the Brisbane Valley. These flood waters can threaten Brisbane after heavy weather events.

The flood storage compartment at Wivenhoe Dam temporarily stores flood water and releases it at a controlled rate to minimise downstream impacts. Flood levels along the Brisbane River and in the Ipswich and Brisbane urban areas would be much higher without the support of Wivenhoe and Somerset dams.

The Wivenhoe Dam wall is designed to withstand an extreme flood event, much worse than anything on record to date.

In a flood event similar to 1974, there would still be a large amount of local flooding in and around the Ipswich and Brisbane regions, simply due to the heavy local rainfalls. However, water levels along the Brisbane River would be reduced due to the mitigating impacts of Somerset and Wivenhoe dams.

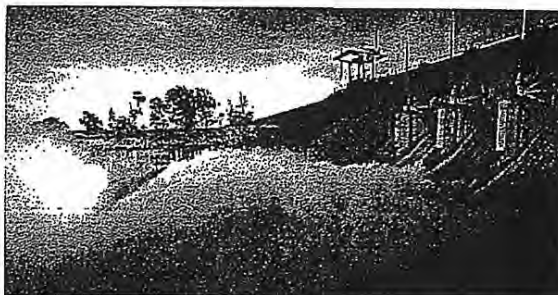
### Wivenhoe Dam Flood Storage Compartment



If it wasn't for Wivenhoe and Somerset dams, a considerable number of people, properties and infrastructure could be at an even greater risk of serious flooding. These dams are a crucial component of South East Queensland's flood mitigation plan and something Queenslanders can be proud of.

### Spectacular pictures – but why does Wivenhoe Dam have to release stored flood water?

South East Queensland has a weather pattern that often sees prolonged or multiple rain events in close succession.



As soon as Wivenhoe Dam's flood storage compartment begins to fill, it has to be carefully emptied in order to make room for additional heavy rainfall events that may occur. Wivenhoe Dam's flood storage compartment can fill in less than three days following heavy rainfall. This highlights the need for strategic management of dam levels. Controlled releases consider the following flood factors: catchment runoff, below the dam wall, urban runoff and river levels.

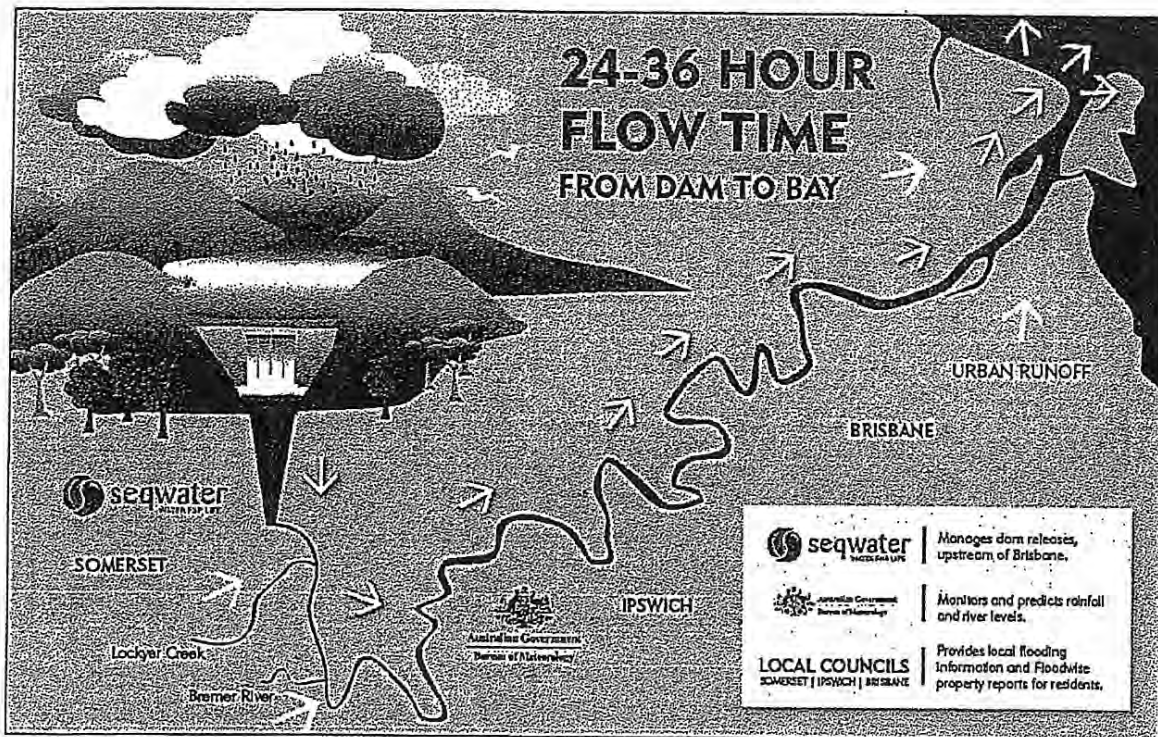
Following heavy rainfall in October 2010, Wivenhoe Dam received inflows equivalent to almost half the flood storage compartment capacity – in just a few days.

Wivenhoe Dam controls 50 per cent of the Brisbane catchment. It is therefore possible for Brisbane to flood from other sources such as rainfall in the catchment below the dam wall.

A fundamental principle in the management of Wivenhoe Dam is that all floodwater should be released within seven days. This means the greater the volume received in the flood storage compartment, the greater the discharge required.

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[www.watergrid.com.au](http://www.watergrid.com.au)



## How are the releases managed?

Before Wivenhoe Dam begins a controlled release from its flood storage compartment, a dedicated 24-hour Flood Operations Centre is activated. The specific purpose of the centre is to manage any potential impacts of releases downstream.

The actions of the Flood Operations Centre are guided by a Flood Mitigation Manual. The Queensland State Government, local councils and relevant emergency services are consulted before the water releases from dams take place, to ensure communities are warned and can take all necessary precautions.

The amount of water released from Wivenhoe Dam depends on the level of water inside the flood storage compartment, as well as the incoming flows and downstream tributaries.

During a major flooding event, the SEQ Water Grid Manager, Seqwater (the dam operators), the Bureau of Meteorology and local councils work together to formulate recommendations. Members of the public and relevant emergency services are then advised on how to best manage impending localised flooding.

Rainfall is continually monitored throughout all South East Queensland catchments during a flood event. The Bureau of Meteorology provides rainfall forecasts to Seqwater who then monitor the surrounding catchments.

Together with weather predictions, a comprehensive network of river sensors, providing real-time data, work to inform the basis for a formulated schedule of controlled dam releases. The schedule works to ensure the maximum protection from flooding in urban areas is achieved.

Based on the weather forecast from the Bureau of Meteorology, and Seqwater's decisions to release water from Wivenhoe Dam, councils then work with residents regarding local area impacts. Councils know their areas best and work to advise residents about road and bridge closures, as well as local flooding.

The following priorities are considered when determining how much water is to be released from Wivenhoe Dam, and at what capacity:

- the structural safety of the dam
- maximising protection from flooding in urbanised areas
- minimising disruption to rural industries along the Brisbane River and Stanley River valleys
- minimising impacts to flora and fauna during the water release phase of a flood event
- the ability to retain the dam at full supply level at the conclusion of a flood event.

## How do I find out further information?

For more information on the status of dam levels and Water Grid recreation sites visit [www.watergrid.com.au](http://www.watergrid.com.au)

For information on local flooding, including road closures, contact your local council or visit their website.

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[www.watergrid.com.au](http://www.watergrid.com.au)

