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8th February 2022
Ref: J2113_L2.doc

Adco Constructions
Level 2, 7-9 West Street
North Sydney, NSW, 2060

Attention: Elizabeth Creswell
Senior Design Manager

Dear Elizabeth,

New Liverpool Primary School (18 Forbes Street, Liverpool)
Flood Emergency Response Plan – Response to Issues Raised

I refer to your email dated 8th February 2022, in which you requested clarification of a number of issues that were raised during the Department of Planning and Environment's review of the Flood Emergency Response Plan that was prepared by FloodMit Pty Ltd in November 2021. Our response to issues raised is provided below. The paragraph numbering is the same as that provided in the Department's email of 4th February 2022.

1. Compliance with Liverpool DCP

There is no assessment of compliance matters within the Flood Emergency Response Plan. This was not included in the project scope, and it is understood to be addressed by other parties. Instead, the Flood Emergency Response Plan details how the risk of flooding can be managed if approval for the development is forthcoming.

2 (i) Rate of Rise of the PMF

The Plan assesses warning times on the basis of the maximum rate of rise in a 100 year flood, assuming that this rate of rise continues up to the PMF flood level. This is shown in Illustration 1 from the FloodMit report. The review requested consideration of warning times based on the actual PMF flood hydrograph.

Design flood levels provided in the Plan are those that have been formally adopted by Liverpool Council. The source of this data is the Georges River Flood Study (PWD, 1991). This is based on a physical scale model that was developed by the University of NSW. Unfortunately, PMF hydrographs were not included in that report, and the physical model is no longer available. Consequently, we have relied on results from a numerical MIKE-11 model that was developed as part of the Georges River Floodplain Management Study (Bewsher, 2004). This model was calibrated by Bewsher to match results from the physical model for the 100 year flood, and was found to provide "reasonable agreement" for other flood events. The PMF flood hydrograph has been extracted from this model and included in Illustration 1 for reference purposes (attached).

The PMF flood rises much quicker than the 100 year flood in the early stages of that event, but then appreciably slows and very gradually rises as the peak of the PMF flood is approached. This is because the PMF event is dominated by downstream flood conditions that are experienced at East Hills, some 17km downstream. The PMF is nearly 5.0m higher than the 100 year flood at East Hills due to the restricted downstream floodplain. As flood levels at East Hills continue to rise in a PMF event, backwater influences gradually extend upstream towards Liverpool, and the PMF event at Liverpool takes longer to peak than the 100 year flood.

The peak of the PMF flood at Liverpool occurs slightly later than the peak of the 100 year flood. By the time that a "major flood warning" level at Liverpool is reached, there is 3.6 hours until the maximum flood level is reached within the school based on the rate of rise of the 100 year flood, but approximately 12 hours based on the PMF hydrograph.

The assumed maximum rate of rise in a 100 year flood (as adopted in the flood emergency response plan) provides a conservatively low estimate of the time available in which to appropriately respond to the flood emergency.

2 (ii) Assess and mitigate risks to account for any reduced warning times

Flood warning times are not reduced if an actual PMF flood hydrograph is considered rather than the assumed maximum rate of rise in a 100 year flood.

The recommended evacuation strategy (Page 16) is to "evacuate, or close the school at the early stage of a developing major flood on the Georges River". Given that the Bureau of Meteorology provides 6-12 hours warning of an impending flood, it is anticipated that the decision to close the school will be made prior to the start of the school day.

2(iii) Shelter-in-place be considered as a viable alternative to evacuation

Shelter-in-place already forms an important component of the flood emergency response plan, which is summarised on Pages 15-16 of the report.

The strategy involves three main response measures, which in priority order is:

i) Close the school (before the start of the day) if the Bureau of Meteorology issues a flood warning for "major flooding" at Liverpool. The Bureau typically provides 6-12 hours warning of future flooding.

ii) If school is already in progress and "major flooding" is predicted to occur before the end of the school day, then the school should be closed and students evacuated;

iii) If flooding on site is experienced, then it is too late to evacuate, and shelter-in-place on one of the upper floor levels is recommended.

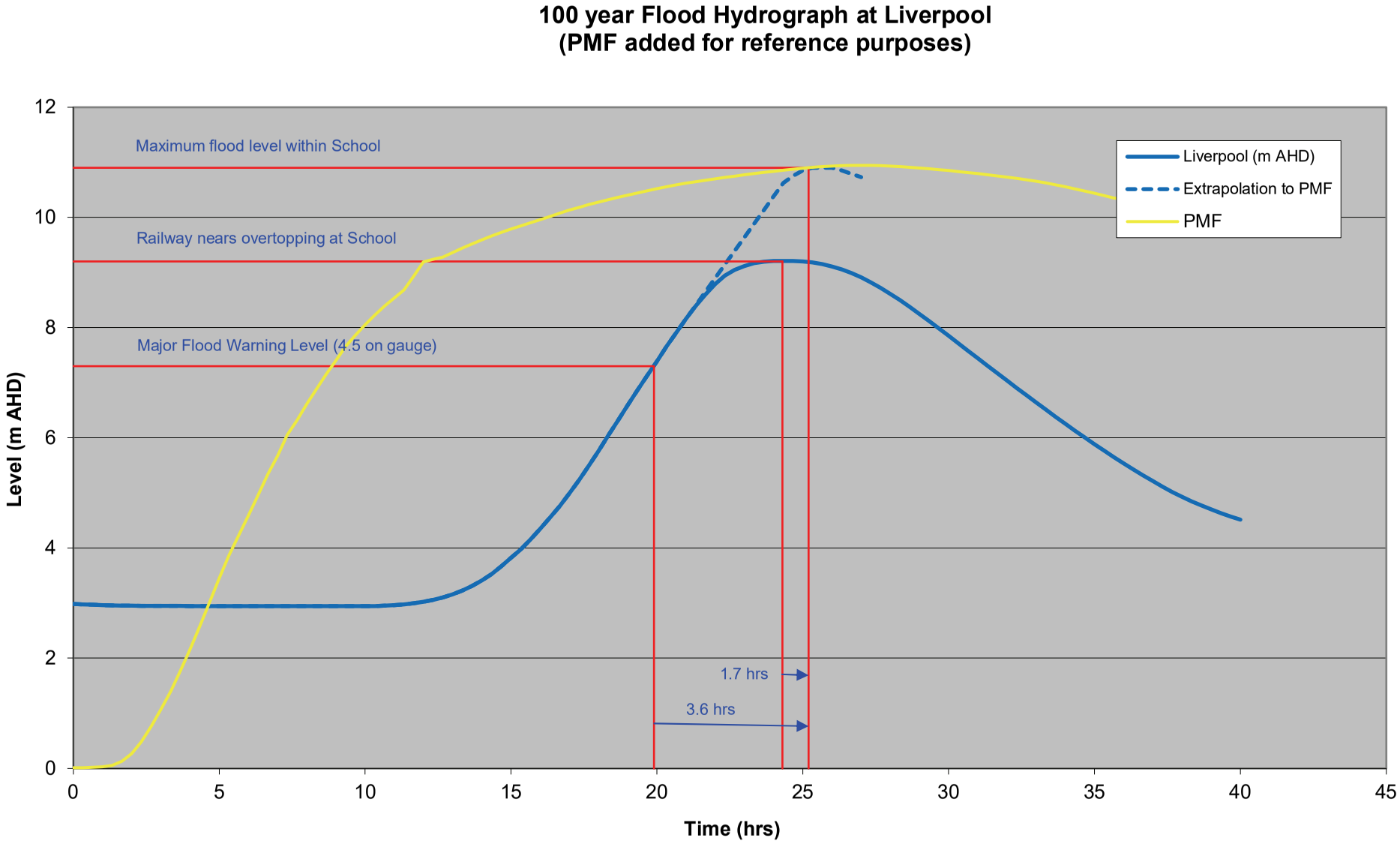
If you have any questions on the above, please don't hesitate to contact me.

Yours sincerely,

J Maddocks

John Maddocks
Director

Attachment: Illustration 1 – Rate of Rise of Floodwater at Liverpool


100 year Flood Hydrograph at Liverpool
(PMF added for reference purposes)
Maximum flood level within School
Railway nears overtopping at School
Major Flood Warning Level (4.5 on gauge)
Liverpool (m AHD)
Extrapolation to PMF
PMF
1.7 hrs
3.6 hrs
Level (m AHD)
Time (hrs)
0
2
4
6
8
10
12
0
5
10
15
20
25
30
35
40
45