

QUEENSLAND FLOODS COMMISSION OF INQUIRY

SEVENTH STATEMENT OF ROBERT ARNOLD AYRE

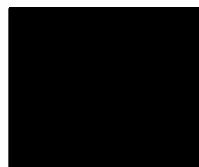
1 February 2012

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:

HOW FLOOD ENGINEERS APPLY STRATEGIES W1A -1E, W2 AND W3

1. When I determine what the gate strategy will be during my shift in the FOC I undertake an assessment of the magnitude of the event, both upstream and downstream of the dams using the RTFM. This is done on both No Rain and With Forecast considerations:-
2. I consider the following parameters:
 - Volume of floodwater in the system upstream of Wivenhoe Dam (including Somerset Dam)
 - Peak flow rates in Upper Brisbane River
 - Actual or current lake level and predicted peak lake levels
 - Current release rate
 - Naturally occurring peak flow rates at Lowood and Moggill
 - Conditions contained in strategies
3. I determine an appropriate release rate starting with an assessment of what is the minimum release I need to meet the drainage requirement of 7 days.
4. For example if the upstream flood volume is estimated to be 200,000 ML, then I will need to release at a rate of at least 330 m³/s to empty the flood storage compartment within 7 days.
5. This release rate is then adjusted up (if necessary) to satisfy the conditions that are applicable at that time, by taking into consideration the actual or predicted lake level and the naturally occurring flow rates of downstream tributary streams.



6. You cannot be in more than one strategy at a time, but you can consider more than one objective, although there is always a primary objective.
7. Strategies are defined from bottom up in terms of lake levels.
 - W1A commences at gate trigger of 67.25m AHD and progress up to 68.25m AHD for W1E. Maximum rates of release apply with each sub-strategy relating to various downstream bridge capacities. (Actual lake levels are usually used in applying W1)
 - Between predicted lake levels of 68.5m AHD and 74.0 mAHD you move to strategies W2 or W3 depending upon the relativity of the proposed release rate and the naturally occurring peak flow rates at Lowood and Moggill.
 - Maximum target flows in the Brisbane River for strategy W2 are 3,500 m³/s at Lowood and 4,000 m³/s at Moggill. Maximum release rate for W2 is 3,500 m³/s.
 - Maximum target flows in the Brisbane River for W3 are based upon naturally occurring peak flows at Moggill. Prior to the peak of the naturally occurring flow at Moggill the flow is to be minimized, whilst after the peak the flow should be lowered to 4,000 m³/s as soon as possible.
 - Maximum release rate for W3 should not exceed 4,000 m³/s.
8. All events start with the application of strategy W1 and will progress to higher level strategies based upon the magnitude of the upstream flood volumes.
9. The selection of the flow rate is made in consideration of the objectives as stated in the W&S Manual in Section 3.1. These objectives are considered from top down in order of priority. The objectives are:-
 - Ensure structural safety of the dams;
 - Provide optimum protection of urbanized areas from inundation;
 - Minimise disruption to rural life in the valleys of the Brisbane and Stanley Rivers;
 - Retain the Full Supply Level at the conclusion of the Flood Event;
 - Minimise impacts to riparian flora and fauna during the drain down phase of the flood.

W1 Releases

10. The application of strategy W1 is intended for 'freshes' or small floods that will fill the available 910,000 ML flood storage compartment of Wivenhoe Dam to less than 20% of its overall capacity. This equates to the level 68.5 m AHD.

11. Once the upstream flood volume is predicted to exceed this capacity (ie predicted lake level > 68.5 mAHD) the Duty Flood Engineer is required to focus on providing optimum protection of urbanized areas by utilizing the remaining flood storage up to 74.0m AHD. This release strategy is then labeled W2 or W3 depending upon the magnitude of the naturally occurring peak flows at Lowood and Moggill relative to the release rate at Wivenhoe Dam.

W1 to W2/W3 Threshold Level

12. I view the W1 to W2/W3 threshold level of 68.5m AHD as a 'soft' boundary that simply signifies that the event upstream of the dam is building in magnitude and alerts the Flood Engineer to be primarily focused on maximizing the protection of urban areas. The release rates may well be similar in any adopted strategy if the predicted lake levels remain near the threshold limit or indeed drops below it.
13. I note that for the period from 08:00 on Saturday 8 January 2011 until 12:00 on Sunday 9 January 2011 the lake level varied from 68.52m AHD to 68.54m AHD, a change of 20mm. The peak level attained in this period was 68.65m AHD at around 18:00 on Saturday 8 January 2011, meaning the lake level penetrated a maximum of 150mm into the available 5.5m flood mitigation compartment during this time span.

W2 'Style' Releases

14. The practical way that floods are managed by Wivenhoe Dam releases is to match the naturally occurring flow rates in Lowood or Moggill with the release rate from Wivenhoe Dam. This approach generally applies at the commencement of a flood event and whilst limiting the flow in the Brisbane River to less than the naturally occurring peaks at Lowood and Moggill.
15. Releases can be made on the rising limb of the naturally occurring flood hydrograph at Lowood, providing the release from Wivenhoe Dam is throttled to ensure the combined flow (Lockyer and Wivenhoe) does not exceed the naturally occurring peak.
16. Releases under a W2 strategy are also constrained by ensuring the flow remains within the upper limit of non-damaging flows at Lowood (3,500 m³/s).
17. For example, if the peak flow rate of the naturally occurring flood at Lowood is 500 m³/s, and this will be reached at noon on a particular day, then releases from Wivenhoe Dam will be timed to piggy back on the recession of the naturally

occurring flood. This will elongate the flood peak duration but ensure the flood peak is not exacerbated. This approach also allows the naturally occurring flood to impact (bridge closure or inundation of urban area) the downstream reach and ensures that releases from Wivenhoe Dam are not responsible for initiating the impacts.

18. This is a management technique adopted whether we are in W1 or W2. However, it will only be called a W2 strategy if the lake level is actually exceeds 68.5m AHD, otherwise it is labeled a W1 strategy.
19. However, if the volume of floodwater for an event is such that the release rate of 500 m³/s is insufficient to drain the flood storage compartment within seven days then the release rate must be increased. Provided the actual lake level is greater than 68.5m AHD this strategy is then a W3 strategy otherwise it may be labeled a W1 strategy.
20. For example, when actual lake level is above 68.5m AHD and the naturally occurring peak flow at Lowood was 500 m³/s, if I chose to release from Wivenhoe Dam 500 m³/s or less, I would be choosing to apply a W2 strategy. By choosing a release rate greater than the naturally occurring peak flow at Lowood a W3 strategy is chosen. The higher release rate chosen strikes a balance between the need to protect urban areas from inundation and the need to empty the flood storage compartment of the dam, whilst retaining its role as a flood mitigator.

W3 Releases

21. Releases made under this strategy are intended to limit the flow in the Brisbane River to less-than 4,000 m³/s, noting that according the W&S Manual this is the upper limit of non-damaging floods downstream. Based upon recent flood events in October 2010 and December 2010, a Mid-Brisbane River flow of 1,600 m³/s is considered to be the maximum flow that provides maximum protection to urban areas (or also often referred to as the flow that minimizes downstream damage).
22. The recent flood events provide a good reference point as to the sort of damage that may accrue with such a flow rate. The inundation of low-lying areas and impacts on infrastructure such as bikeways and walkways, low level bridges and closure of ferry services is now well understood.

23. Release rates under a W3 strategy are constrained by a target maximum flow in the Brisbane River that minimizes the flow at Moggill prior to the naturally occurring peak or returns the flow at Moggill to 4,000 m³/s as soon as possible.
24. The terms W1A-1E, W2, W3 and W4 are not necessarily referenced at any particular time during a flood event. What is referenced are the gate release rates, lake levels and downstream peak flow rates.
25. The Flood Engineer is focused on release rates and meeting appropriate objectives. That is why the Situation Reports, which specify the current operating strategy, do not necessarily contain reference to the strategy label of W1A-1E, W2, W3 or W4.
26. It is also recognized that agencies that receive the Situation Reports do not necessarily understand what the strategy label means as they have limited exposure to the W&S Manual. They are generally more interested in actual flow rates, flood levels and associated consequence of these flows (bridge closures and associated inundation and impacts on rural and urban communities).
27. Strategy labels are sometimes referenced in Directives issued to Dam Operators as they are aware of the significance of the labels due to their familiarity with the W&S Manual.
28. Strategy labels are generally only attributed after the event as part of the reporting process.
29. The Flood Engineer selects the strategy during the flood event by testing different release rates and then assessing the suitability of the release rates in respect of achieving objectives. The action that informs the choice of strategy is in fact the gate release rate and how that manages the lake levels and downstream flows.
30. For example, by Friday 7 January 2011, the FOC was cognizant of the need to protect urban areas from inundation evidenced by the decision to make releases greater than the naturally occurring peak at Lowood. It was only when the lake level reached 68.5m AHD as well, would W3 be formally engaged. This is why we were in transition.

HOW THESE STRATEGIES WERE COMPLIED WITH

31. Terry Malone who initiated the mobilization of the event had proposed a gate operating strategy that required the application of a 'W2 style release' at the

commencement of the event. I verbally endorsed this approach on Thursday 6 January 2011.

32. This approach entailed storing floodwaters upstream of Wivenhoe Dam until such time as the peak of the naturally occurring flood had passed Lowood. Estimates of the naturally occurring peak flow at Lowood were 470 m³/s, which was expected at 22:00 on Friday 7 January 2011. (Model Run #7).
33. This peak flow rate was of sufficient magnitude to inundate Burtons Bridge. The delay in releasing from Wivenhoe Dam provided Somerset Regional Council over a day to prepare the community for isolation.
34. Gate releases commenced at Wivenhoe Dam at 15:00 on Friday 7 January 2011.
35. When I came on shift on Saturday 8 January 2011 at 7:00 am I was provided a handover briefing from John Ruffini, who explained the current situation and proposed gate operating strategy.
36. Reference is made to the Situation Report issued at 6:32 on Saturday 8 January 2011. (No further Rainfall Model #9) and paragraphs 32 and 34 of my supplementary statement.
37. At 06:00 on Saturday 8 January 2011 Wivenhoe lake level was 68.45m AHD and rising with an estimated inflow flood volume of 380,000 ML for the event. Approximately 50,000 ML had been released overnight, so therefore we still had to manage 330,000 ML of floodwater in Wivenhoe Dam and 80,000 ML in Somerset Dam.
38. I noted that a minimum release rate of at least 680m³/s was required to meet drainage requirements within seven days, however as the current release rate was 890 m³/s we would be able to drain flood storage compartment within prescribed time at the current rate. (5.3 days).
39. Predicted peak lake level was 68.8 m AHD which is above W1 strategy range. This assumed a proposed 1,250m³/s release rate and a drainage time of around 3.8 days.
40. Based upon the actual lake level, the strategy being applied at the time was in fact W1E.

41. Naturally occurring flows at Lowood had peaked at 530 m³/s the previous night at around mid-night.
42. In accordance with Strategy W1E I could release up to a maximum of rate of 1,900 m³/s, if necessary. I note that this release rate would drain the flood storage compartment in 2.5 days and result in urban inundation downstream.
43. The associated flow in Lockyer Creek at 06:00 was 504 m³/s and falling. Therefore if I wanted to keep Mt Crosby Weir Bridge open (which is the first objective of strategy W1E), I could not release more than around 1,400 m³/s as the combined Lockyer flow and Wivenhoe release would be in excess of the bridge capacity. I recognized that this rate could increase as Lockyer Creek receded during the day.
44. I also noted that the predicted peak lake level was above the limit of application of strategy W1 and therefore I would need to transition to a higher strategy W2 or W3.
45. I noted the peak inflow in the Upper Brisbane River was 1,850 m³/s.
46. If I were to adopt a maximum release rate strategy of 1,900 m³/s, I would in effect not be operating a flood mitigation dam, but rather a flood creation dam and I would not satisfying any higher level objectives or indeed those specified in strategy W1.
47. All strategies require the Duty Engineer to consider the objectives in order of importance. All objectives need to be considered when making a decision of the release rate.
48. In selecting a target release rate of 1,250 m³/s I was cognizant of the requirement to optimize protection of urban areas from flooding as is noted in strategies W2 and W3.
49. I recognized that a release rate of 1,250 m³/s would result in a flow in the Mid-Brisbane River of 1,600 m³/s. From recent previous flood events (October 2010 and December 2010) I was aware of the impacts that flows of this magnitude would have.
50. The forecast rainfall for the next four days was significant. I was aware of the potential threat, but recognized that the threat had not yet materialized. The current QPF only indicated 20 to 30 mm to 16:00pm on Saturday 8 January 2011.
51. We do not operate on the basis of forecast rainfall, but rather use it to help inform the choice of current gate release strategy.

52. I therefore adopted the target release rate of 1,250 m³/s and issued Wivenhoe Dam Directive WD4 at around 08:15.
53. I also noted that the lake level had exceeded 68.5 mAHD at 08:00 8 January 2011 and so therefore the strategy had transitioned out of W1 and progressed to W3.
54. Later in my shift I investigated the potential threat of the forecast rainfall to determine if my adopted gate operating strategy was still appropriate.

THE PREPARATION OF THE MINISTERIAL BRIEFING NOTE ON 15 AND 16 JANUARY 2011 AND THE EMAIL ATTACHING THE SPREADSHEET AT EXHIBIT 10 OF MY 6TH STATEMENT.

55. As mentioned earlier the strategy labels are generally attributed to the gate releases after the event.
56. However, during the January 2011 flood, the Minister requested that DERM and Seqwater prepare a Ministerial Briefing Note during a teleconference held in the FOC at 14:00 on Saturday 15 January 2011. The Briefing Note was required by 17:00 on Sunday 16 January 2011.
57. It should be recognized that both Wivenhoe Dam and Somerset Dam were operational and we were still making flood releases at this time. The Flood Engineers were all fatigued after ten consecutive days of operation following on from 25 days of operation during December 2010.
58. As part of the Ministerial Briefing Note, Seqwater were requested to provide a summary of the decision making associated with the event, with a focus on the Tuesday 11 January 2011 releases.
59. The three 'off duty' Flood Engineers in association with the Dam Operations Manager from Seqwater were tasked with compiling parts of the Seqwater Report of the Briefing Note.
60. Terry Malone was the Duty Flood Engineer at the time of the teleconference. John Ruffini conducted the Saturday night shift and I operated the Sunday day shift. This left John Tibaldi and Rob Drury to compile the majority of the Report.
61. I did contribute on the Saturday evening (15 January 2011) by assisting in identifying background documents, and in particular, I examined the current Gate Operating Spreadsheets and correlated the gate operating directives with it for the day of Tuesday 11 January 2011.

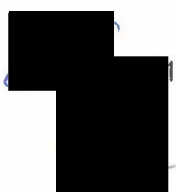
62. I recall the focus of the briefing to the Minister was on the Tuesday 11 January 2011 releases.
63. I received a draft document of the Seqwater report on my SunWater email account at around 6:45am on the morning of Sunday 16 January 2011, but I don't believe I reviewed it at that time I was just commencing my shift for the day and was undertaking a handover with John Ruffini.
64. I cannot recall if I reviewed that document during the day or even responded to John Tibaldi regarding the draft document as I was pre-occupied directing operations of the dams during the course of the day. I recall that on the Sunday morning when I was the duty engineer that the telephone communications with the Somerset Dam operators had failed, and I was occupied on re-establishing these communications and the required gate operations for the shut down sequence at Somerset to get the timing right so that the dam was retained at full supply.
65. At 14:20pm on the Sunday 16 January 2011 I recall being requested by Terry Malone to provide a summary of the flood event volumes, both daily and cumulative values, as the SEQ Water Grid Manager had asked for the information. I can recall collating the relevant data, but I cannot remember to whom I provided the information.
66. I have seen an email with a document attached that attributes strategies to certain times during the flood event. That document was attached to an email sent from the Duty Engineer email account to John Tibaldi's Seqwater email account. (Exhibit 10 to my 6th statement dated 30 January 2011). At paragraph 53 of my sixth statement of 30 January 2011 I state that I sent this email. I now believe that I did not send this email attaching the spreadsheet.
67. In relation to the spreadsheet attached to the email, I do not believe I entered the strategy references into this document. I note that there are errors in this document in relation to the attribution of times that certain strategies were being implemented.
68. In particular it indicates that a strategy of W1D was being applied at 8:00am on Saturday 8 January 2011. I know this to be incorrect as the actual lake level at this time was 68.52m AHD and strategy W1D only applies up to a level of 68.25m AHD and I was the Duty Flood Engineer on 8 January 2011.
69. It also suggests that strategy W1D was being applied at 21:53pm on Friday 7 January 2011 and again at 4:55am on Saturday 8 January 2011 when the actual

lake level was 68.26m AHD and 68.46m AHD respectively. I know this to be incorrect as strategy W1D only applies up to a level of 68.25m AHD.

70. It also suggests that strategy W1E was being applied at 01:00, 4:15, 6:15 and 10:30am on Sunday morning 9 January 2011. I know this to be incorrect as the actual lake levels at those times were, 68.63m AHD, 68.60m AHD, 68.58m AHD and 68.53m AHD respectively. I know this to be incorrect as strategy W1E only applies up to a level of 68.5m AHD.
71. It also suggests that strategy W2 was being applied from 15:30 to 16:00pm on Sunday 9 January 2011. I know this to be incorrect as strategy W2 was never implemented during this event. I note that the actual lake level at that time was about 68.70m AHD and the release rate was 1,394 m³/s. The peak flow rates of the naturally occurring flows at Lowood and Moggill (Model Run 19) was estimated to be 530 m³/s and 770 m³/s respectively. Therefore since the release rate was in excess of the naturally occurring peak flow rates at these locations although the lake level was above 68.5m AHD, W2 cannot be applied.
72. It suggests that a transition occurred between strategy W2 and W3 at 19:15pm on Sunday 9 January 2011. I know this to be incorrect as strategy W2 was never implemented during this event.
73. It suggests a strategy W3/W4 was applied at 6:12am, 8:00, 8:10, and 9:00am on Tuesday 11 January 2011. You can only be in one strategy at any time. At 6.12am the strategy was W3 and for the remaining times it was strategy W4.
74. It suggests that strategy W4A was applied at 12:00pm on Tuesday 11 January 2011. I know that this strategy was applied at this time, but it was actually implemented at 08:00am on Tuesday 11 January 2011.
75. It suggests that strategy W4A was applied at 13:00, 14:00, 14:15, 15:15, 15:30, 16:15, 16:45, 17:15, 18:00, 18:07, and 20:35pm on Tuesday 11 January 2011. I know that this strategy was applied at these times and so these entries are correct.
76. It suggests that strategy W4A/W4B was applied at 12:11, 13:55, 18:00pm on Tuesday 11 January 2011. It appears the situation reports for these entries reference the auxiliary spillway by way of mention of the fuse plugs. The reference to Strategy W4A is correct. The reference to Strategy W4B is not correct.

77. It suggests that the drainage phase of the event commenced at 21:00pm on Tuesday 11 January 2011. This entry is correct.
78. To undertake the assessment properly, you need to have information such as is provided in Appendix A – Model Data, of the Flood Event Report. Relevant model data needs to be available for specific dates and time before an attribution of strategy can be made.
79. Factors that may influence these errors include:
- Unfamiliarity of the application of strategies within the W&S Manual
 - Lack of required model data
 - Lack of first-hand knowledge of the event or periods within the event
 - Time available to complete the assessment
 - Fatigue of people involved.
80. I believe that subsequent documents were based upon this document which perpetuated the errors in some form.
81. I only became aware of this during the preparation of the Flood Event Report some weeks later. During the preparation of the Flood Event Report a more rigorous assessment of the attribution of the timing of the strategies was possible using all of the required information.

HOW THE STRATEGIES APPEAR TO HAVE BEEN INSERTED INTO THE SPREADSHEET (EXHIBIT 10 TO ROBERT AYRE'S 6TH STATEMENT)

82. The spreadsheet that I refer to at Exhibit 10 of my 6th statement is clearly wrong in the manner in which it attributes strategies to particular times.
83. It is not an accurate reflection of the Flood Event.
84. I did not create this document.
85. The times attributed to particular strategies in that document are clearly wrong.
86. I believe that this has occurred when strategies were later inserted into the document but only using the situation reports, directives and the event log.
87. I believe that this has occurred in the process of urgently preparing the ministerial briefing.
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88. This analysis has clearly been done without a full consideration of all of the relevant data such as lake levels, release rates and downstream flows.
89. The "Category" column appears to refer to how the strategy was determined for the purpose of inserting it into the table. For instance, it references either a Directive, Situation Report, or Correspondence.
90. I have analysed the times attributed to changes in strategies in that document in order to try and work out how the strategy may have been attributed. My analysis is below:

Date	Time	Category	How the change in strategy appears to have been attributed
7/1/11	12.34 PM	Directive – Strategy W1C	<p>Directive 1 is referenced in the table.</p> <p>Appendix L Directive 1 states <i>"By 21:30, Gate 3 will be open 3.5 metres and releasing approximately 400 m3/s"</i></p> <p>W1C provides that the maximum release is 500 cumecs (Page 26 of the Manual.) The lower strategy W1B has a maximum release rate of 380 cumecs.</p> <p>But, using this information in the directive alone ignores the fact the lake level had exceeded 67.75 mAHD</p>
7/1/11 8/1/11 8/1/11	9.53pm 4.55am 8.00am	Directive - Strategy W1D	<p>This is said to be the next change in strategy and for when it was in place.</p> <p>These entries reference directives 2, 3 and 4 of Appendix L.</p> <p>Directives are often sent in short sequences so that a dam operator does not have a long list of openings to perform at once and inadvertently misses one.</p> <p>The last directive in that sequence (directive 4 of Appendix L) states <i>"At the completion of these gate operations the dam will be releasing 1,247m3/s"</i></p> <p>W1D provides that the maximum release is 1900 cumecs (page 26 of the manual). The lower strategy W1C has a</p>

Date	Time	Category	How the change in strategy appears to have been attributed
			<p>maximum release rate of 500 cumecs.</p> <p>But, using this information in the directive alone ignores the fact the lake level had exceeded 68.00 m AHD</p>
9/1/11 9/1/11 9/1/11	1.00am 4.30am 10.30am	Directive - Strategy W1-E	<p>This is said to be the next change in strategy.</p> <p>These entries refer to directives 5 and 6.</p> <p>These appear to simply be the directives in between the W1D and first W2 entry.</p> <p>This ignores the fact that the lake level had exceeded 68.5m AHD</p>
9/1/11	3.30pm	Situation Report – Strategy W2	<p>This is the first reference to W2.</p> <p>This entry refers to a situation report, but I believe the information is based on the duty engineer conference.</p> <p>The notation in the log states <i>“At this stage operating at the top end of W1 and bottom end of <u>W2</u>.”</i></p> <p>The lake level had exceeded W1.</p> <p>Strategy W2 was never implemented.</p> <p>Ignores the fact that the release rates were already in excess of the naturally occurring peak at Lowood and Moggill.</p>
9/1/11	7.15pm	Correspondence – Strategy W2 – transition to W3	<p>This is the first reference to “strategy W2- transition to W3”</p> <p>The entry refers to correspondence.</p> <p>The notation of the telephone call in the log is <i>“FOC called Peter Allen advising him that FOC is now looking at much larger flows and will have to <u>ramp up releases to around 3000 cumecs</u> as by as early as midnight which is</i></p>

Date	Time	Category	How the change in strategy appears to have been attributed
			<p><i>likely to have flooding impacts on low-lying areas of Brisbane."</i></p> <p>3000 cumecs is approaching W2 maximum natural flow, even absent downstream tributaries. If releases were "around 3000" the releases combined with the natural flows would likely tip it into W3. This would persuade the author that the strategy was in transition at about that time.</p> <p>Ignores the fact that the release rates were already in excess of the naturally occurring peak at Lowood and Moggill.</p>
9/11/11	9.04pm	Situation Report – Strategy W3	<p>This is the first reference to "strategy W3"</p> <p>Situation Report 12 issued at 9.04pm Appendix E</p> <p>Under the heading "Wivenhoe Dam (Full Supply 67.00m ahd)", this situation report includes for the first time <i>"the objective for dam operators will be to minimize the impact of urban flooding in areas downstream of the dam and, at this stage, releases will be kept below 3,500 and <u>the combined flows in the lower Brisbane will be limited to 4000m3/s. This is below the limit of urban damages in the City reaches.</u>"</i></p> <p>The phrase "limit of urban damages" and the figure "4,000m3/s" are features of W3.</p>
11/1/11	6.12am	Situation Report - strategy W3 / W4	<p>This is the first reference to "strategy W3/W4"</p> <p>This entry refers to a situation report.</p> <p>Situation Report 18 at 6.12am Appendix E</p> <p>Under the heading "Wivenhoe Dam" it states <i>"At this stage, the dam will reach <u>just over 74.0m AHD</u> during Tuesday evening. <u>Above EL 74.0m AHD</u> the objective</i></p>

Date	Time	Category	How the change in strategy appears to have been attributed
			<p>for dam operations is to <u>maintain the security of the dam</u> and minimize downstream flood flows if possible."</p> <p>Something very different is in the previous situation report (situation report 17 of Appendix E, where the level referenced was below 74.0mm. "At this stage, the dam will reach about <u>73.8m</u> AHD during Tuesday. The objective for dam operations is currently <u>to minimize the impact of urban flooding</u> in areas downstream of the dam and to keep river flows in the lower Brisbane River <u>below 4,000m3/s if possible.</u>"</p>
11/1/11	12.00pm	Directive - strategy W4A	<p>This is the first reference to strategy "W4A"</p> <p>Directive 14 of Appendix L is referenced, but makes no reference to release rates or lake levels.</p> <p>On the line above, it states "strategy 4A" in the action column.</p> <p>The log of the telephone call immediately above that 11.38am states that "JT called Peter Burrows and advised that releases at Wivenhoe will be <u>ramped up to 4000 cumecs</u> and strategy will be revised on an hourly basis. In reality, releasing slightly less than the flood ops manual."</p> <p>The intent of W3 is to limit the flow at Moggill to less than 4,000 cumecs (W3 strategy in manual)</p>
11/1/11	12.11pm	Situation Report – Strategy W4A / W4B	<p>This is the first reference to W4B.</p> <p>The fuse plugs are an important feature of strategy W4</p> <p>Situation Report 19 of Appendix E issued at 12.11pm</p> <p>Refers to fuse plugs in first paragraph: "it may be that <u>fuse plug initiation</u> might provide a lower outflow than increasing the gate outflow to protect it."</p>

Date	Time	Category	How the change in strategy appears to have been attributed
			W4B was not used during the flood event.
11/1/11	1.00pm	Directive - Strategy W4A	<p>This is said to be the next change is strategy</p> <p>Does not refer to strategy W4B as fuse plugs are not mentioned in Directives 15 and 16 of Appendix L.</p>
11/1/11	1.55pm	Situation Report - Strategy W4A / W4B	<p>This is said to be the next change in strategy</p> <p>Again includes W4B (reinserted).</p> <p>No situation report was issued at that time.</p> <p>The log records a telephone call and states <i>"SEQWater is continually revising release strategy, could be as high as 6500 cumecs by tonight. If dam stabilizes, then estimates may be reduce (sic). TM also passed on information for BoM to consider the effects at Brisbane if Wivenhoe releases 9000 cumecs."</i></p> <p>A release rate of 9,000 cumecs would indicate that the fuse plugs were in danger. (the maximum release in January was about 7,464 cumecs on Tuesday evening.)</p>
11/1/11	2.00pm	Directive - strategy W4A	<p>This is said to be the next change in strategy</p> <p>Does not refer to strategy W4B as fuse plugs are not mentioned in directive 17.</p> <p>Same applies for the following directives: 2.15pm (directive 18), 3.15pm (directive 19), 3.30pm (directive 20), 4.15pm (directive 21), 4.45pm (directive 22)</p>
11/1/11	6.00pm	Situation Report - W4A/W4B	<p>This is said to be the next change in strategy.</p> <p>Again includes W4B (reinserted)</p>

Date	Time	Category	How the change in strategy appears to have been attributed
			<p>Situation Report 20 of Appendix E again mentions the fuse plugs <i>"the dam is expected to peak below 75.5mAHD which is 100 mm below the <u>first fuse</u> plug initiation level."</i></p> <p>Fuse plugs are mentioned</p> <p>The lake level references are in the W4A range of 74m to 75.5 m</p>
11/1/11	6.07pm	Correspondence - W4A	<p>This is said to be the next change in strategy.</p> <p>Does not refer to W4B as fuse plugs not mentioned in the correspondence.</p> <p>Log records <i>"Recap of current release strategy amongst duty engineers. Current Wivenhoe scenario: 74.9m all gates at 12 m. Wont go to 13 m settings until level reaches 75.0m AHD."</i></p> <p>The levels referenced are below the W4B lake levels and are within the range of W4A.</p>
11/1/11	9.00pm	Directive - Drainage phrase	<p>This is said to be the next change in strategy and the first mention of the drainage phase.</p> <p>Directive 25 of Appendix L is referenced.</p> <p>This is the first directive closing the gates.</p>

THE STATEMENTS IN SECTION 10 - FLOOD EVENT REPORT

91. Section 10 of the Flood Event report says that four strategies were used during the flood event.
92. The statements made in Section 10 of the Flood Event Report were made on the basis of a rigorous assessment of all available and necessary information that is relevant to make such a judgment.

93. The attribution of times at which the various strategies were applied was based upon a comprehensive set of modeling information which had been compiled for the report with corroboration of the Flood Engineer or Engineers involved.
94. It became apparent during that assessment that earlier interpretations of the attributions of the times that various strategies were applied were in error.
95. I believe the statements made in Section 10 of the Flood Event Report are correct and provide a true reflection of the adopted operational gate release strategy throughout the event.

COMPLIANCE WITH W&S MANUAL

96. I believe that Wivenhoe Dam and Somerset Dam were operated in accordance with the requirements of the W&S Manual.

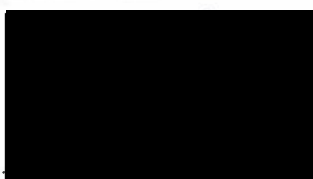
THE COMMISSION OF INQUIRY

97. At no time have I misled this Inquiry. At no time have I been imposed upon to create any false or misleading aspect of the Flood Event Report.

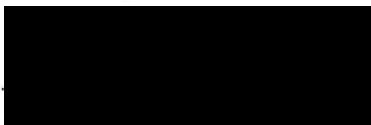
AND I MAKE this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the *Oaths Act 1867*.

Affirmed and Declared at Brisbane)

this 1st day of February 2012 in the)
presence of:



Solicitor


Signature of the declarant