

**SIXTH STATEMENT**  
**OF**  
**ROBERT ARNOLD AYRE**  
  
**30 JANUARY 2012**

**QFCI**

Date:

2/2/12 *jm*

Exhibit Number:

1048

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QUEENSLAND FLOODS COMMISSION OF INQUIRY

SIXTH STATEMENT OF ROBERT ARNOLD AYRE

30 January 2012

**QUEENSLAND TO WIT**

I, **ROBERT ARNOLD AYRE**, care of Holding Redlich, Level 1, 300 Queen Street, Brisbane in the State of Queensland do solemnly and sincerely declare as follows:

**INTRODUCTION**

- 1 This statement is a further supplementary statement to statements previously provided to the Commission of Inquiry on 23 March 2011 (**my first statement**), 29 March 2011 (**my supplementary statement**), 8 April 2011 (**my third statement**) and 11 April 2011 (**my response to Michael O'Brien's submission**) and my statement of 30 April 2011 (**my fifth statement**).
- 2 I will provide any further information or explanation required by the Commission of Inquiry.

**The Requirement Dated 25 January 2012**

- 3 I have been provided with a Requirement to provide an account of my involvement in the creation of the following parts of the January 2011 Flood Report on the Operation of Somerset Dam and Wivenhoe Dam, 2 March 2011 (Exhibit 24 in the Commission of Inquiry):
  - (a) Executive Summary;
  - (b) Part 2 – Flood Event Summary
  - (c) Part 10 Flood Management Strategies and Manual Compliance
  - (d) Part 19 Report Conclusions.
- 4 **Exhibit 1 to this statement** is a copy of the Requirement dated 25 January 2011.

## The Drafting and Review Process Generally

- 5 The process for drafting and reviewing the Flood Report was generally that the principal author of various Parts of the Flood Report would be responsible for the drafting of that Part. Discussion would sometimes occur at an early stage of the drafting of a Part to consider the contents in a broad sense (such as the column headings in a table, or the subsections to be dealt with). The principal author would then produce a largely complete draft of that Part of the Flood Report, and distribute it to the other Flood Engineers, generally in hard copy. The other engineers would then review that Part, and provide feedback to the principal author. Whilst at times this occurred in writing, most of the time this would occur in a meeting with the principal author. Sometimes this would include the other engineers and sometimes it would not. I have not kept a record of the dates or times of these meetings. My recollection is that during that meeting, we would often do a page turn on the Part raising any comments or suggestions that each of us had, rather than simply providing the draft that we had made our corrections or notes on to the principal author of that Part.
- 6 As best as I can now recall, I did not make electronic comments / corrections to the drafts of the Flood Report. It was my usual practice to make notes on my own hard copy, and then provide verbal feedback to the principal author of that Part. I have found in the past that electronic amendments by several people to documents is often more hassle than it is worth because of difficulties in reconciling various changes to different versions of the same document.
- 7 I have exhibited to this statement all previous drafts of the Flood Report or Parts of the Flood Report that I have been able to locate in my possession. Once I had made my notes and provided feedback, I did not generally retain my version of that draft.
- 8 The Flood Report was largely prepared in the FOC on the computers that were present. The document was saved on the FOC local area network in a dedicated series of folders entitled "draft", "final draft" and then "final", or something like that. Our general practice was not to email the document, but rather to work on the copy on the computer. This was to avoid confusion as to what the latest version of the draft was.

- 9        **Exhibit 2 to this statement** is a compact disc containing 7 Folders containing various electronic documents relevant to the Flood Report that I have in my possession. These are the only electronic documents relevant to the Requirement that I have been able to locate in my possession.
- 10       The “Draft” folder was essentially the initial working draft folder for the live documents that were still being worked on and reviewed primarily by the author for that relevant Part and the document formatters. This folder is saved in “Folder 1” on the compact disc at exhibit 2 to this statement.
- 11       As each Part of the Flood Report would near completion, it would be transferred to the “Final Draft” folder for final review, proof reading and preparation for printing. I believe that the final draft was also forwarded to the Seqwater Board. This folder is saved in Folder 2 on the compact disc in exhibit 2.
- 12       I believe that Parts of the Flood Report contained in the “Final” folder were provided to external technical reviewers (Dr Rory Nathan and Peter Hill from SKM, and Emeritus Professor Colin Apelt (University of Queensland), and Greg Roads (WRM Water and Environment) and Brian Shannon (retired SunWater) and Len McDonald (retired former NSW Dam Safety). The Reports from these technical reviewers are exhibits before the Commission of Inquiry. The “Final” folder is saved in Folder 3 on the compact disc in exhibit 2.
- 13       Folder 4 contains a copy of a draft of Part 2 Flood Event Summary in electronic form. I don’t believe that the corrections / annotations down the side of that document were created by me.
- 14       Folder 5 contains a document entitled “Performance of RTFM” and a document entitled “Copy of Performance of RTFM.” These documents appear to be identical. This document is an early draft of Part 7 of the Flood Report, which is the only substantive Part of the Flood Report for which I was the principal author.
- 15       Folder 6 contains a document entitled “final sunset” which is an excel version of the model results. I believe that Terry Malone created this document, which ultimately made its way into appendix A.
- 16       Folder 7 contains a copy of an excel document that I compiled as my own aide. The document started as one of the gate operation spreadsheets, and I added to it. I have dated this document as 19 January 2011 at 7.00am in the file name. I don’t

believe that I gave this document to any of the other engineers. I cannot now recall if I referred to this document in reviewing any parts of the Flood Report or any of the data contained therein.

17 I do not believe that I have any other electronic versions of documents relevant to the Flood Report specified in the Requirement issued to me.

### **The First Step in the Process – The Table of Contents**

18 Before the drafting of the Flood Report commenced, the Flood Engineers held a series of meetings to determine the content and structure of the Flood Report and the Parts to be included.

19 One of the very first tasks that was undertaken was to decide upon an overall structure to the Flood Report and a table of contents.

20 Various tasks were then assigned to people to complete.

21 Terry Malone, John Ruffini and I are all hydrologists, and so we were tasked with the Modelling and Event Data Parts, and because of the huge amount of modelling and data involved in the Flood Event, the three of us were to take the lead in collating, recording and summarising that data in a digestible form.

22 John Tibaldi was left to take the lead on the Parts such as the Introduction, Flood Event Summary, and the Flood Management Strategies.

23 John Ruffini was initially tasked with completing Part 5 Data Collection, however, Terry Malone and I ultimately drafted that Part as John Ruffini had other work commitments that he had to meet with DERM.

24 **Exhibit 3 to this statement** is a copy of a very early draft of the table of contents. I believe that John Tibaldi prepared this draft table of contents.

25 I believe that the handwriting on the second page of exhibit 3 is John Ruffini's.

26 I can recall a particular meeting that all four Flood Engineers attended in the FOC before the drafting of the Flood Report commenced where we discussed this proposed table of contents.

27 I do recall that we had a lot of discussion about Part 17 in the Table of Contents in exhibit 3, namely, the Review of the Wivenhoe Dam Full Supply Level. As the Full Supply Level is set by the ROP, it was my view that was outside the scope of the flood operations manual, which operates separately to the ROP. Ultimately, a Part about the impacts on the procedures in the manual of any proposed review of FSL was included in the Flood Report (see Part 17 of the Flood Report of 22 March 2011.)

### **The Ultimate Ownership of the Flood Report**

28 Under section 2.9 of the W&S Manual, Seqwater are required to prepare a report after each Flood Event and forward the report to the Chief Executive within six weeks of the completion of the Flood Event. Whilst all Flood Engineers were involved in the preparation and drafting or review of the Flood Report, it is ultimately Seqwater's Flood Report. Because John Tibaldi and Terry Malone were both Seqwater employees, and neither I nor John Ruffini were, John Tibaldi and Terry Malone took a more active role in drafting and reviewing the Flood Report.

29 As is stated at paragraph 154 of my first statement, I considered that the Flood Report was an accurate record of the January 2011 Flood Event.

30 The Requirement issued to me by the Commission of Inquiry requires information on 4 specific Parts of the Flood Report, namely:

- (a) Part 1 Executive Summary;
- (b) Part 2 Flood Event Summary;
- (c) Part 10 Flood Management Strategies and Manual Compliance;
- (d) Part 19 Report Conclusions.

### **Part 1 Executive Summary**

31 From my recollection, the principal author of the Executive Summary was John Tibaldi.

32 I reviewed a draft of the Executive Summary. I made handwritten comments on the draft that I reviewed. The notation that I have made indicates that I reviewed the document at 14:00 hours on 7 February 2011. **Exhibit 4 to this statement** is a copy of my handwritten comments on the Executive Summary.

33 **Exhibit 5 to this statement** is a copy of what I believe is an earlier version of the Executive Summary. I have not made any notations on that draft and I cannot recall making any comments on it.

34 I don't believe I drafted any of the paragraphs in the Executive Summary.

35 I did participate in various reviews of the Executive Summary. The process that would generally be adopted was that John Tibaldi would issue a draft which we would all review and then pass our comments back to John Tibaldi to consider. After searching my documents, I don't believe that I have a copy of any other drafts of the Executive Summary.

36 I don't recall precisely the comments or corrections that I suggested in detail.

37 The particular issues that I remember discussing with John Tibaldi was to ensure that the Executive Summary gave a good account of the magnitude of the Flood Event and its relativity, provided a brief but sufficient description of the flood at each of the dams, and adequately explained complicated matters in a way that could be understood by people without experience in the operation of a flood mitigation dam.

38 One particular issue that I do recall discussing with John Tibaldi was the use of the phrase "extremely large" in describing the magnitude of the Flood Event in the draft of the Executive Summary as appears in exhibit 4 to this statement. In the final version of the Flood Report, the description is given as a "large (Annual Exceedance Probability AEP of 1 in 100) to rare (AEP of 1 in 2,000 years) event". I had a concern with the use of the words "extremely large" as in hydrologic terminology, "extreme" has a technical meaning, namely the PMF (probable maximum flood). John Tibaldi and I discussed that in layman's terms, the Flood Event could be characterised as "extremely large", but we decided to adopt the industry practice. I recall that we discussed this on a number of occasions. I also recall discussing this with Terry Malone and John Ruffini.

39 I recall we also discussed the order of paragraphs, but I cannot now recall what those changes were.

40 I also made typographical corrections to various drafts, although I no longer have any of these other than those exhibited to this statement.

## **Part 2 Flood Event Summary**

41 The principal author of Part 2 Flood Event Summary was John Tibaldi.

42 I recall receiving a copy of a very early version of the table in Part 2. **Exhibit 6 to this statement** is a copy of that document. I made some handwritten notes on the document referencing model runs and the results out of those model runs. The purpose of being provided with this document by John Tibaldi was to have an early version of the table to workshop how it would be set out and the sort of information that should be included. The notes that I made on the table were for my own benefit so that I could provide feedback to John Tibaldi on the sort of information that should be included in the table.

43 I also reviewed a subsequent draft Part 2. **Exhibit 7 to this statement** is a copy of that document. I have made a handwritten notation of 13:45 on 2/2/11, and I believe this refers to the date and time that I received the document. In that document I made some handwritten amendments. In reviewing this draft, I recall that I had paid particular attention to the data and I spent a lot of time cross checking the data in the draft against our models and captured data. Transposing such a large amount of data and presenting it in a way that can be easily digested is a very difficult task.

44 I also have in my possession another draft of Part 2. **Exhibit 8 to this statement is a copy of that document.** I believe that this draft came from the technical writer (a formatter) with notes down the side with suggested formatting or typographical changes for review. I do recall looking at this document, but I don't recall having any comments to make regarding the formatting changes that were being suggested. I believe that some of the information that was contained in this draft dealing with forecasts was moved to Part 6.2 of the Flood Report.

45 **Exhibit 9 to this statement** is a copy of a draft of the text in Part 2 of the Flood Report. I note that the text in this draft provides a little more information than what is contained in the final Flood Report. I don't recall making those changes, and I am not sure who did.



46 I have also exhibited the electronic version of a draft of this Part in Folder 4 contained in the compact disc at exhibit 2 to this statement.

47 I do not recall or have in my possession any other drafts of Part 2 of the Flood Report, and I do not believe that I was involved in any other reviews of this Part.

#### **Part 10 – Flood Management Strategies and Manual Compliance**

48 I think that John Tibaldi was the person who drafted this Part of the Flood Report, but I cannot be sure. I know that it was not me, and I am sure that it was not John Ruffini.

49 I do recall making comments on this Part, although I do not have any drafts of Part 10 in my possession. The first sections of this document are largely extracts from the Manual.

50 In regards to the table at 10.4.1, I do recall reviewing at least one draft of this table. I may have reviewed more than one draft but I cannot now recall. I recall making spelling corrections, and making suggestions about the order of bullet points to place them in a sequence that was easier to understand, but I cannot now recall what those were. I cannot now recall the specific content of my corrections or amendments to the drafts of this document.

51 I do recall a meeting where all four duty engineers discussed the table in Part 10. I do recall going through each period with the other Flood Engineers and checking that the data, such as release rates, lake levels, forecasts, and projected flows etc was accurately recorded. My recollection of what was discussed in this meeting centred on ensuring the accuracy of the data captured in the Part.

52 I also recall that at a very early stage in the Flood Report process, when I and the other Flood Engineers on duty were in the FOC working on the Flood Report, John Tibaldi said to me words to the effect that he realised from looking at the data that the criteria of W2 could not technically have been achieved at any stage of the Flood Event because the rates of release from Wivenhoe Dam exceeded the peak of the naturally occurring flows at Lowood and Moggill. I recall saying to John that I agreed with him about that. I cannot recall if the other Flood Engineers were involved in that discussion.

53 I have recently been shown an excel spreadsheet attached to an email from me to John Tibaldi on 15 January 2011. I believe this email was sent in preparing the ministerial briefing. A copy of the email and the excel spreadsheet is **Exhibit 10 to this statement**. I do not now recall this document. I note that the times attributed to strategies W1 to W4 coming into effect are incorrect. I can recall a meeting involving all of the engineers where we discussed those errors in attributing times in a document like the attached spreadsheet, but I can't now recall if this is the actual spreadsheet I looked at as at the time we discussed this I was looking at it on my computer screen. That information had been produced in a very short amount of time, and when the Flood Event was still ongoing. Realising those errors, they were not repeated in the Flood Report at table 10.4.1.

#### **Part 19 – Report Conclusions**

54 To the best of my recollection, John Tibaldi was the principal author of this Part.

55 I don't have any drafts of this Part of the Flood Report in my possession to the best of my knowledge.

56 I do recall reviewing the conclusions in Part 19, but I don't recall making any particular comments or suggestions. I do recall discussing with all of the other Flood Engineers when we were all together in the FOC the order of the conclusions.

#### **My Involvement regarding the Remaining Parts of the Flood Report**

57 I assisted in drafting and / or reviewing various parts of the Flood Report.

#### **Part 3 Event Mobilisation and Staffing**

58 As best as I can now recall, John Tibaldi was the principal author of Part 3.

59 I was not involved in drafting any sections of this Part, however, I did review a draft of this Part. I recall checking for accuracy table 3.4.1.

60 I cannot recall any particular comments that I made on this Part.

Part 4 Flood Event Procedures

- 61 I believe that John Tibaldi was the principal author of Part 4.
- 62 I was not involved in drafting any sections of this Part, however, I did review a draft of this Part.
- 63 I cannot recall any particular comments that I made on this Part.

Part 5 Data Collection System Performance

- 64 Terry Malone and I were the principal authors of Part 5. To the best of my recollection, I populated Tables 5.2.3, 5.2.4, 5.2.5, and 5.2.6, and I authored some of the paragraphs, although I couldn't say which ones.
- 65 I was also involved in reviewing this Part.
- 66 I cannot recall any particular comments or reviews that I undertook on this Part.

Part 6 Event Data

- 67 I believe that Terry Malone was the principal author of Part 6 Event Data,
- 68 Although I was not the principal author, I was involved in drafting various sections of this Part. From memory, I produced the images in Figures 6.3.2 to 6.3.11 and 6.3.13 and the associated text for those Figures.
- 69 I was also involved in reviewing this Part.
- 70 I cannot recall any particular comments or reviews that I undertook on this Part.

Part 7 Flood Model Validity and Performance

- 71 I was the principal author of Part 7 of the Flood Report, namely Flood Model Validity and Performance.

72 **Exhibit 11 to this statement** is a copy of a draft that I issued to each of the engineers for review with a handwritten notation of 8/2/11 at 11.00am in my handwriting. This document includes only one correction, namely a spelling mistake on the first page that I believe is my notation.

73 **Exhibit 12 to this statement** is a copy of that same draft that I received back with comments from John Ruffini.

74 I cannot now recall if John Tibaldi or Terry Malone provided me with any written comments on this draft of this Part of the Flood Report.

75 I do recall John Tibaldi providing me with verbal feedback on this Part. I don't have a precise recollection of what those comments were but I think they related to a suggestion that I expand on the discussion of how we were able to compare the model performance with the actual performance at various key locations. I note that under the heading "cases" in this Part of the Flood Report of 22 March 2011 further explanation is provided (when compared to exhibit 9 to this statement) in accordance with the suggestion I believe was made by John Tibaldi.

76 I have not been able to locate a copy of any written draft reviewed by John Tibaldi or Terry Malone.

77 Folder 5 on Exhibit 2 contains two copies of electronic versions of drafts for this Part.

#### Part 8 Preliminary Assessment of Event Magnitude

78 I believe that Terry Malone was the principal author of this Part.

79 Although I was not the principal author, I did contribute to drafting various sections of this Part. I believe I drafted Part 8.5 by populating some of the figures in table 8.5.1.

80 I recall reviewing Parts 8.10 and 8.11 but I cannot recall any particular corrections or comments I may have had.

Part 9 Dam Inflow and Flood Release Details

81 I believe that Terry Malone was the principal author of this Part.

82 I was involved in reviewing this Part but I cannot recall any particular corrections or comments I had.

Part 11 Event Communications

83 I believe that John Tibaldi was the principal author of this Part.

84 I was also involved in reviewing this Part. I cannot recall anything in particular about any corrections or comments I may have made.

Part 12 Review of Data Collection Systems

85 I believe that Terry Malone was the principal author of this Part.

86 I was also involved in reviewing this Part.

87 I cannot recall any particular comments or reviews that I undertook on this Part.

Part 13 Review of Flood Operations Centre Personnel and Staffing

88 I cannot recall whether Terry Malone or John Tibaldi was the principal author of this Part. I think it was John Tibaldi but I can't be sure.

89 I was not an author of any of this Part, but I did review it. I can recall a discussion between all four Flood Engineers where we discussed staffing strategies during the Flood Event and facilities in the FOC. I made some comments on this topic at paragraphs 138 to 140 of my first statement.

Part 14 Review of Dam Site Personnel and Staffing

90 I believe that John Tibaldi was the principal author of this Part.

91 I was involved in reviewing this Part, but I cannot recall any particular comments or corrections I may have suggested.

Part 15 Review of Flood Modelling Systems

92 Terry Malone was the principal author of this Part.

93 I was involved in reviewing this Part. I recall discussing with Terry Malone the level of detail required in this Part, namely whether we should review each and every minor aspect of the RTFM system, or provide an overall assessment, which is the approach that we decided upon.

Part 16 Review of the Manual Objectives and Strategies

94 I believe that John Tibaldi was the principal author of this Part.

95 I was involved in reviewing this Part. John Tibaldi asked me for suggestions on areas of the Manual that could be examined, and I recall that all of the Flood Engineers workshopped the topic and came up with the points reflected in the bullet points listed on page 218 of the Flood Report.

Part 17 Review of Wivenhoe Dam Full Supply Level

96 I do not know who drafted Part 17.

97 I was not involved in drafting or reviewing this Part.

Part 18 Review of Agency Interaction

98 I believe that John Tibaldi was the principal author of this Part.

99 I was not involved in drafting this Part.

100 I cannot recall if I reviewed this Part at any stage.

Part 20 Report Recommendations

- 101 I believe that John Tibaldi was the principal author of this Part.
- 102 I did not draft any aspects of this Part.
- 103 I was involved in reviewing this Part. I recall agreeing with all of the recommendations listed.

Appendix A

- 104 I believe that John Tibaldi drafted the text in Appendix A. The tables and graphs were compiled by Terry Malone. I recall discussing with Terry and John Tibaldi which models to include and there was a post event numbering of the model runs. As described in the text, some of the model runs were re-created. We discussed trying to select specific model runs that were representative of key moments in the Flood Event.

Appendix B Flood Volume Summary

- 105 Terry Malone prepared the table and the graph in Appendix B. I recall reviewing the table, but cannot recollect anything in particular about my review.

Appendix C Quantitative Precipitation Forecasts

- 106 Terry Malone prepared the summary table in this Appendix. I don't know who copied or formatted the forecast information into this Appendix.

Appendix D Catchment Rainfall

- 107 I produced figure 1 in this Appendix.
- 108 Terry Malone produced Table 1 and the remaining figures.

#### Appendix E Situation Reports

- 109 The situation reports were collated and assigned a chronological number for reference use for inclusion in the Flood Report. I cannot recall who collated the situation reports, but I believe it may have been a data collector or technical assistant.
- 110 In that process, it appears some of the situation reports were left out of the Flood Report inadvertently by the person who collated them for inclusion. I note that one of these situation reports is the 5.53pm report from Saturday 8 January 2011. By way of comment I note that I had included the complete text of this situation report in my supplementary statement dated 29 March 2011 (exhibit 18 before the Commission of Inquiry at paragraph 49).
- 111 I believe some of the other situation reports were not chronologically included in the Flood Report by the person who collated them for inclusion.
- 112 I can't recall ever checking to ensure that each situation report had been included in the Flood Report.

#### Appendix F Communication Protocol Technical Situation Reports

- 113 I am unsure who collated this Appendix of the Flood Report. The technical situation reports were collated from emails sent by Mr Rob Drury during the Flood Event.

#### Appendix G Severe Weather Warnings

- 114 I am unsure who collated this Appendix of the Flood Report from the information received from the BoM during the Flood Event.

#### Appendix H Flood Event Notification Email

- 115 I am unsure who collated this Appendix of the Flood Report.



Appendix I Flood Readiness Checklists

116 I am unsure who collated this Appendix of the Flood Report.

Appendix J Forecast Rainfall Comparison

117 Terry Malone was the principal author of this Appendix. I can recall reviewing the data in this Appendix.

Appendix K Three Day Assessments and Model Results

118 I was the principal author of this Appendix, and I produced the tables and graphs. Terry Malone produced the copy of the email for inclusion in this Appendix.

Appendix L Flood Operations Directives

119 I am unsure who collated this Appendix to the Flood Report.

Appendix M Flood Event Log

120 I believe that Chloe Cross (an administrative assistant at Seqwater) removed individual names and gate operation directives (as explained in Appendix M).

121 By way of additional comment I note the entry for 3.30pm Sunday 9 January 2011 and see that "Engineer 1" is referred to in the far right column of Appendix M. I note that this is an error and in this instance refer to Exhibit 23 before the Commission of Inquiry where for the same entry the cipher NGA is attributed to this event.

Appendix N Flood Operation Engineers Resumes

122 I drafted the section of this Appendix for Engineer 1.

Appendix O Daily and Hourly Rainfall Tables

123 Terry Malone compiled this Appendix. I reviewed the data contained in this Appendix and I cannot recall making any comment.

Appendix P Rainfall Intensity Frequency Duration

124 Terry Malone and John Ruffini prepared this Appendix. I reviewed the data contained in this Appendix and I cannot recall making any comment.

Appendix Q Recorded Height Hydrographs

125 Terry Malone produced the plots. I reviewed the data contained in this Appendix and I cannot recall making any comment.

Appendix R Ratings

126 I was the principal author of this Appendix. I extracted the information from the RTFM and plotted the information into graph form.

Appendix S Model Calibration Runs

127 I produced the tables and graphs in this Appendix from information extracted from the RTFM.

Appendix T Rainfall Station Temporal Patterns

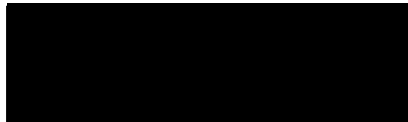
128 Terry Malone was the principal author of this Appendix. I recall reviewing the data but cannot recall making any comment.

Appendix U Wivenhoe Dam Hydrology Reports

129 I produced the list of Wivenhoe Dam hydrology reports noted in this Appendix.

AND I MAKE this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the *Oaths Act 1867*.

Affirmed and Declared at Brisbane )  
this 30th day of January 2012 in the )  
presence of: )



.....

Signature of the declarant



Solicitor

Tulani Love

Due to the large number, and size, of the annexures to this statement, it is only possible to publish those annexures specifically referenced in the Commission's Final Report.

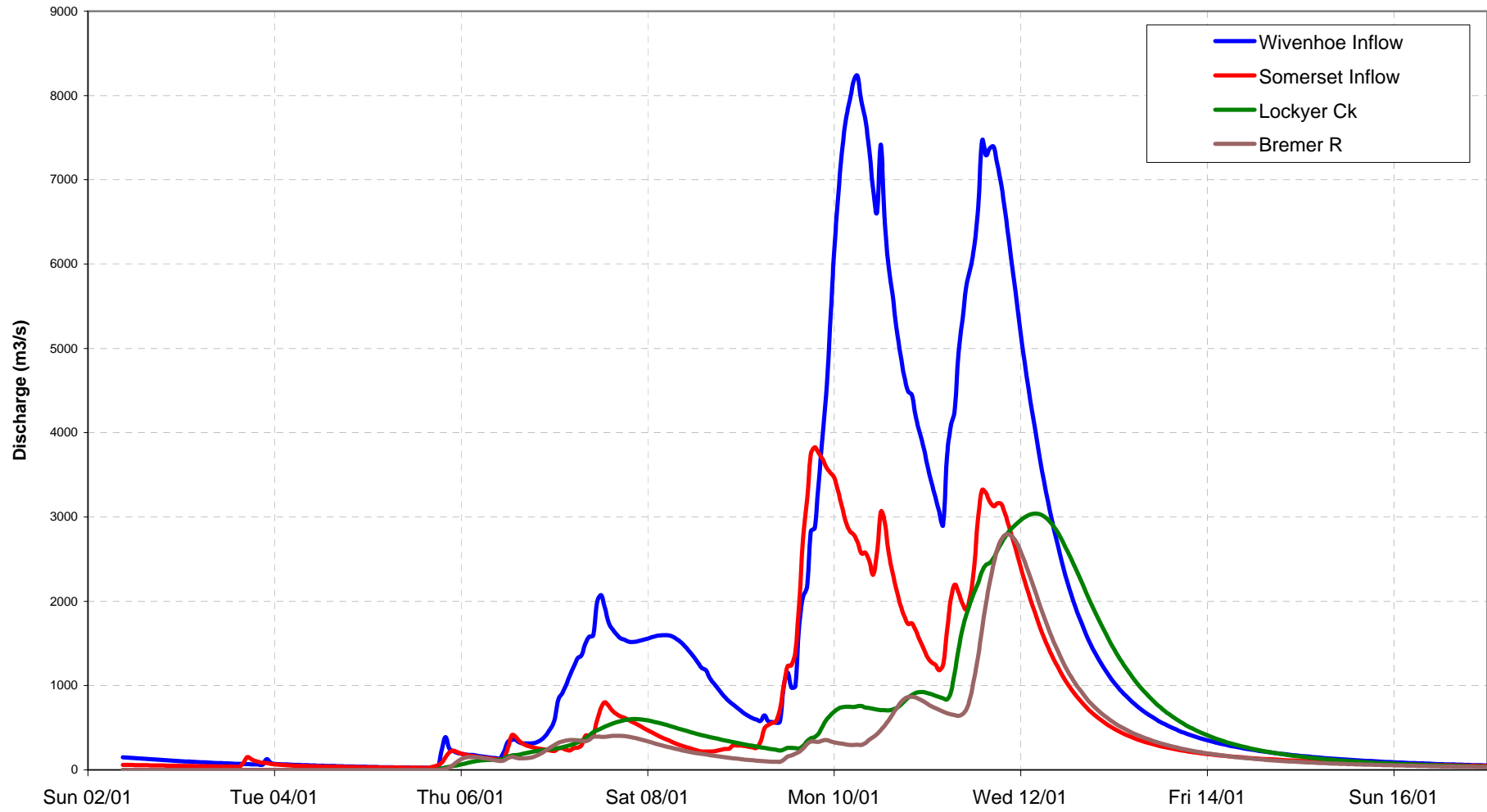
These annexures are:

Exhibit 2: Folder 7

Exhibit 6

Exhibit 7

# Brisbane R Flows



## CERTIFICATE OF EXHIBIT

**Exhibit 6** to statutory declaration of **ROBERT AYRE** affirmed and declared 30 January 2012.



Declarant



Solicitor

B:1377523\_1 NMW

**CERTIFICATE OF EXHIBIT**

**Holding Redlich**  
Level 1, 300 Queen Street  
Brisbane Q 4000  
Tel: (07) 3135 0500  
Fax: (07) 3135 0599  
Ref: TZB:11800005

| DATE/TIME            | DIRECTIVE   | DAM LEVELS   | MODEL RESULTS  | STRATEGY   |
|----------------------|---|--|--|--|
| 06 Jan 2011<br>07:42 | Event Mobilisation, currently using Strategy W1A. 24/7 staffing of the Flood Operations Centre and dams to continue until official de-mobilisation announced. | Wivenhoe Dam<br>67.31<br><br>Somerset Dam<br>99.34 | <ul style="list-style-type: none"> <li>Lake level not expected to reach 67.50 (Strategy W1B) until 07 January 2011.</li> <li>Significant inflows expected from Lockyer Creek into the Brisbane River and these inflows likely to impact on College's Crossing. (Estimate of Lockyer flows needed) <i>2.2-2.5 150 2900 41</i></li> <li>Wivenhoe Lake level forecast to peak at ?? <i>67.7 NO RELEASE</i></li> </ul>   | <b>Strategy W1A</b><br>(Lake Level greater than 67.25, maximum release 110 cumecs) <ul style="list-style-type: none"> <li>Endeavour to maintain College's Crossing trafficable by limiting combined flows from Wivenhoe Dam and Lockyer Creek to a maximum of 175 cumecs.</li> <li>Water held in Wivenhoe in an attempt to maintain College's Crossing trafficable in accordance with Strategy W1A.</li> </ul> |
| 07 Jan 2011<br>02:00 | Transition from Strategy W1A to W1B.  | Wivenhoe Dam<br>67.52<br><br>Somerset Dam<br>99.55 | <ul style="list-style-type: none"> <li>Lake level not expected to reach 67.75 (Strategy W1C) for at least six hours.</li> <li>Significant inflows expected from Lockyer Creek into the Brisbane River and these inflows likely to impact on Burton's Bridge, although there is uncertainty as to whether the Lockyer flows alone will be sufficient to inundate Burtons Bridge. (Estimate of Lockyer flows needed) <i>460 1900 7/1</i></li> <li>Wivenhoe Lake level forecast to peak at ?? <i>67.4 NO RELEASE</i></li> </ul> | <b>Strategy W1B</b><br>(Lake Level greater than 67.50, maximum release 110 cumecs) <ul style="list-style-type: none"> <li>Endeavour to maintain Burtons Bridge trafficable by limiting combined flows from Wivenhoe Dam and Lockyer Creek to a maximum of 430 cumecs.</li> <li>Water held in Wivenhoe in an attempt to maintain Burtons Bridge trafficable in accordance with Strategy W1B.</li> </ul>         |

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| 07 Jan 2011<br>07:00 | Transition from Strategy W1B to W1C. | <p>Wivenhoe Dam<br/>67.52</p> <p>Somerseset Dam<br/>99.55</p> <p><i>FORECAST</i><br/>660 m<sup>3</sup>/s<br/>1900 7/1</p> <p>60.3</p> <p>550 m<sup>3</sup>/s<br/><i>RELEASE</i></p> | <ul style="list-style-type: none"> <li>Significant inflows expected from Lockyer Creek into the Brisbane River and these inflows likely to impact on Kholo Bridge, although there is uncertainty as to whether the Lockyer flows alone will be sufficient to inundate Kholo Bridge. (Estimate of Lockyer flows needed) <i>Also flow 7/1</i></li> <li>Wivenhoe Lake level forecast to peak at ?? <i>68-4 No release</i></li> </ul> | <p>Strategy W1C<br/>(Lake Level greater than 67.75, maximum release 500 cumecs)</p> <ul style="list-style-type: none"> <li>Endeavour to maintain Kholo Bridge trafficable by limiting combined flows from Wivenhoe Dam and Lockyer Creek to a maximum of 550 cumecs.</li> <li>Water held in Wivenhoe in an attempt to maintain Kholo Bridge trafficable in accordance with Strategy W1C.</li> </ul> |
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| <p>07 Jan 2011<br/>08:30</p>  | <p>Transition from Strategy W1C to W1E. Based on rainfall on the ground, it becomes apparent that all bridges apart from the Mt Crosby Weir Bridge and Fernvale Bridge will be flooded by Lockyer Creek flows alone.</p> | <p>Wivenhoe Dam<br/>67.52<br/>Somerset Dam<br/>99.79</p> | <ul style="list-style-type: none"> <li>• Significant inflows expected from Lockyer Creek into the Brisbane River and these will be sufficient to inundate all bridges downstream of the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge. (Estimate of Lockyer flows needed).</li> <li>• Wivenhoe Lake level forecast to peak at ??</li> </ul> | <p><b>Strategy W1C</b><br/><b>(Lake Level greater than 67.75, maximum release 500 cumecs)</b></p> <ul style="list-style-type: none"> <li>• Endeavour to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable by limiting combined flows from Wivenhoe Dam and Lockyer Creek to a maximum of 1900 cumecs.</li> <li>• Releases from Wivenhoe Dam managed in an attempt to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable in accordance with Strategy W1E.</li> </ul> |
| <ul style="list-style-type: none"> <li>• All impacted Councils are notified of situation and that releases are to be commenced from Wivenhoe Dam. Releases were delayed until 15:00 to allow bridges to be closed and arrangements to be made to cater for rural community isolation. The impacted rural communities had been isolated over the Christmas period and time was needed for suitable arrangements to be made to allow these communities to be prepared for another extended period of isolation.</li> <li>• Rainfall on the ground and rainfall forecasts did not suggest that the event was likely to approach the use of Strategy W4.</li> </ul> |  |  |   |  |

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| <p>Commenced<br/>07 Jan 2011<br/>15:00</p> <p>Completed<br/>08 Jan 2011<br/>14:00</p> | <p>Wivenhoe Directives #1 to #4.</p> <ul style="list-style-type: none"> <li>Gates opened continuously at Wivenhoe Dam for 23 hours in accordance with the standard gate opening sequence at a rate of 0.5 metres of opening per hour.</li> <li>At 14:00 on 08 January 2011, Wivenhoe discharge is 1271 cumecs. All bridges below the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge are flooded.</li> </ul> | <p>Wivenhoe Dam level rises from 68.03 to 68.61 over the 23 hour period.</p> |  |  |
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## CERTIFICATE OF EXHIBIT

Exhibit 7 to statutory declaration of **ROBERT AYRE** affirmed and declared  
30 January 2012.



Declarant



Solicitor

B:1377523\_1 NMW

**CERTIFICATE OF EXHIBIT**

**Holding Redlich**  
Level 1, 300 Queen Street  
Brisbane Q 4000  
Tel: (07) 3135 0500  
Fax: (07) 3135 0599  
Ref: TZB:11800005

Rob AIRE  
1345 2/2/11

# SIT REPORTS :- PROFORMA WITH AGREED INFO

## SUMMARY OF JANUARY 2011 FLOOD EVENT

The following series of tables provides a detailed summary of the operation of Wivenhoe and Somerset Dams during the January 2011 Flood Event that impacted on Brisbane. Each table covers a period of the event during which one of the following occurred:

- There was a transition or change to the flood operation strategy used as defined by the Manual.
- There was a period of stability during which no gate operations from either Wivenhoe Dam or Somerset Dam were directed.
- There was a period of sustained gate operations (either opening or closing) at either Wivenhoe Dam or Somerset Dam.

Each table also provides a summary of both relevant background information and a summary of the information that was used in decision making during the period covered by the table. This information includes:

- Details of the time period covered by the table.
- Relevant background information from the period leading up to and during the time period covered by the table.
- Changes in dam levels during the period.
- Rainfall information (including forecast rainfall) and model results available during the period.
- The Strategy used and/or adopted during the period.

Further reports and appendices are available to explain in detail the derivation of the technical information presented in the tables. Much of the background detail in the reports is taken from the event log.

In summary, the event was extreme with some relevant statistics that demonstrate this fact as follows:

- Catchment average rainfalls recorded for the catchment area above Wivenhoe Dam indicate rainfall intensities for the 72 hour and 120 hour periods to Tuesday 11 January 2011 at 19:00 had an annual exceedance probability of between 1 in 500 years and 1 in 1000 years.
- Point rainfalls experienced in the Wivenhoe Dam storage area experienced between 05:00 and 13:00 on Tuesday 11 January 2011 have been calculated to have an annual exceedance probability of between 1 in 500 years and 1 in 1000 years. Although this rainfall was not recorded at a single station, it is calculated to have occurred based on the extreme storage level rises experienced at Wivenhoe Dam during this period.
- The volume of total inflow into Wivenhoe Dam experienced during this event has been calculated to be in the order of 88% more that the comparable volume of inflow calculated from the January 1974 event.
- The peak inflow into Wivenhoe Dam experienced during this event has been calculated to be in the order of 50% more that the comparable peak inflow calculated from the January 1974 event.

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> 1 in 2000  
WD

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rate  
estimated  
flow rate  
GPE  
SILCO  
ADSR  
INTERACTING WETTER WATER  
LAND WATER 4 DAY

*REMOVED*

**JANUARY 2011 FLOOD EVENT - PERIOD 1 OF 20**

| DATE/TIME   | BACKGROUND   | DAM LEVELS  | RAINFALL AND MODEL RESULTS   | STRATEGY   |
|---|--|---|--|--|
| <p>Commenced Thursday 06 Jan 2011 07:42</p> <p>Completed Friday 07 Jan 2011 02:00</p> | <p>Strategy W1A and Strategy W1B; and Strategy S2</p> <ul style="list-style-type: none"> <li>No significant rainfall occurred in the 24 hours to 0900 on 5 January 2011.</li> <li>Catchment average rainfalls in the 24 hours to 0800 on 6 January 2011 were:               <ul style="list-style-type: none"> <li>Wivenhoe 25mm;</li> <li>Somerset 21mm;</li> <li>Lockyer 23mm;</li> <li>Bremer 23mm.</li> </ul> </li> <li>Event Mobilisation occurred at 7:42 on Thursday 6 January 2011, using Strategies W1A and S2.</li> <li>Once mobilisation occurs, 24/7 staffing of the Flood Operations Centre and dams continues until official de-mobilisation is announced. For this event, this occurred at 12:00 on Wednesday 19 January 2011.</li> <li>Duty Engineer called back early from annual Christmas holidays to assist with the management of the event.</li> <li>Transition from Strategy W1A to W1B once the Wivenhoe Lake Level exceeded 67.50.</li> </ul> | <p><i>REMOVED</i></p> <p>Wivenhoe Dam level rises from 67.31 to 67.52 over the 18 hour period.</p> <p>Somerset Dam level rises from 99.34 to 99.55 over the 18 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 53mm;</p> <p>Somerset 44mm;</p> <p>Lockyer 53mm;</p> <p>Bremer 54mm.</p> | <p><i>REMOVED</i></p> <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were:           <ul style="list-style-type: none"> <li>Wivenhoe 28mm;</li> <li>Somerset 23mm;</li> <li>Lockyer 30mm;</li> <li>Bremer 31mm.</li> </ul> </li> <li>Forecast rainfall is 25mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 68.2 (excluding forecast) 68.7 (including forecast).</li> <li>Somerset Lake level forecast to peak at 99.7 (excluding forecast) 100.1 (including forecast).</li> <li>Total dam inflow volume forecast is 204,000ML (excluding forecast) 343,000ML (including forecast).</li> <li>Peak flow at Lowood (excluding Wivenhoe releases) estimated at 470 cumecs (including forecast) 720 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 550 cumecs (excluding forecast) 960 cumecs (including forecast).</li> </ul> | <p>Strategy W1A and Strategy W1B; and Strategy S2<br/>(Lake Level greater than 67.25, maximum release 110 cumecs)</p> <ul style="list-style-type: none"> <li>Peak inflows into the Brisbane River from Lockyer are estimated to be in the order of 400 cumecs, but these flows will not inundate Colleges Crossing until the morning of Friday 07 January 2011.</li> <li>Lake level not expected to reach 67.50 (Strategy W1B) until Friday 7 January 2011. Lake level may not exceed 68.5.</li> <li>Endeavour to maintain College's Crossing trafficable by limiting combined flows from Wivenhoe Dam and Lockyer Creek to a maximum of 175 cumecs.</li> <li>Water held in Wivenhoe in an attempt to maintain College's Crossing trafficable in accordance with Strategy W1A. <i>more to see</i></li> <li>In accordance with Strategy S2, the crest gates at Somerset Dam were raised to enable uncontrolled discharge and the low level regulators and sluices at Somerset Dam were kept closed.</li> </ul> <p><i>neg over 50% Somersets</i></p> |

*Somersets*

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*REMOVED*

JANUARY 2011 FLOOD EVENT - PERIOD 2 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS   | RAINFALL AND MODEL RESULTS   | STRATEGY   |
|---|--|--|--|--|
| <p>Commenced<br/>Friday<br/>07 Jan 2011<br/>02:00</p> <p>Completed<br/>Friday<br/>07 Jan 2011<br/>09:00</p> | <p>Strategy W1B and Strategy S2</p> <ul style="list-style-type: none"> <li>Transition from Strategy W1A to W1B due to the Wivenhoe Lake Level exceeding 67.50.</li> <li>Transition from Strategy W1B to W1C once the Wivenhoe Lake Level exceeds 67.75.</li> </ul> | <p>Wivenhoe Dam level rises from 67.52 to 67.75 over the 7 hour period.</p> <p>Somerset Dam level rises from 99.55 to 99.65 over the 7 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 64mm;<br/>Somerset 60mm;<br/>Lockyer 57mm;<br/>Bremer 60mm.</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 11mm;</li> <li>Somerset 15mm;</li> <li>Lockyer 4mm;</li> <li>Bremer 5mm;</li> </ul> </li> <li>Forecast rainfall is 25mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 68.2 (excluding forecast) 68.5 (including forecast).</li> <li>Somerset Lake level forecast to peak at 99.7 (excluding forecast) 100.2 (including forecast).</li> <li>Total dam inflow volume forecast is 242,000ML (excluding forecast) 380,000ML (including forecast).</li> <li>Peak flow at Lowood (excluding Wivenhoe releases) estimated at 470 cumecs (excluding forecast) 670 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 570 cumecs (excluding forecast) 970 cumecs (including forecast).</li> </ul> | <p>Strategy W1B and Strategy S2 (Lake level greater than 67.50, maximum release 110 cumecs)</p> <ul style="list-style-type: none"> <li>Peak inflows into the Brisbane River from Lockyer are estimated to be in the order of 500 cumecs, but these flows may not be sufficient to inundate Burtons Bridge.</li> <li>Lake level not expected to reach 67.75 (Strategy W1C) for at least 6 hours. Lake level may not exceed 68.5.</li> <li>Endeavour to maintain Burtons Bridge trafficable by limiting combined flows from Wivenhoe Dam and Lockyer Creek to a maximum of 430 cumecs.</li> <li>Water held in Wivenhoe in an attempt to maintain Burtons Bridge trafficable in accordance with Strategy W1B.</li> <li>In accordance with Strategy S2, the crest gates at Somerset Dam were raised to enable uncontrolled discharge and the low level regulators and sluices at Somerset Dam were kept closed.</li> </ul> <p><i>ACT 50%</i></p> |

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JANUARY 2011 FLOOD EVENT - PERIOD 3 OF 20

| DATE/TIME   | BACKGROUND  | DAM LEVELS   | RAINFALL AND MODEL RESULTS   | STRATEGY  |
|---|---|--|--|---|
| <p>Commenced Friday 07 Jan 2011 09:00</p> <p>Completed Friday 07 Jan 2011 15:00</p> | <p>Strategy W1C and Strategy S2</p> <ul style="list-style-type: none"> <li>At around 9:00 it becomes apparent that flows from Lockyer Creek into the Brisbane River combined with local Brisbane River inflows downstream of Wivenhoe will be sufficient to inundate all bridges downstream of the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge.</li> <li>All impacted Councils are notified of situation and that releases are to be commenced from Wivenhoe Dam. Release commencement was delayed until 15:00 to allow bridges to be closed and arrangements to be made to cater for rural community isolation. The impacted rural communities had been isolated over the Christmas period and time was needed for suitable arrangements to be made to allow these communities to be prepared for another potentially extended period of isolation. The delay in releases was also in accordance with the Manual requirements of maintaining Burtons Bridge and Kholo Bridge trafficable when operating under Strategy W1C.</li> <li>Transition from Strategy W1C to Strategy W1D once the Wivenhoe Dam lake level exceeds 68.0</li> </ul> | <p>Wivenhoe Dam level rises from 67.75 to 68.03 over the 6 hour period.</p> <p>Somerset Dam level rises from 99.65 to 99.94 over the 6 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 89mm;<br/>Somerset 90mm;<br/>Lockyer 71mm;<br/>Bremer 74mm;</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were:               <ul style="list-style-type: none"> <li>Wivenhoe 24mm;</li> <li>Somerset 30mm;</li> <li>Lockyer 14mm;</li> <li>Bremer 12mm;</li> </ul> </li> <li>Forecast rainfall is 25mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 68.4 (excluding forecast) 68.9 (including forecast).</li> <li>Somerset Lake level forecast to peak at 100.3 (excluding forecast) 100.6 (including forecast).</li> <li>Total dam inflow volume forecast is 346,000ML (excluding forecast) 483,000ML (including forecast).</li> <li>Peak flow at Lowood (excluding Wivenhoe releases) estimated at 530 cumecs (excluding forecast) 710 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 660 cumecs (excluding forecast) 1040 cumecs (including forecast).</li> </ul> | <p>Strategy W1C (Lake level greater than 68.00, maximum release 1900 cumecs)</p> <ul style="list-style-type: none"> <li>Due to the further rain and observed stream rises, it has become apparent that flows from Lockyer Creek into the Brisbane River combined with local Brisbane River inflows downstream of Wivenhoe will be sufficient to inundate all bridges downstream of the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge.</li> <li>Releases from Wivenhoe Dam managed in an attempt to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable in accordance with Strategies W1D and W1E.</li> <li>In accordance with Strategy S2, the crest gates at Somerset Dam were raised to enable uncontrolled discharge and the low level regulators and sluices at Somerset Dam were kept closed.</li> </ul> <p style="text-align: right;"><i>RES 501</i></p> |

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| DATE/TIME  | BACKGROUND   | DAM LEVELS  | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|--|--|---|---|---|
| <p>JANUARY 2011 FLOOD EVENT - PERIOD 4 OF 20</p> <p>Commenced Friday 07 Jan 2011 15:00</p> <p>Completed Saturday 08 Jan 2011 14:00</p> | <p>Transition from Strategy W1D to W1E to W3; and Strategy S2 Wivenhoe Directives #1 to #4. Somerset Directives #1 to #3.</p> <ul style="list-style-type: none"> <li>Gates opened continuously at Wivenhoe Dam for 23 hours in accordance with the standard gate opening sequence at a rate of 0.5 metres of opening per hour.</li> <li>Transition from Strategy W1D to W1E once the Wivenhoe Dam level exceeds 68.25 (22:00 on 7 Jan 2011).</li> <li>Transition from Strategy W1E to W2 once it becomes apparent that the Wivenhoe Dam level exceeds 68.50 (08:00 on 8 Jan 2011). However it was not possible to meet the intent of Strategy W2 by limiting the flow in the Brisbane River to less than the naturally occurring peaks at Lowood and Moggill. This is because the calculated naturally occurring peaks at Lowood and Moggill were 530 cumecs and 800 cumecs respectively, whereas the release rate from the dam was already 940 cumecs. Accordingly Strategy W2 was bypassed and Strategy W3 was adopted for use at 08:00 on Saturday 8 January 2011.</li> <li>At 14:00 on 08 January 2011, Wivenhoe discharge is 1239 cumecs. All rural bridges below the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge are flooded.</li> </ul> | <p>Wivenhoe Dam level rises from 68.03 to 68.61 over the 23 hour period.</p> <p>Somerset Dam level rises from 99.94 to 100.44 over the 23 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 92mm<br/>Somerset 95mm<br/>Lockyer 72mm<br/>Bremer 72mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 3mm;</li> <li>Somerset 5mm;</li> <li>Lockyer 1mm;</li> <li>Bremer 1mm;</li> </ul> </li> <li>Forecast rainfall is 40mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 68.7 (excluding forecast) 69.1 (including forecast).</li> <li>Somerset Lake level forecast to peak at 100.5 (excluding forecast) 100.6 (including forecast).</li> <li>Total dam inflow volume forecast is 420,000ML (excluding forecast) 500,000ML (including forecast).</li> <li>Peak flow at Lowood (excluding Wivenhoe releases) estimated at 530 cumecs (including forecast) 530 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 770 cumecs (excluding forecast) 940 cumecs (including forecast). This peak was calculated to already have occurred at 05:00 on 8 January 2011.</li> <li>Predicted peak Wivenhoe Dam outflow was 1480 cumecs (excluding forecast) 1540 cumecs (including forecast). This is significantly greater than the calculated natural peak that excluded Wivenhoe releases.</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Inflows from Lockyer Creek into the Brisbane River have inundated all bridges downstream of the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge.</li> <li>The Strategy transitions from W1 to W3 once it becomes apparent that the Wivenhoe Dam level is likely to exceed 68.5 and Strategy W2 cannot be applied.</li> <li>Strategy W3 requires the flow at Moggill to be lowered to 4000 cumecs as soon as possible after the naturally occurring peak at Moggill (excluding Wivenhoe releases). This was already achieved.</li> <li>Strategy W3 also requires consideration of lower level Manual objectives. Therefore consideration during this period was given to minimizing disruption to downstream rural life and endeavoring to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable.</li> <li>Due to rainfall on the ground, it was apparent that the Somerset Dam level would exceed 100.45. Flooded Accordingly two sluice gates were opened during this period to allow dam levels to move towards the Wivenhoe/Somerset Operations Target Line in accordance with Strategy S2.</li> </ul> |



JANUARY 2011 FLOOD EVENT - PERIOD 5 OF 20

| DATE/TIME   | BACKGROUND  | DAM LEVELS  | RAINFALL AND MODEL RESULTS  | STRATEGY   |
|---|---|---|---|--|
| <p>Commenced Saturday 08 Jan 2011 14:00</p> <p>Completed Sunday 09 Jan 2011 01:00</p> | <p>Strategy W3 and Strategy S2</p> <ul style="list-style-type: none"> <li>Releases maintained from both dams to maintain Mt Crosby Weir Bridge and Fernvale Bridge (2.2m) trafficable.</li> <li>No change to gate settings over this period. Wivenhoe discharge is 1240 cumecs. All rural bridges below the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge are flooded.</li> </ul> | <p>Wivenhoe Dam level rises very slightly from 68.61 to 68.63 over the 13 hour period.</p> <p>Somerset Dam level falls from 100.44 to 100.32 over the 13 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 100mm<br/>Somerset 11mm<br/>Lockyer 7.5mm<br/>Bremer 7.5mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 8mm;</li> <li>Somerset 16mm;</li> <li>Lockyer 3mm;</li> <li>Bremer 2mm;</li> </ul> </li> <li>Forecast rainfall is 40mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 68.7 (excluding forecast) 68.9 (including forecast).</li> <li>Somerset Lake level forecast to peak at 100.5 (excluding forecast) 100.6 (including forecast).</li> <li>Total dam inflow volume forecast is 457,000ML (excluding forecast) 547,000ML (including forecast).</li> <li>Peak flow at Lowwood (excluding Wivenhoe releases) estimated at 530 cumecs (excluding forecast) 530 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 770 cumecs (excluding forecast) 840 cumecs (including forecast). This peak was calculated to already have occurred at 05:00 on 8 January 2011.</li> <li>Predicted peak Wivenhoe Dam outflow was 1480 cumecs (excluding forecast) 1520 cumecs (including forecast). This is significantly greater than the calculated natural peak that excluded Wivenhoe releases.</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Strategy W3 requires the flow at Moggill to be lowered to 4000 cumecs as soon as possible after the naturally occurring peak at Moggill (excluding Wivenhoe releases). This was already achieved.</li> <li>Strategy W3 also requires consideration of lower level Manual objectives. Therefore with lake levels rising slightly (Wivenhoe) and falling (Somerset) consideration during this period remained on minimizing disruption to downstream rural life and endeavoring to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable.</li> <li>With the Somersset Lake Dam Level still expected to exceed 100.45 and the level in Wivenhoe remaining relatively static, releases from Somersset Dam continued. In any event, closing of the sluices would have resulted in dam levels quickly moving under the Wivenhoe/Somersset Operations Target Line requiring sluice re-opening within a short period.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 6 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS  | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|--|---|---|---|
| <p>Commenced Sunday 09 Jan 2011 01:00</p> <p>Completed Sunday 09 Jan 2011 08:00</p> | <p>Strategy W3 and Strategy S2 Wivenhoe Directives #5 to #7.</p> <ul style="list-style-type: none"> <li>Releases increased marginally from Wivenhoe Dam to account for the passing of the Lockyer peak while maintaining Mt Crosby Weir Bridge and Fernvale Bridge trafficable.</li> <li>Wivenhoe discharge increased from 1240 cumecs to 1334 cumecs.</li> <li>No change to Somerset Dam gate settings over this period.</li> <li>All rural bridges below the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge are flooded.</li> </ul> | <p>Wivenhoe Dam level falls from 68.63 to 68.56 over the 7 hour period.</p> <p>Somerset Dam level falls from 100.32 to 100.28 over the 7 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 112mm<br/>Somerset 146mm<br/>Lockyer 76mm<br/>Bremer 75mm.</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were:                             <ul style="list-style-type: none"> <li>Wivenhoe 12mm;</li> <li>Somerset 36mm;</li> <li>Lockyer 1mm;</li> <li>Bremer 0mm.</li> </ul> </li> <li>Forecast rainfall is 40mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 68.7 (excluding forecast) 69.3 (including forecast).</li> <li>Somerset Lake level forecast to peak at 100.5 (excluding forecast) 101.0 (including forecast).</li> <li>Total dam inflow volume forecast is 569,000ML (excluding forecast) 614,000ML (including forecast).</li> <li>Peak flow at Lowood (excluding Wivenhoe releases) estimated at 530 cumecs (excluding forecast) 530 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 770 cumecs (excluding forecast) 780 cumecs (including forecast). This peak was calculated to already have occurred at 05:00 on 8 January 2011.</li> <li>Predicted peak Wivenhoe Dam outflow was 1500 cumecs (excluding forecast) 1550 cumecs (including forecast). This is significantly greater than the calculated natural peak that excluded Wivenhoe releases.</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Strategy W3 requires the flow at Moggill to be lowered to 4000 cumecs as soon as possible after the naturally occurring peak at Moggill (excluding Wivenhoe releases). This was already achieved.</li> <li>Strategy W3 also requires consideration of lower level Manual objectives. Therefore with lake levels falling at both dams, consideration during this period remained on minimizing disruption to downstream rural life and endeavoring to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable.</li> <li>With the Somerset Lake Dam Level still expected to exceed 100.45 and the level in Wivenhoe Dam falling, releases from Somerset Dam continued. In any event, closing of the sluices would have resulted in dam levels quickly moving under the Wivenhoe/Somerset Operations Target Line requiring sluice re-opening within a short period, particularly given the rainfall that occurred in the Somerset Dam catchment during this period.</li> </ul> |

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| JANUARY 2011 FLOOD EVENT - PERIOD 7 OF 20   |   |  |  |  |
|---|---|--|--|--|
| DATE/TIME   | BACKGROUND  | DAM LEVELS   | RAINFALL AND MODEL RESULTS   | STRATEGY   |
| <p>Commenced Sunday 09 Jan 2011 08:00</p> <p>Completed Sunday 09 Jan 2011 14:00</p> | <p>Strategy W3 and Strategy S2 Wivenhoe Directives #7. Somerset Directives #4 to #5.</p> <ul style="list-style-type: none"> <li>Releases increased marginally from Wivenhoe Dam to account for the passing of the Lockyer peak while maintaining Mt Crosby Weir Bridge and Fernvale Bridge trafficable.</li> <li>Wivenhoe discharge increased from 1334 cumecs to 1386 cumecs.</li> <li>Somerset Dam sluice gates opened progressively over this period to allow dam levels to move towards the Wivenhoe/Somerset Operations Target Line in accordance with Strategy S2.</li> <li>All rural bridges below the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge are flooded.</li> </ul> | <p>Wivenhoe Dam level rises very slightly from 68.56 to 68.58 over the 6 hour period.</p> <p>Somerset Dam level rises from 100.28 to 100.47 over the 6 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 146mm<br/>Somerset 199mm<br/>Lockyer 94mm<br/>Bremer 90mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were:               <ul style="list-style-type: none"> <li>Wivenhoe 34mm;</li> <li>Somerset 53mm;</li> <li>Lockyer 18mm;</li> <li>Bremer 15mm.</li> </ul> </li> <li>Forecast rainfall is 50mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 70.0 (excluding forecast) 71.3 (including forecast).</li> <li>Somerset Lake level forecast to peak at 100.7 (excluding forecast) 101.1 (including forecast).</li> <li>Total dam inflow volume forecast is 804,000ML (excluding forecast) 780,000ML (including forecast).</li> <li>Peak flow at Lowood (excluding Wivenhoe releases) estimated at 530 cumecs (excluding forecast) 690 cumecs (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 770 cumecs (excluding forecast) 1210 cumecs (including forecast). This peak was calculated to already have occurred at 05:00 on 8 January 2011.</li> <li>Predicted peak Wivenhoe Dam outflow was 1490 cumecs (excluding forecast) 1560 cumecs (including forecast). This is significantly greater than the calculated natural peak that excluded Wivenhoe releases.</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>With lake levels rising at both dams and heavy rain being experienced in the dam catchments, consideration is given to transitioning the operation to downstream rural life to protecting urban areas from inundation.</li> <li>Model results also showing likely rises in water levels in the dams provides further justification to consider transitioning to Strategy W3 within the next 6 hours.</li> <li>Using the BOM interactive-Medell, a three day assessment shows the lower limit of three day-forecast inflow to be similar to the October 2010 event, with the upper limit similar to the February 1999 event. Therefore, during this period consideration remained on minimizing disruption to downstream rural life and endeavoring to maintain Mt Crosby Weir Bridge and Fernvale Bridge trafficable.</li> <li>With dam levels under the Wivenhoe/Somerset Operations Target Line at the end of this period, releases continued from Somerset Dam.</li> </ul> |

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JANUARY 2011 FLOOD EVENT - PERIOD 8 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS   | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|--|--|---|---|
| <p>Commenced Sunday 09 Jan 2011 14:00</p> <p>Completed Sunday 09 Jan 2011 19:00</p> | <p>Strategy W3 and Strategy S2</p> <ul style="list-style-type: none"> <li>During this period releases continued from both dams at a level that maintained Mt Crosby Weir Bridge and Fernvale Bridge trafficable. Gate settings were unchanged and the Wivenhoe discharge was 1411 cumecs.</li> <li>Due to rainfall on the ground and the modeled rapid lake level rises, a decision is made to transition to focus on protecting urban areas from inundation at 19:00.</li> <li>Councils and the Seqwater CEO were notified of the decision soon after 19:00. The ramifications of the decision were that the new estimated peak flow at Moggill of 3300 cumecs would impact properties and commence to cause damage in the urban areas of Brisbane. Damage tables supplied by the Brisbane City Council indicated that at flows of 3000 cumecs, damage costs would exceed \$5M and 2600 properties would be impacted in some way. These impacts rise steeply as flows increase, so the focus was on minimizing the flow at Moggill.</li> <li>A decision is also made at 19:00, that because of the serious nature of the event, the Flood Operations Centre will be staffed with at least two Duty Engineers at all times until at least the peak of the event has occurred.</li> </ul> | <p>Wivenhoe Dam level rises from 68.58 to 68.97 over the 5 hour period.</p> <p>Somerset Dam level rises from 100.47 to 101.43 over the 5 hour period.</p> <p>Total rainfall since commencement event (including the current period):</p> <p>Wivenhoe 208mm</p> <p>Somerset 305mm</p> <p>Lockyer 116mm</p> <p>Bremer 96mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 62mm</li> <li>Somerset 106mm</li> <li>Lockyer 22mm</li> <li>Bremer 6mm</li> </ul> </li> <li>Forecast rainfall is 65mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 72.1 (excluding forecast) 73.9 (including forecast).</li> <li>Somerset Lake level forecast to peak at 102.3 (excluding forecast) 103.0 (including forecast).</li> <li>Total dam inflow volume forecast is 1,272,000ML (excluding forecast) 1,712,000ML (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 770 cumecs (excluding forecast) 1940 cumecs (including forecast). This peak was calculated to already have occurred at 05:00 on 8 January 2011.</li> <li>Peak flow at Moggill (including Wivenhoe releases) estimated at 3300 cumecs (excluding forecast) 4400 cumecs (including forecast).</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>With lake levels continuing to rise at both dams combined with heavy rain in the dam catchments during this period, the decision was made at the end of this period to longer consider minimizing disruption to downstream rural life and to focus on protecting urban areas from inundation.</li> <li>Towards the end of this period, it was also starting to become apparent that Moggill was likely to experience a second naturally occurring peak on 10 January 2011 or later and that the Manual required the flow at Moggill to be minimized prior to this peak occurring. This requirement was competing with the need to protect urban areas by not allowing the Wivenhoe Dam level to reach a level that invoked Strategy W4. After considering these issues it was decided that the best course of action would be to increase releases as quickly as possible to the limit of non-damaging flows at Moggill. However before this could occur, Councils needed to be advised, bridges needed to be closed and actions needed to be taken to prepare for rural communities for isolation and Brisbane for river flows approaching 3500 cumecs.</li> <li>With dam levels under the Wivenhoe/Somerset Operations Target Line during this period, releases continued from Somersset Dam.</li> </ul> |

**JANUARY 2011 FLOOD EVENT - PERIOD 9 OF 20**

| DATE/TIME   | BACKGROUND   | DAM LEVELS   | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|--|--|---|---|
| <p>Commenced Sunday 09 Jan 2011 19:00</p> <p>Completed Monday 10 Jan 2011 01:00</p> | <p>Strategy W3 and Strategy S2</p> <ul style="list-style-type: none"> <li>Council and Agency notifications commenced at 7:00pm. The likely peak flow at Moggill of over 3000 cumecs was communicated to the Brisbane City Council and the Seqwater CEO.</li> <li>Damage tables supplied by the Brisbane City Council indicated that at flows of 3000 cumecs, damage costs would exceed \$5M and 2600 properties would be impacted in some way. These impacts rise steeply as flows increase, so the focus was on minimizing the flow at Moggill.</li> <li>Fernvale Bridge closed by police at around 01:00 on 10 January 2011 and once this was confirmed a directive was issued to increase releases from Wivenhoe Dam.</li> <li>No change to gate settings over this period due to the potential danger to the public associated with inundating Fernvale Bridge from Wivenhoe Dam outflows prior to the bridge being closed to traffic. Councils also required time to prepare for the isolation of rural communities, the onset of urban damage in Brisbane and to undertake any necessary evacuations. Wivenhoe discharge is 1473 cumecs. All rural bridges below the dam with the exception of the Mt Crosby Weir Bridge and Fernvale Bridge are flooded.</li> </ul> | <p>Wivenhoe Dam level rises from 68.97 to 69.97 over the 6 hour period.</p> <p>Somerset Dam level rises from 101.43 to 102.54 over the 6 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 232mm<br/>Somerset 343mm<br/>Lockyer 137mm<br/>Bremer 102mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 24mm;</li> <li>Somerset 38mm;</li> <li>Lockyer 14mm;</li> <li>Bremer 6mm.</li> </ul> </li> <li>Forecast rainfall is 65mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 72.9 (excluding forecast) 74.7 (including forecast).</li> <li>Somerset Lake level forecast to peak at 102.9 (excluding forecast) 103.4 (including forecast).</li> <li>Total dam inflow volume forecast is 1,468,000ML (excluding forecast) 1,922,000ML (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 820 cumecs (excluding forecast) 2000 cumecs (including forecast). This peak was calculated to occur at 16:00 on 10 January 2011.</li> <li>Peak flow at Moggill (including Wivenhoe releases) estimated at 3240 cumecs (excluding forecast) 4480 cumecs (including forecast).</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Consideration was on protecting urban areas from inundation. However before releases are increased to and above the limit of non-damaging floods at Moggill, Councils and other impacted agencies are notified so that appropriate actions can be taken including any necessary evacuations and the closure of both the Mt Crosby Weir Bridge and Fernvale Bridge.</li> <li>The Manual requires the flow at Moggill to be minimized prior to its naturally occurring peak and this requirement was balanced against the need to protect urban areas by releasing water from the dams in an attempt to keep the Wivenhoe Dam lake level below a level that will invoke Strategy W4. However the onset of increased releases did roughly coincide with the calculated naturally occurring peak at Moggill (based on a 16 hour travel time between the dam and Moggill).</li> <li>With dam levels under the Wivenhoe/Somerset Operations Target Line during this period, releases continued from Somerset Dam.</li> <li>Although there is a full awareness of the rainfall forecasts and associated potential flood impacts, the strategy is not to release flows that will cause high level urban inundation until it is certain that this cannot be avoided. Model results continue to indicate that this may be possible.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 10 OF 20

| DATE/TIME   | BACKGROUND  | DAM LEVELS   | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|---|--|---|---|
| <p>Commenced Monday 10 Jan 2011 01:00</p> <p>Completed Monday 10 Jan 2011 09:00</p> | <p>Strategy W3 and Strategy S2 Wivenhoe Directives #8 to #10.</p> <ul style="list-style-type: none"> <li>Gates opened continuously at Wivenhoe Dam for 8 hours in accordance with the standard gate opening sequence at a rate of 0.5 metres of opening per hour.</li> <li>Wivenhoe discharge is increased from 1473 cumecs to 2015 cumecs. All rural bridges below the dam are flooded.</li> <li>Further gate openings at Wivenhoe Dam were paused at 09:00 in an attempt to allow the Lockyer and Bremer peaks to pass Brisbane and to restrict Brisbane River flows at Moggill to 3500 cumecs. This was done following discussions with the Brisbane City Council that advised a flow of 3500 cumecs at Moggill will fully submerge 322 properties and impact on 7000 properties.</li> <li>No gate movements occurred at Somerset Dam during this period, with dam levels plotted under the Wivenhoe/Somerset Operations Target Line. This meant that the only gate movements allowable at Somerset under Strategy S2 would be openings and this was not done to limit further rises in Wivenhoe.</li> </ul> | <p>Wivenhoe Dam level rises from 69.97 to 71.56 over the 8 hour period.</p> <p>Somerset Dam level rises from 102.54 to 103.08 over the 8 hour period.</p> <p>Total rainfall since commencement (including the current period):</p> <p>Wivenhoe 244mm<br/>Somerset 373mm<br/>Lockyer 143mm<br/>Bremer 120mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 12mm;</li> <li>Somerset 30mm;</li> <li>Lockyer 12mm;</li> <li>Bremer 18mm.</li> </ul> </li> <li>Forecast rainfall is 65mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 72.9 (excluding forecast) 74.5 (including forecast).</li> <li>Somerset Lake level forecast to peak at 103.1 (excluding forecast) 103.5 (including forecast).</li> <li>Total dam inflow volume forecast is 1,531,000ML (excluding forecast) 1,985,000ML (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 1090 cumecs (excluding forecast) 2090 cumecs (including forecast). This peak was calculated to occur at 16:00 on 10 January 2011.</li> <li>Peak flow at Moggill (including Wivenhoe releases) estimated at 3420 cumecs (excluding forecast) 4680 cumecs (including forecast).</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Consideration on protecting urban areas from inundation and minimizing urban damage.</li> <li>Due to advice received from the Brisbane City Council that a flow of 3500 cumecs at Moggill will fully submerge 322 properties and impact on 7000 properties, an attempt is made to remain within this flow</li> <li>The Manual states that the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs and this approach was adopted. Advice received during the event from the Brisbane City Council that the upper limit of non-damaging floods was below the 4000 cumecs stated in the manual was noted and taken into account in the decision making processes.</li> <li>With dam levels under the Wivenhoe/Somerset Operations Target Line during this period, releases continued from Somerset Dam.</li> <li>Although there is a full awareness of the rainfall forecasts and associated potential flood impacts, the strategy is not to release flows that will cause high level urban inundation until it is certain that this cannot be avoided. Model results continue to indicate that this may be possible.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 11 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS   | RAINFALL AND MODEL RESULTS  | STRATEGY   |
|---|--|--|---|--|
| <p>Commenced Monday 10 Jan 2011 09:00</p> <p>Completed Monday 10 Jan 2011 15:00</p> | <p>Strategy W3 and Strategy S2</p> <ul style="list-style-type: none"> <li>No change to gate settings occurred at Wivenhoe Dam over this period. Wivenhoe discharge is 2087 cumecs. All rural bridges below the dam are flooded.</li> <li>At 15:00 the attempt to restrict Brisbane River flows at Moggill to 3500 cumecs was abandoned due to the rainfall being experienced in the dam catchments. A new target of 4000 cumecs was set in accordance with the Manual, on the basis that the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs and minimize urban damage.</li> <li>No gate movements occurred at Somerset Dam during this period, with dam levels plotting under the Wivenhoe/Somerset Operations Target Line. This meant that the only gate movements allowable at Somerset under Strategy S2 would be openings and this was not done to limit further rises in Wivenhoe.</li> </ul> | <p>Wivenhoe Dam level rises from 71.56 to 72.54 over the 6 hour period.</p> <p>Somerset Dam level rises from 103.08 to 103.43 over the 6 hour period.</p> <p>Total rainfall since commencement (including the current period):</p> <p>Wivenhoe 274mm<br/>Somerset 407mm<br/>Lockyer 169mm<br/>Bremer 149mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 34mm;</li> <li>Somerset 31mm;</li> <li>Lockyer 27mm;</li> <li>Bremer 30mm.</li> </ul> </li> <li>Forecast rainfall is 75mm in the next 24 hours.</li> <li>Wivenhoe Lake level forecast to peak at 73.6 (excluding forecast) 75.2 (including forecast) 74.2</li> <li>Somerset/Lake level forecast to peak at 103.4 (excluding forecast) 103.7 (including forecast) 106.6</li> <li>Total dam inflow volume forecast is 1,708,000ML (excluding forecast) 1,360,000ML (including forecast) 2,178,000ML</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 1500 cumecs (excluding forecast) 2570 cumecs (including forecast). This peak was calculated to occur at 20:00 on 10 January 2011.</li> <li>Peak flow at Moggill (including Wivenhoe releases) estimated at 3910 cumecs (excluding forecast) 5180 cumecs (including forecast).</li> </ul> | <p>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Consideration on protecting urban areas from inundation and minimizing urban damage.</li> <li>A decision is made at 15:00 to attempt to remain within a target flow of around 4000 cumecs at Moggill.</li> <li>The Manual states that the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs and this approach continues to be followed.</li> <li>With dam levels under the Wivenhoe/Somerset Operations Target Line during this period, releases continued from Somerset Dam.</li> <li>Although there is a full awareness of the rainfall forecasts and associated potential flood impacts, the strategy is not to release flows that will cause high level urban inundation until it is certain that this cannot be avoided. Model results continue to indicate that this may be possible.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 12 OF 20

| DATE/TIME   | BACKGROUND  | DAM LEVELS   | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|---|--|---|---|
| <p>Commenced Monday 10 Jan 2011 15:00</p> <p>Completed Monday 10 Jan 2011 20:00</p> | <p><b>Strategy W3 and Strategy S2 Wivenhoe Directive #11.</b></p> <ul style="list-style-type: none"> <li>Gates opened continuously at Wivenhoe Dam for 5 hours in accordance with the standard gate opening sequence at a rate of 1.0 metres of opening per hour.</li> <li>A target of 4000 cumecs at Moggill was set in accordance with the Manual, on the basis that the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs and minimize urban damage.</li> <li>Wivenhoe discharge is increased from 2087 cumecs to 2695 cumecs.</li> <li>Further gate openings at Wivenhoe Dam were paused at 20:00 in an attempt to allow the Lockyer and Bremer peaks to pass Brisbane and to restrict Brisbane River flows at Moggill to 4000 cumecs.</li> <li>No gate movements occurred at Somerset Dam during this period, with dam levels plotting under the Wivenhoe/Somerset Operations Target Line. This meant that the only gate movements allowable at Somerset under Strategy S2 would be openings and this was not done to limit further rises in Wivenhoe.</li> </ul> | <p>Wivenhoe Dam level rises from 72.53 to 73.06 over the 5 hour period.</p> <p>Somerset Dam level rises from 103.43 to 103.45 over the 5 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 279mm<br/>Somerset 415mm<br/>Lockyer 174mm<br/>Bremer 153mm</p> | <p>Catchment average rainfalls over this period were:</p> <ul style="list-style-type: none"> <li>Wivenhoe 4mm;</li> <li>Somerset 8mm;</li> <li>Lockyer 5mm;</li> <li>Bremer 3mm;</li> </ul> <p>Forecast rainfall is 38mm in the next 24 hours, with isolated falls to 100mm.</p> <p>Wivenhoe Lake level forecast to peak at 73.6 (excluding forecast) 74.3 (including forecast).</p> <p>Somerset Lake level forecast to peak at 103.5 (excluding forecast) 103.5 (including forecast).</p> <p>Total dam inflow volume forecast is 1,731,000ML (excluding forecast) 1,982,000ML (including forecast).</p> <p>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 1500 cumecs (excluding forecast) 1840 cumecs (including forecast). This peak was calculated to occur at 20:00 on 10 January 2011.</p> <p>Peak flow at Moggill (including Wivenhoe releases) estimated at 3980 cumecs (excluding forecast) 4470 cumecs (including forecast).</p> | <p><b>Strategy W3 and Strategy S2 (Lake Level greater than 68.50, maximum release 4000 cumecs)</b></p> <ul style="list-style-type: none"> <li>Consideration on protecting urban areas from inundation and minimizing urban damage.</li> <li>The target maximum flow at Moggill is now 4000 cumecs. The Manual states that the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs and this approach continues to be followed.</li> <li>With dam levels under the Wivenhoe/Somerset Operations Target Line during this period, releases continued from Somerset Dam.</li> <li>The reduced QPF provides justification to retain the target of 4000 cumecs at Moggill, with the Wivenhoe peak of 74.3 (including forecast) indicating that it may be possible to keep urban damage within tolerable limits. A discussion is held with the Dam Safety Regulator requesting permission to exceed a level of 74.0 in Wivenhoe for a short period without invoking Strategy W4 if the safety of the dam can be guaranteed and urban damage reduced. The Regulator agreed with this approach.</li> <li>The strategy continues to be not to release flows that will cause high level urban inundation until it is certain that this cannot be avoided. Model results continue to indicate that this may be possible.</li> </ul> |



JANUARY 2011 FLOOD EVENT - PERIOD 13 OF 20

| DATE/TIME  | BACKGROUND  | DAM LEVELS  | RAINFALL AND MODEL RESULTS  | STRATEGY   |
|--|---|---|---|--|
| <p>Commenced Monday 10 Jan 2011 20:00</p> <p>Completed Tuesday 11 Jan 2011 04:00</p> | <p><b>Strategy W3 and Strategy S2</b></p> <ul style="list-style-type: none"> <li>Gate openings at Wivenhoe Dam were paused at 20:00 in an attempt restrict Brisbane River flows at Moggill to close to 4000 cumecs. No change to gate settings occurred at Wivenhoe Dam over this period. Wivenhoe discharge is 2726 cumecs.</li> <li>A target of 4000 cumecs is set at Moggill in accordance with the Manual. According to the Manual, the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs. However BCC damage tables indicated this would still impact 5325 properties and cause damage in excess of \$47M.</li> <li>Initial advice on a flash flood originating in Lockyer headwaters received at 20:00 and considerations undertaken during this period to develop a strategy to manage these potential flows. Strategies would involve reducing outflows from Wivenhoe until the peak of the flash flood passed after these strategies were not adopted.</li> <li>During this period the plotted dam levels drifted just above the Wivenhoe/Somerset Operations Target Line. This led to a decision at 04:00 to commence closing down releases from Somerset Dam to limit further rises in Wivenhoe.</li> </ul> | <p>Wivenhoe Dam level rises from 73.06 to 73.40 over the 8 hour period.</p> <p>Somerset Dam level fell from 103.45 to 103.23 over the 8 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 323mm<br/>Somerset 437mm<br/>Lockyer 186mm<br/>Bremer 167mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 44mm;</li> <li>Somerset 22mm;</li> <li>Lockyer 12mm;</li> <li>Bremer 14mm.</li> </ul> </li> <li>Forecast rainfall is 38mm in the next 24 hours, with isolated falls to 100mm.</li> <li>Wivenhoe Lake level forecast to peak at 74.1 (excluding forecast) 74.9 (including forecast).</li> <li>Somerset Lake level forecast to peak at 103.5 (excluding forecast) 103.7 (including forecast).</li> <li>Total dam inflow volume forecast is 2,016,000ML (excluding forecast) 2,267,000ML (including forecast).</li> <li>Peak flow at Moggill (excluding Wivenhoe releases) estimated at 1500 cumecs (excluding forecast) 1810 cumecs (including forecast). This peak was calculated to occur at 20:00 on 10 January 2011.</li> <li>Peak flow at Moggill (including Wivenhoe releases) estimated at 4040 cumecs (excluding forecast) 4540 cumecs (including forecast).</li> </ul> | <p><b>Strategy W3 and Strategy S2</b><br/>(Lake Level greater than 68.50, maximum release 4000 cumecs)</p> <ul style="list-style-type: none"> <li>Consideration on protecting urban areas from inundation and minimizing urban damage. The target maximum flow at Moggill remains at 4000 cumecs. The Manual states that the intent of Strategy W3 is to limit the flow in the Brisbane River at Moggill to less than 4000 cumecs and this approach continues to be followed.</li> <li>Model results show that a peak level in the dam close to 74.0 remains possible, but is appearing increasing unlikely.</li> <li>With dam levels moving above the Wivenhoe/Somerset Operations Target Line during this period, a decision is made commence closing down releases from Somerset Dam to limit further rises in Wivenhoe.</li> <li>Although there is a full awareness of the rainfall forecasts and associated potential flood impacts, the strategy is not to release flows that will cause high level urban inundation until it is certain that this cannot be avoided. Model results continue to indicate that this may be possible, although with continued rainfall, the strategy is now being reviewed on an hour by hour basis. The discussion at 21:00 with the Dam Safety Regulator requesting permission to exceed a level of 74.0 in Wivenhoe for a short period without invoking Strategy W4 (provided the safety of the dam can be guaranteed) is also being considered carefully in view of the continued rainfall.</li> </ul> |

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| JANUARY 2011 FLOOD EVENT - PERIOD 14 OF 20  |   |  |  |  |
|---|---|--|--|--|
| DATE/TIME   | BACKGROUND  | DAM LEVELS   | RAINFALL AND MODEL RESULTS   | STRATEGY   |
| <p>Commenced<br/>Tuesday<br/>11 Jan 2011<br/>04:00</p> <p>Completed<br/>Tuesday<br/>11 Jan 2011<br/>08:00</p> | <p>Transition from Strategy W3 to Strategy W4; and Strategy S2 Wivenhoe Directive #12. Somerset Directive #6.</p> <ul style="list-style-type: none"> <li>Extreme intense rainfall (IFD curves indicate that this rainfall exceeded 1 in 500 year intensities) is experienced on lake area during this period. If the centroid of this rainfall was located east or south, it may have been possible to avoid transition to Strategy W4.</li> <li>Because this extreme intense rainfall is occurring on and close to the dam rather than in the northern areas of the dam catchment, response time is minimized and actions must be taken quickly to protect the safety of the dam. Accordingly at 08:00 a decision is made to transition to Strategy W4. Significant urban damage can now not be avoided. The Dam Safety Regulator, Seqwater CEO and the Councils are advised of this development.</li> <li>No change to gate settings occurred at Wivenhoe Dam over this period. Wivenhoe discharge is 2832 cumecs.</li> <li>During this period sluice gate openings at Somerset Dam are reduced from 5 to 2 as the plotted dam levels had drifted just above the Wivenhoe/Somerset Operations Target Line. This decision is consistent with Strategy S2.</li> </ul> | <p>Wivenhoe Dam level rises from 73.40 to 73.70 over the 4 hour period.</p> <p>Somerset Dam level rises from 103.23 to 103.46 over the 4 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 356mm;<br/>Somerset 483mm;<br/>Lockyer 240mm;<br/>Bremer 183mm.</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 33mm;</li> <li>Wivenhoe Local 78mm;</li> <li>Somerset 46mm;</li> <li>Lockyer 54mm;</li> <li>Bremer 16mm.</li> </ul> </li> <li>Forecast rainfall is 138mm in the next 24 hours, with isolated falls to 100mm.</li> <li>Wivenhoe Lake level forecast to peak at 74.5 (excluding forecast) 75.1 (including forecast).</li> <li>Somerset Lake level forecast to peak at 103.9 (excluding forecast) 104.2 (including forecast).</li> <li>Total dam inflow volume forecast is 2,210,000ML (excluding forecast) 2,460,000ML (including forecast).</li> <li>Peak flow at Moggill (including Wivenhoe releases) estimated at 5870 cumecs (excluding forecast).</li> </ul> | <p>Strategy W4 and Strategy S2 (Lake Level predicted to exceed 74.00, no maximum release rate)</p> <ul style="list-style-type: none"> <li>At 08:00, model results show that restricting the peak level in the dam close to 74.0 is no longer possible due to the high intensity rainfall experienced over this period.</li> <li>At 08:00 a decision is made to transition to Strategy W4 and the Dam Safety Regulator, Seqwater CEO and the Councils are advised of this decision. It is now apparent that significant urban damage resulting from releases from Wivenhoe Dam cannot be avoided due to the extreme intense rainfall (IFD curves indicate that this rainfall exceeded 1 in 500 year intensities) that is experienced on and close to the Wivenhoe Dam lake area during this period.</li> <li>With dam levels moving above the Wivenhoe/Somerset Operations Target Line during this period releases from Somerset Dam are closed down to limit further rises in Wivenhoe.</li> </ul> |

Make notes  
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JANUARY 2011 FLOOD EVENT - PERIOD 15 OF 20

| DATE/TIME   | BACKGROUND  | DAM LEVELS   | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|---|--|---|---|
| <p>Commenced Tuesday 11 Jan 2011 08:00</p> <p>Completed Tuesday 11 Jan 2011 13:00</p> | <p>Strategy W4 and Strategy S2 Wivenhoe Directive #12 to #14. Somerset Directive #7.</p> <ul style="list-style-type: none"> <li>Extreme intense rainfall (IFD curves indicate greater than 1 in 500 year intensities) continues on and close to the Wivenhoe Dam lake area during this period. If the centroid of this rainfall was located east or south, it may have been possible to avoid transition to Strategy W4.</li> <li>Because the (extreme) rainfall is occurring on and close to the dam rather than in the northern areas of the dam catchment, response time is minimized and actions must be taken quickly to protect the safety of the dam. Once Strategy W4 is invoked, the Manual requires the opening of gates in accordance with standard sequences until the storage level of Wivenhoe Dam begins to fall. Accordingly gates are opened continuously at Wivenhoe Dam for 5 hours in accordance with the standard gate opening sequence at an average rate of 2.0 metres of opening per hour. This increases the dam discharge from 2753 cumecs to 4250 cumecs. The threshold limit for urban damage has been exceeded and the lake level continues to rise.</li> <li>During this period sluice gate openings at Somerset Dam are closed off to limit rises in Wivenhoe in accordance with Strategy S2.</li> </ul> | <p>Wivenhoe Dam level rises from 73.70 to 74.39 over the 5 hour period.</p> <p>Somerset Dam level rises from 103.46 to 103.83 over the 5 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 382mm<br/>Somerset 570mm<br/>Lockyer 287mm<br/>Bremer 287mm</p> | <p>Catchment average rainfalls over this period were:</p> <ul style="list-style-type: none"> <li>Wivenhoe 27mm;</li> <li>Wivenhoe Local 85mm;</li> <li>Somerset 86mm;</li> <li>Lockyer 47mm;</li> <li>Bremer 55mm.</li> </ul> <p>Forecast rainfall is 400mm in the next 24 hours.</p> <p>A portion of the extreme intense rainfall in the dam catchment was falling outside of rain gauges (e.g. on the dam lake area) and this resulted in difficulties in the model being able to accurately predict lake level rises. Accordingly gauge board readings were obtained every 30 minutes during this period.</p> <p>Wivenhoe Lake level forecast to peak at 75.0 (excluding forecast) 76.2 (including forecast).</p> <p>Somerset Lake level forecast to peak at 104.8 (excluding forecast) 105.7 (including forecast).</p> <p>Total dam inflow volume forecast is 2,506,000ML (excluding forecast) 3,123,000ML (including forecast).</p> <p>Peak flow at Moggill (including Wivenhoe releases) estimated at 9180 cumecs (excluding forecast).</p> | <p>Strategy W4 and Strategy S2 (Lake Level predicted to exceed 74.00, no maximum release rate)</p> <ul style="list-style-type: none"> <li>The strategy was to protect the structural safety of the dam.</li> <li>The Manual requires actions under Strategy 4 to be that Wivenhoe gate openings are to occur in accordance with standard sequences until the storage level of Wivenhoe Dam begins to fall.</li> <li>The dam level continued to rise at 13:00. During this period, a Dam Operator was relaying Wivenhoe Dam gauge board readings to the Flood Operations Centre every 30 minutes. All four duty engineers were present in the Flood Operations Centre and decisions were being made on a half hourly basis once the gauge board readings were received.</li> <li>With dam levels above the Wivenhoe/Somerset Operations Target Line during this period releases from Somerset Dam are closed down to limit further rises in Wivenhoe.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 16 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS   | RAINFALL AND MODEL RESULTS   | STRATEGY   |
|---|--|--|--|--|
| <p>Commenced Tuesday 11 Jan 2011 13:00</p> <p>Completed Tuesday 11 Jan 2011 19:00</p> | <p>Strategy W4 and Strategy S2 Wivenhoe Directive #12 to #14.</p> <ul style="list-style-type: none"> <li>Extreme lake level rises in Wivenhoe Dam continue during this period and a severe weather warning for intense rainfall remains current (issued at 17:00). The QPF issued at 16:00 is for a catchment average rainfall of 75mm over the next 24 hours.</li> <li>Gates opened continuously at Wivenhoe Dam for 6 hours in accordance with Strategy W4 and the standard gate opening sequence at an average rate of 4.5 metres of opening per hour.</li> <li>Wivenhoe discharge is increased from 4250 cumecs to 7464 cumecs. Significant damage to urban areas in Brisbane cannot be avoided.</li> <li>No releases are made from Somerset Dam to limit increases in Wivenhoe Dam in accordance with Strategy S2.</li> </ul> | <p>Wivenhoe Dam level rises from 74.39 to 74.97 over the 6 hour period.</p> <p>Somerset Dam level rises from 103.83 to 104.60 over the 6 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <ul style="list-style-type: none"> <li>Wivenhoe 397mm;</li> <li>Somerset 610mm;</li> <li>Lockyer 325mm;</li> <li>Bremer 278mm;</li> </ul> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were:                             <ul style="list-style-type: none"> <li>Wivenhoe 15mm;</li> <li>Wivenhoe Local 35mm;</li> <li>Somerset 40mm;</li> <li>Lockyer 38mm;</li> <li>Bremer 40mm;</li> </ul> </li> <li>Forecast rainfall is 75mm in the next 24 hours (issued at 16:00) and a severe weather warning for potential intense rainfall in the dam catchment remains current. However, catchment average rainfalls for the 24 hour period commencing at 16:00 during this period were:                             <ul style="list-style-type: none"> <li>Wivenhoe 8mm;</li> <li>Wivenhoe Local 13mm;</li> <li>Somerset 19mm;</li> <li>Lockyer 9mm;</li> <li>Bremer 8mm.</li> </ul> </li> <li>A portion of the extreme intense rainfall in the dam catchment has fallen outside of rain gauges (e.g. on the dam lake area) and this resulted in difficulties in the model being able to accurately predict lake level rises.</li> <li>Wivenhoe Lake level forecast to peak at 75.0 (excluding forecast) 75.2 (including forecast).</li> <li>Somerset Lake level forecast to peak at 105.2 (excluding forecast) 105.9 (including forecast).</li> <li>Total dam inflow volume forecast is 2,659,000ML (excluding forecast) 3,289,000ML (including forecast).</li> </ul> | <p>Strategy W4 and Strategy S2 (Lake Level predicted to exceed 74.00, no maximum release rate)</p> <ul style="list-style-type: none"> <li>The strategy was to protect the structural safety of the dam.</li> <li>The Manual requires actions under Strategy 4 to be that Wivenhoe gate openings are to occur in accordance with standard sequences until the storage level of Wivenhoe Dam begins to fall.</li> <li>The lake level in both dams continued to rise during this period. A dam operator was relaying Wivenhoe Dam gauge board readings to the Flood Operations Centre every 30 minutes. All four duty engineers were present in the Flood Operations Centre and decisions were being made on a half hourly basis once the gauge board readings were received.</li> <li>With dam levels above the Wivenhoe/Somerset Operations Target Line during this period no releases from Somerset Dam are made to limit further rises in Wivenhoe.</li> <li>The water level in Wivenhoe Dam peaked at 19:00 on 11 January 2011.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 17 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS  | RAINFALL AND MODEL RESULTS  | STRATEGY  |
|---|--|---|---|---|
| <p>Commenced Tuesday 11 Jan 2011 19:00</p> <p>Completed Tuesday 11 Jan 2011 21:00</p> | <p>Strategy W4 and Strategy S2 Wivenhoe Directive #15 to #24.</p> <ul style="list-style-type: none"> <li>No change to gate settings occurred at Wivenhoe Dam over this period. Wivenhoe discharge is 7458 cumecs.</li> <li>The lake level in Wivenhoe dam stabilizes and then falls slightly at 21:00. A severe weather warning for intense rainfall remains current (issued at 17:00), but it appears from the BOM radar that the rainfall may have dissipated. On this basis a decision to commence closing down the gates to reduce urban flood impacts is taken at 21:00. This decision is potentially in contravention of the minimum gate opening settings required under Strategy W4, however it is made in an attempt to minimize urban damage in Brisbane which is an objective that must be considered under Strategy S4.</li> <li>No releases are made from Somerset Dam in accordance with Strategy S2.</li> </ul> | <p>During this 2 hours period, the lake level in Wivenhoe Dam stabilizes at 74.97 and then falls slightly to 74.95 at 21:00.</p> <p>Somerset Dam level rises from 104.60 to 104.78 over the 2 hour period.</p> <p>Total rainfall since commencement (including the current period):</p> <p>Wivenhoe 398mm;<br/>Somerset 610mm;<br/>Lockyer 326mm;<br/>Bremer 278mm.</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 1mm;</li> <li>Somerset 1mm;</li> <li>Lockyer 1mm;</li> <li>Bremer 1mm;</li> </ul> </li> <li>Forecast rainfall is 75mm in the next 24 hours and a severe weather warning for possible intense rainfall in the catchment remains current.</li> <li>A portion of the extreme intense rainfall in the dam catchment has fallen outside of rain gauges (e.g. on the dam lake area) and this continued to result in difficulties in the model being able to accurately predict lake level behaviour.</li> <li>Wivenhoe Lake level forecast to peak at 75.0 (excluding forecast) 75.2 (including forecast).</li> <li>Somerset Lake level forecast to peak at 105.2 (excluding forecast) 105.9 (including forecast).</li> <li>Total dam inflow volume forecast is 2,659,000ML (excluding forecast) 3,282,000ML (including forecast).</li> </ul> | <p>Strategy W4 and Strategy S2 (Lake Level predicted to exceed 74.00, no maximum release rate)</p> <ul style="list-style-type: none"> <li>The target was to protect the structural safety of the dam.</li> <li>The Manual requires actions under Strategy 4 to be that Wivenhoe gate openings are to occur at the minimum intervals and sequences until the storage level of Wivenhoe Dam begins to fall.</li> <li>The dam level stabilized during this period and then fell slightly at 21:00. A dam operator was relaying Wivenhoe Dam gauge board readings to the Flood Operations Centre every 30 minutes. All four duty engineers were present in the Flood Operations Centre and decisions were being made on a half hourly basis once the gauge board readings were received.</li> <li>With dam levels above the Wivenhoe/Somerset Operations Target Line during this period no releases from Somerset Dam are made to limit further rises in Wivenhoe.</li> <li>The water level in Wivenhoe Dam peaked at around 20:09 on 11 January 2011.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 18 OF 20

| DATE/TIME   | BACKGROUND   | DAM LEVELS  | RAINFALL AND MODEL RESULTS   | STRATEGY   |
|---|--|---|--|--|
| <p>Commenced Tuesday 11 Jan 2011 21:00</p> <p>Completed Wednesday 12 Jan 2011 08:00</p> | <p>Strategy W4 and Strategy S2 Wivenhoe Directive #25 to #34.</p> <ul style="list-style-type: none"> <li>During this period Wivenhoe Dam gates are closed off as quickly as possible without causing rises in lake level. These actions are taken to reduce urban flood impacts downstream. The severe weather warning for intense rainfall is cancelled at 22:00 and it appears from the BOM radar that the rainfall may have dissipated. The decision to close off the release in this way is potentially in contravention of the minimum gate opening settings required under Strategy W4, however it is made in an attempt to minimize urban damage in Brisbane which is an objective that must be considered under this Strategy.</li> <li>Gates closed continuously at Wivenhoe Dam for 11 hours in accordance with the standard gate closing sequence at an average rate of just over 3.6 metres of opening per hour.</li> <li>Wivenhoe discharge is decreased from 7464 cumecs to 2547 cumecs. All rural bridges below the dam remain flooded and significant damage to urban areas in Brisbane has not been avoided.</li> <li>No releases are made from Somerset Dam in accordance with Strategy S2.</li> </ul> | <p>Wivenhoe Dam level falls from 74.97 to 74.78 over the 11 hour period.</p> <p>Somerset Dam level rises from 104.78 to 105.11 over the 11 hour period.</p> <p>Total rainfall since commencement (including the current period):</p> <p>Wivenhoe 399mm<br/>Somerset 61.3mm<br/>Lockyer 328mm<br/>Bremer 279mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were: <ul style="list-style-type: none"> <li>Wivenhoe 1mm</li> <li>Somerset 3mm;</li> <li>Lockyer 3m;</li> <li>Bremer 1m;</li> </ul> </li> <li>Forecast rainfall is 10mm in the next 24 hours (issued Wednesday morning).</li> <li>Wivenhoe Lake level forecast to peak at 75.0 (excluding forecast) 75.0 (including forecast).</li> <li>Somerset Lake level forecast to peak at 105.1 (excluding forecast) 105.1 (including forecast).</li> <li>Total dam inflow volume forecast is 2,650,000ML (excluding forecast) 2,650,000ML (including forecast).</li> </ul> | <p>Strategy W4 and Strategy S2 (Lake Level predicted to exceed 74.00, no maximum release rate)</p> <ul style="list-style-type: none"> <li>The target was to protect the structural safety of the dam.</li> <li>The Manual requires actions under Strategy W4 to be that Wivenhoe gate openings are to occur at the minimum intervals and sequences until the storage level of Wivenhoe Dam begins to fall. Because the lake level was falling slightly, a decision was made to reduce releases from Wivenhoe Dam as quickly and to as low a level as possible, to minimize urban damage in Brisbane.</li> <li>It was calculated that reducing to a discharge of 2547 cumecs from Wivenhoe Dam would: <ul style="list-style-type: none"> <li>Not increase the downstream flood peak;</li> <li>Not cause the water level in Wivenhoe Dam to rise and;</li> <li>Allow the dam to be drained back to FSL in 7 days in accordance with the Manual.</li> </ul> </li> <li>With dam levels above the Wivenhoe/Somerset Operations Target Line during this period no releases from Somerset Dam are made to limit further rises in Wivenhoe.</li> </ul> |

JANUARY 2011 FLOOD EVENT - PERIOD 19 OF 20

| DATE/TIME  | BACKGROUND  | DAM LEVELS  | RAINFALL AND MODEL RESULTS   | STRATEGY   |
|--|---|---|--|--|
| <p>Commenced<br/>Wednesday<br/>12 Jan 2011<br/>08:00</p> <p>Completed<br/>Thursday<br/>13 Jan 2011<br/>12:00</p> | <p>Transition from Strategy W4 to the Drain Down Phase Somerset Directives #8 to #9.</p> <ul style="list-style-type: none"> <li>No change to gate settings occurred at Wivenhoe Dam over this period. Wivenhoe discharge is 2534 cumecs. All rural bridges below the dam remain flooded.</li> <li>Releases commenced from Somerset Dam during this period as the plotted dam levels fell below the Wivenhoe/Somerset Operations Target Line. These actions were undertaken in accordance with Strategy S2 and to allow the D'Aguilar Highway to be opened as soon as possible. Even though plotted dam levels later rose above the Wivenhoe/Somerset Operations Target Line during this period, releases from Somerset dam continued to allow the dam to be drained back to FSL in 7 days in accordance with the Manual.</li> </ul> | <p>Wivenhoe Dam level falls from 74.78 to 74.61 over the 28 hour period.</p> <p>Somerset Dam level falls from 105.11 to 103.96 over the 28 hour period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 401mm;<br/>Somerset 619mm;<br/>Lockyer 330mm;<br/>Bremer 280mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this period were:                             <ul style="list-style-type: none"> <li>Wivenhoe 2mm;</li> <li>Somerset 6mm;</li> <li>Lockyer 6mm;</li> <li>Bremer 6mm;</li> </ul> </li> <li>Forecast rainfalls 10mm in the next 24 hours.</li> </ul> | <p>Drain Down Phase<br/>(Stored floodwaters emptied from the dam in seven days)</p> <ul style="list-style-type: none"> <li>During this period the strategy transitioned from Strategy W4, during which the target is to protect the structural safety of the dam, to the Drain Down Phase of the event.</li> <li>Once the Drain Down Phase commenced, the target was to release stored floodwaters from the dam within seven days of the flood peak passing through the dams, while controlling downstream impacts. Considerations impacting on the duration and timing of the Drain Down Phase in this instance included:                             <ul style="list-style-type: none"> <li>Causing no increases in river levels below the dam (except where they were unavoidable due to tidal influences.</li> <li>Maintaining an adequate release rate to ensure that the temporary pumps providing water supplies to the Lowwood area could continue to operate;</li> <li>Minimizing bank slumping impacts along the river, particularly in key areas such as Coronation Drive (as requested from the Brisbane City Council);</li> <li>Re-opening the Brisbane Valley highway and key rural bridges as quickly as possible;</li> <li>Achieving full supply levels in the dams at the conclusion of the event.</li> </ul> </li> </ul> |

**JANUARY 2011 FLOOD EVENT - PERIOD 20 OF 20**

| DATE/TIME  | BACKGROUND   | DAM LEVELS  | RAINFALL AND MODEL RESULTS   | STRATEGY  |
|--|--|---|--|---|
| <p>Commenced Thursday 13 Jan 2011 12:00</p> <p>Completed Wednesday 19 Jan 2011 12:00</p> | <p><b>Drain Down Phase</b></p> <p><b>Wivenhoe Directives #35 to #62</b></p> <p><b>Somerset Directives #10 to #13.</b></p> <ul style="list-style-type: none"> <li>During this period releases from Wivenhoe Dam are increased to as the peaks from the Lockyer and Bremer subside. Downstream impacts are controlled to ensure that at no time during this phase do downstream water levels rise except if impacted by tidal influences.</li> <li>During this period, stored flood water in Somerset Dam is drained into Wivenhoe Dam in accordance with the drain down target of seven days. Importance is placed on opening the D'Aguilar Highway as soon as possible.</li> </ul> | <p>Wivenhoe Dam level falls from 74.61 to 66.89 over the 6 day period.</p> <p>Somerset Dam level falls from 103.96 to 99.00 over the 6 day period.</p> <p>Total rainfall since event commencement (including the current period):</p> <p>Wivenhoe 415mm<br/>Somerset 626mm<br/>Lockyer 357mm<br/>Bremer 288mm</p> | <ul style="list-style-type: none"> <li>Catchment average rainfalls over this six day period were:                             <ul style="list-style-type: none"> <li>Wivenhoe 14mm</li> <li>Somerset 7mm</li> <li>Lockyer 7mm</li> <li>Bremer 8mm</li> </ul> </li> </ul> | <p><b>Drain Down Phase</b></p> <p>During this period the target was to release stored floodwaters from the dam within seven days of the flood peak passing through the dams, while controlling downstream impacts. Considerations impacting on the duration and timing of the Drain Down Phase in this instance included:</p> <ul style="list-style-type: none"> <li>Causing no increases in river levels below the dam (except where they were unavoidable due to tidal influences.</li> <li>Maintaining an adequate release rate to ensure that the temporary pumps providing water supplies to the Lowwood area could continue to operate;</li> <li>Minimizing bank slumping impacts along the river, particularly in key areas such as Coronation Drive (as requested from the Brisbane City Council);</li> <li>Re-opening the Brisbane Valley highway and key rural bridges as quickly as possible;</li> <li>Achieving full supply levels in the dams at the conclusion of the event.</li> </ul> |