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Ref BRI-LET-002

Queensland Floods Commission of Inquiry
Level 30, 400 George St
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By email Kyla.hayden [REDACTED]

Attention: Kyla Hayden

Review of Hydraulic Modelling

The following addresses responses included in the letter Ref L111118_111024 18 November 2011 from WMAwater to the Queensland Flood Commission of Inquiry (**WMAwater letter**) and refers to my submission entitled: -

Brisbane Flooding January 2011, An Avoidable Disaster – Submission in response to Hydraulic Modelling Reports dated 31 August 2011 (MJ O'Brien submission)

To allow for a more ready comparison with the WMAwater letter each relevant section below includes the paragraph number used in the WMAwater letter.

General Comments

1. Unconsidered Submission

The WMAwater letter does not address the following obvious deficiencies in the Version 2 model identified at Item 10 of Section 2.2 of the MJ O'Brien submission.

10. *There are a number of obvious deficiencies in Version 2 of the Model: -*

- *It fails to predict the minor peak at the Brisbane City Gauge that occurred around 17:20 Tuesday 12th January,*
- *The predicted peak height at the Brisbane City Gauge is 470 mm higher than the actual measured peak,*
- *The predicted time of the peak at the Brisbane City Gauge is approximately ten (10) hours earlier than the actual peak.*

Without access to the modeling the following is presented only as a suggestion. My own calculations, based on the recorded tides at the Brisbane Bar, indicate that the minor peak which occurred at the Port Office at 17:20 Tuesday 12th January is likely to be close to the peak flow past the City Gauge for the whole of the event. However the Version 2 Model appears to predict both a peak flow and a peak height close to this time. It is possible that the prediction of the time of the peak height by the Version 2 Model is correct but that the flow rate predicted by the Version 2 Model is too high.

It is suggested therefore that the flow rates at the City Gauge predicted by the Version 2 Model are high. This then leads to questioning of the assumed flows input to the model at Mt

Crosby and leads to the need to reconsider the modeling of the measured flows at Jindalee. It is not clear to me exactly how the assumed input to the Model at Mt Crosby is calculated. It is well recognised that measurement and modeling of flows from Lockyer Creek during the event are inadequate and it is not clear to me whether this impacts the assumed boundary conditions at Mt Crosby.

2. Modelling of Wivenhoe/Lockyer Creek Interaction

It remains difficult to accept any model which does not adequately simulate the changes in floodplain storage above Savages, including the potentially significant storage of releases from Wivenhoe as backflow up Lockyer Creek, can be reliably used to compare the impact within Brisbane of varying release strategies from Wivenhoe.

Version 2 of the SKM model appears only to model the performance of the Brisbane River below Mt Crosby relying on an unknown methodology to predict the flows into Mt Crosby for events other than the January 2011 event.

3. Extent of Flooding in Brisbane attributable to Wivenhoe Releases

WMAwater letter paragraph 5 to 12

The points made in the WMAwater letter are valid, and a calculation of the percentage of the volume of water, flowing through Brisbane at the peak of the flood, which was released from Wivenhoe, is not particularly relevant to an examination of the performance of the dams.

However the inability of any model to provide this information is indicative of very poor tracking of the major contributions to the flood from various sources within the Brisbane River valley. In many ways it is indicative of the outcome of not adequately modeling the Wivenhoe/Lockyer interaction. It means that there must remain a much lower level of confidence that the relative contributions from the upper and lower Brisbane River inflows are correctly handled in the Version 2 Model.

Specific Comments

4. Operation of Somerset

WMAwater letter paragraph 41(c)

Given that the total unused flood storage capacity in Somerset was 190,739 ML compared with the very approximate 93,000 ML that caused the flood in Brisbane to exceed the threshold of a Major Flood, renders the operation of Somerset significant.

The unused flood storage capacity in Somerset is calculated from the data below. In my original submission it was calculated that the total volume of water passing the City Gauge, above the level of a Major Flood, was 123,000 ML. This has subsequently been reassessed using SEQWater's preferred rating curve for the Brisbane River at the City Gauge and the revised data for the Port Office Gauge resulting in a calculated volume above the level of a Major Flood of 93,090 ML.

Notwithstanding that there now appears to be significant doubt about the validity of SEQWater's preferred rating curve for the City Gauge, the operation of Somerset, and the apparent inability/unwillingness to utilise the crest gates, should remain a significant consideration for the Commission.

WMAwater letter paragraph 24 to 26

Based on data provided by SEQWater and summarised in my original submission (copied below), flow through the open crest gates occurs once the level in Somerset exceeds 100.45 mAHD, not 107.45 mAHD as noted in paragraph 25 of the WMAwater letter. 107.46 mAHD represents the top of the closed crest gates and there is approximately 455,088 ML of flood storage capacity between 100.45 mAHD and 107.46 mAHD.

Item No	Characteristic	Value	Capacity ML	Source
S1	Full Supply Level (FSL)	99 mAHD	379,800	Page 77 (SEQWater, November 2009 Revision 7)
S2	Spillway Fixed Crest Level	100.45 mAHD	445,640	Page 77 (SEQWater, November 2009 Revision 7)
S3	Sluice & Regulator Trigger Level	102.25 mAHD	539,000	Page 77 (SEQWater, November 2009 Revision 7)
S4	Crest level	107.46 mAHD	900,728	Page 77 (SEQWater, November 2009 Revision 7)
S5	Top of Deck	112.34 mAHD	1,129,800	Page 77 (SEQWater, November 2009 Revision 7)
S6	Flood Storage		520,887	SEQWater advice to Australian 22 nd Feb 2011
S7	Maximum Level during Tuesday 11 th	104.42 mAHD	672,988	
S8	Maximum Level for period	104.96 mAHD	709,948	

When Wivenhoe Dam and Somerset Dam are both operating in flood operation mode, the requirement that the crest gates on Somerset remain open will not necessarily result in each dam maintaining a similar proportion of total flood mitigation capacity. Operation of the sluice gates alone can only bring the level in Somerset down to operating target line. In the event that rainfall is primarily over the Wivenhoe catchment, operation of the sluice gates alone cannot force the level in Somerset up to the target operating line.

5. Practical Assessment of alternative release strategies

WMAwater letter paragraph 39

The adequacy of the Version 2 Model to carry out even a high level assessment of various alternative release strategies must be seriously called into question due to the issues raised in Items 1, 2 and 3 above. It must be expected that the accuracy of the predicted flood heights, especially at the Brisbane City Gauge, deteriorate substantially with Strategies that include releases from Wivenhoe substantially different from those that actually occurred in January 2011.

6. Transition to Strategy W3

WMAwater letter paragraph 50

While the transition to Strategy W3 is more a consideration for the Commission, it is clear from the response in the WMAwater letter that my original explanation was unclear. In summary the point being made in the MJ O'Brien submission was.

The actual release rates up until 13:00 on 8th January, five hours later that the time SEQWater claimed to have implemented Strategy W3, were essentially identical to the projected release rates issued at 10:23 7th January 2011, determined under Strategy W1 and prior to any suggestion that implementation of Strategies W2 or W3 would be required. Furthermore the projected release rates, issued at 14:57 8th January 2011, some seven hours after W3 was claimed to have been implemented, do not become substantially different from the release rates determined under a W1 Strategy until 23:00 8th January. This is some fifteen hours after Strategy W3 was claimed to have been implemented at 08:00 8th.

This would directly contradict the statements made before the Commission by Mr Ayre.

7. Selection of Release Rates under each Strategy

WMAwater letter paragraph 46

The WMAwater letter reasserts the proposition that *"the operators ... would have required a high level of confidence that the peak dam inflows were going to increase dramatically, as they happened to do for the actual flood event, but were not expected to do based on information available at the time."*

Again this is more a question of risk management than a hydrological analysis. The dilemma posed to the dam operators at the time is: -

- There is potential that a low frequency future event will cause a serious or catastrophic outcome for a certain at risk population,
- By taking no action the risk of the serious or catastrophic outcome remains unchanged,
- However by taking action to mitigate the potentially future serious or catastrophic outcome it will impose a known lower risk to a different population.

In these circumstances, the decision to take no action, or to take an inadequate action, does not constitute good risk management. While there remains considerable doubt about around the validity of the development of the Strategies, the maximum release rate permitted under any Strategy should have been premised on the known lower risk tolerable given the existing

known circumstances. This known tolerable risk becomes the tradeoff for addressing the much higher risk associated with the low frequency future event.

While this concept of decision making for preventing serious or catastrophic future outcomes is very well established and has been addressed in a number of submissions to the Commission it does not seem to have been applied or recognised by the Operators of the dams. In the case of the January 2011 event further, although potentially unreliable, information was available to the Operators in terms of the BoM forecasts.

It is incumbent on the Commission to have the Independent Engineer quantify the likely potential detrimental effects that might arise from what might be called the “early release” strategies during moderate sized floods.

8. Conclusion

It remains my submission that the Commission cannot rely on Version 2 of the Model and must continue to work with the Independent Engineer to finalise an adequate model for the whole of the Brisbane Valley. Without access to an accurate reliable model the Commission will have no basis on which to make any assessment of the operation of the dams during the January 2011 event.

I thank the Commission and the Independent Engineer for their consideration of my submissions.

Yours Sincerely

A solid black rectangular box used to redact the signature of Mick O'Brien.

Mick O'Brien

Works Cited

SEQWater. (November 2009 Revision 7). *Manual of Operational Procedures for Flood Mitigation at Wivenhoe Dam and Somerset Dam.*