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John Tibaldi
Dam Safety Manager
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Dear John,

SUBJECT: REVIEW OF THE OPERATION OF WIVENHOE AND SOMERSET DAMS DURING THE JANUARY 2011 FLOOD EVENT

1 BACKGROUND

Seqwater has the responsibility for the operation of Somerset and Wivenhoe Dams under the provisions of the *Water Supply (Safety and Reliability) Act 2008*. The Act requires Seqwater to operate these dams accordance with the "Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam" (the Manual). The latest version of the manual is Revision 7 dated November 2009.

Greg Roads of WRM Water & Environment Pty Ltd (WRM) was requested to review the operations of these dams during the severe flooding that occurred along the lower Brisbane River over the period 6 to 19 January 2011. The review is based on data and information provided in the report by Seqwater entitled "*January 2011 Flood Event. Report on the operation of Somerset and Wivenhoe Dam*" (the Report) dated 2 March 2011.

This brief report presents the findings of the review.

2 SCOPE OF WORK

Following the review, Seqwater has requested that the following questions be answered:

1. The January 2011 Flood Event occurred between 6 January 2011 and 19 January 2011. Was the release of water from Wivenhoe Dam and Somerset Dam during the January 2011 Flood Event in accordance with the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam (Revision 7)(the Manual)?

2. Based on the information contained in the draft report (the Report), were there any aspects relating to the operation of Wivenhoe Dam and the operation of Somerset Dam during the January 2011 Flood event not in accordance with the Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam (Revision 7)?

The response to the above questions is based on the information provided in the Seqwater Report with particular reference to:

- Section 2 - Flood Event Summary.
- Section 9 - Dam Inflow and Flood Release Details.
- Section 10 - Flood Management Strategies and Manual Compliance.

No independent modelling or a detailed assessment of the modelling given in Appendix A of the Report was undertaken as part of this review.

3 SUMMARY OF DAM OPERATION

3.1 Compliance

The Manual details a set of strategies to operate both Wivenhoe and Somerset Dams during a flood event. There are four strategies for Wivenhoe Dam named W1, W2, W3 and W4 that change depending upon the stored water level in the dam and the expected inflows to the dam and inflows to the Lower Brisbane River from the Bremer River and Lockyer Creek. There are five subsets of strategies within W1 named a, b, c, d and e. These are designed to minimise the disruption to the downstream community caused by the closure of the various bridges that cross the Lower Brisbane River.

Somerset Dam has three sets of strategies named S1, S2 and S3 that complement the Wivenhoe Dam strategies. The first two sets of Somerset Dam strategies are designed to maximise the available flood storage and mitigation potential of the two dams at any time during a flood. The third strategy, which was not used during the January event, is to protect the structural safety of the dam.

Table 3.1 provides a summary of the compliance criteria detailed in the Manual for each operating strategy. It also shows the date and time when Seqwater transitioned into each strategy and provides comment on whether each criteria was complied with during the event. Note that there is considerable latitude within the above strategies to operate the dams differently and still comply with the Manual. It is outside the scope of this review to comment on whether the dam should have been operated differently.

Table 3.1 Summary of Dam Operation and Compliance

Strategy	Transition Date and Time	Compliance Criteria	Complied
Wivenhoe Dam			
W1a	6 Jan 0742hrs	Water Level > 67.25m AHD	Yes
		Release < 110m ³ /s	Yes
W1b	7 Jan 0200 hrs	Water Level > 67.5m AHD	Yes
		Release < 380 m ³ /s	Yes
		Colleges Crossing closure considered	Yes
		Burton Bridge remained trafficable	Yes
W1c	7 Jan 0900 hrs	Water Level > 67.75m AHD	Yes
		Release < 500 m ³ /s	Yes
		Burton Bridge closure considered	Yes
		Kholo Bridge remained trafficable	Yes
W1d	7 Jan 1500 hrs	Water Level > 68.00m AHD	Yes
		Release < 1900 m ³ /s	Yes
		Kholo Bridge closure considered	Yes
		Mt Crosby Weir Bridge remained trafficable	Yes
W1e	7 Jan 2200 hrs	Water Level > 68.25m AHD	Yes
		Release < 1900 m ³ /s	Yes
		Mt Crosby Weir Bridge closure considered	Yes
		Fernvale Bridge remained trafficable	Yes
W2	8 Jan 0800 hrs	Not used as releases exceeded naturally occurring peak	Yes
W3	8 Jan 0800 hrs	Predicted Water Level > 68.5m AHD	Yes
		Predicted Water Level < 74.0m AHD	Yes
		Release < 4000 m ³ /s	Yes
		Achieve Moggill flow targets	Yes
		Lower level objectives considered	Yes
W3	10 Jan 0100 hrs	Predicted Water Level > 68.5m AHD	Yes
		Predicted Water Level < 74.0m AHD	No (refer to comment 1)
		Release < 4000 m ³ /s	Yes
		Achieve Moggill flow targets	Yes
		Lower level objectives considered	Yes
W4	11 Jan 1300 hrs ^a	Predicted Water Level > 74.0m AHD	Yes
		Predicted Water Level < 75.5m AHD	Yes
		Water Level > 74 m AHD	Yes
		Gate opening sequence followed	Yes
		Structural safety of dam considered	Yes
		Lower level objectives considered	Yes

Strategy	Transition Date and Time	Compliance Criteria	Complied
Gate Closure	12 Jan 2100 hrs	Flood levels lower than during flood	Yes
		Peak outflow less than peak inflow	Yes
		Flow at Lowood reduced to 3,500m ³ /s quickly	Yes
		Lake level <67.5 m AHD within 7 days	Yes
		Gate closure sequence followed	No (refer to comment 2)
Somerset Dam			
S2	6 Jan 0742hrs	Wivenhoe water level > 67.0m AHD	Yes
		Predicted Wivenhoe water level < 75.5m AHD	Yes
		Somerset water level <100.45 m AHD	Yes
		Crest gates raised	Yes
		Storage operating target line followed	Yes
S2	7 Jan 1900hrs	Wivenhoe water level > 67.0m AHD.	Yes
		Predicted Wivenhoe water level < 75.5m AHD.	Yes
		Predicted Somerset water level < 100.45 m AHD	Yes
		Storage operating target line followed	Yes
		Peak outflow less than peak inflow	Yes
Draw Down	12 Jan 2100 hrs	Wivenhoe water level falling	Yes
		Somerset water level >100.45 m AHD.	Yes
		Wivenhoe levels not increased by Somerset releases	Yes
		Peak outflow less than peak inflow	Yes
		Lake level <99 m AHD within 7 days	Yes

^a Equal to time outflow exceeded 4000 m³/s

3.2 Comments on Compliance

The following comments are given on the two potential non-compliance issues shown in Table 3.1.

1. At 0100 hours on 10 January, flood modelling showed that the Wivenhoe Dam storage level would reach 74.7m AHD with the forecast rainfall and 72.9m AHD without the forecast rainfall. No guidance is given in the Manual as to whether forecast rainfall is to be used as a trigger for Strategy W4 to commence. Notwithstanding, the Wivenhoe storage level at the time was well below 74m AHD (at 69.97m AHD) and the modelling with forecast rainfall showed that a fuseplug was not in danger of being activated, and therefore the structural safety of the dam would not be compromised. On this basis, it would appear that it was appropriate for Seqwater to persist with using strategy W3 and protect urban areas from inundation at that time.
2. Between 0500 hours and 0800 hours on 12 January during the recession of the flood, the time interval between successive closing of individual gates of Wivenhoe Dam was less than the 20 minute minimum given in the Manual. The dam outflows had fallen to 4,000 m³/s at the start of this period. There is no minimum period between gate closures above this outflow. This compliance requirement appears to contradict the other requirement to reduce flows at Lowood to below 3,500m³/s as quickly as possible. The Manual is not clear on which compliance requirement takes precedent in this situation.

4 CONCLUSIONS

Based on a review of the Report, Seqwater has operated Wivenhoe Dam and Somerset Dam in accordance with the Manual over the period 6 January 2011 and 19 January 2011. Two minor deviations from the Manual appear to have occurred over the period. This may be due to a lack of clarity in the manual rather than non-compliance.

Please do not hesitate to contact me if you have any queries.

For and on behalf of
WRM Water & Environment Pty Ltd



Greg Roads
Director