Our Ref : W4771

Contact : Andrew Reid

22 September 2008

Goodman International
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Dear Richard,

17 O'RIORDAN ST, ALEXANDRIA FLOOD STUDY – SUPPLEMENTARY

A flood study for the proposed redevelopment of 17 O'Riordan Street, Alexandria was completed by Cardno Lawson Treloar as detailed in the report dated 28 July 2008. The Department of Planning in their response of 8 September 2008 requested clarification of two items regarding the flooding assessment for the proposed Australian Red Cross Medical Research and Development Project at the site. The items identified were related to:

- Flood planning level, and
- Requirement for uninterrupted operations.

FLOOD PLANNING LEVEL

The assessment by City of Sydney dated 29 August 2008 recommends conditions for the development with respect to flood levels. A response to each item is also listed in the following table based on the Flood Study Report of 28 July 2008.

City of Sydney Condition	Response
The Flood Planning Level (FPL) must be set as the higher of either the 1% AEP event plus 500mm freeboard or the PMF	Section 6.2 lists the FPL as 1% AEP plus 500mm freeboard. The City of Sydney condition relating the PMF for FPL is noted for the following items.
All ground floors must be set to the FPL	Section 6.2 details the proposed floor level of 12.60m AHD is above the FPL recommended of "the higher of either the 1% AEP event plus 500mm freeboard or the PMF"
The basement driveway entry level must be set to the FPL	Section 6.3 details the basement entry level of 12.5m AHD is above the FPL
External openings to the building and basement must be above the FPL	Section 6.3 details that all openings to the basement, such as vents or doorways, are to be above the PMF and 1% AEP +0.5m freeboard level
Flood compatible materials must be used below the FPL	Section 6.5 details that all parts of the building lower than the FPL are to be built from flood compatible materials

The building must be structurally designed to withstand flood forces up to the PMF level	Section 6.5 details that the structure is to be capable of withstanding floodwater, debris and buoyancy effects up to the PMF level
All utility services must be constructed above the PMF level	Section 6.6 notes services are to be flood proofed to the higher of the FPL or PMF. City of Sydney's clarifies the statement for utility service construction to be "above the PMF level".

The recommended conditions by City of Sydney are either met, for example ground floors above FPL, or to be incorporated into detailed design, such as flood compatible materials.

REQUIREMENT FOR UNINTERRUPTED OPERATIONS

The Department of Planning requests further details relating to uninterrupted operations for the site. As discussed above, the building is protected from inundation of flood waters up to the FPL and thus on-site operations can continue in a flood event. Details for the provision of backup power and other utilities for the site is not within the scope of this assessment.

Section 5.3 of the Flood Study Report details the provisional hazard adjacent to the site for the modelling of the 1% AEP 60 minute duration and PMF 45 minute duration events presented on Figures C6 and C7. High provisional hazard is shown in O'Riordan Street adjacent to the site for the PMF event. Part of this area is also high provisional hazard in the 1% AEP event.

As a guide, the New South Wales Government Floodplain Development Manual (April 2005) describes the provisional hazard categories as:

- *high hazard possible danger to personal safety; evacuation by trucks difficult; able-bodied adults would have difficulty in wading to safety; potential for significant structural damage to buildings.*
- *low hazard should it be necessary, truck could evacuate people and their possessions; able-bodied adults would have little difficulty in wading to safety.*

The attached figures show the provisional hazard within the modelled extent for the 1% AEP 60min and PMF 45min events. The PMF figure shows that high hazard conditions occur on a significant proportion of the roads in the Alexandria area. It would thus be expected that some of these roads would be untrafficable in a PMF event. The situation of road blockages in a PMF event would not be expected to be isolated to the Alexandria area as the runoff from a PMF event would likely cause many roads across the Sydney region to be impassable. Generally, the major-minor drainage design approach presented in Australian Rainfall and Runoff recommends conveyance of flows in excess of the piped drainage system to be conveyed along roads and overland flowpaths. Thus roadways across Sydney would be expected to be the major conveyance for flows in excess of a 5% AEP or even 10% event AEP. In a 1% AEP event, the figure shows low provisional hazard along O'Riordan Street to the south of the site.

The following table shows peak depth estimates in O'Riordan Street adjacent to the site from the model.

Location – O'Riordan Street	PMF 45min event – Peak depth (m)	1% AEP 60min event – Peak depth (m)
Northern boundary of site	1.3	0.73
Southern boundary of site	0.8	0.35

Access to the site is thus considered to be restricted during the PMF flood event based on the provisional hazard and peak depth estimates. During a 1% AEP event, the southern driveway may continue to be operational.

The flood modelling undertaken for this assessment was to determine peak flood levels for the critical event. Thus the duration of inundation, and hence the time that roads would be untrafficable, cannot be determined without further detailed modelling and analysis. It is noted that the inundation in the Alexandria area is a flash-flooding event that would likely be present for only a couple of hours (depending on storm duration), not for days as may occur on large river systems.

In summary, the proposed building would continue to be operational as facilities are situated above the Flood Planning Level. Access to the site would be restricted by floodwater conveyed in O'Riordan Street in a 1% AEP event and in rarer events to the PMF.

Yours faithfully,

Andrew Reid
Project Engineer
for **Cardno Lawson Treloar**

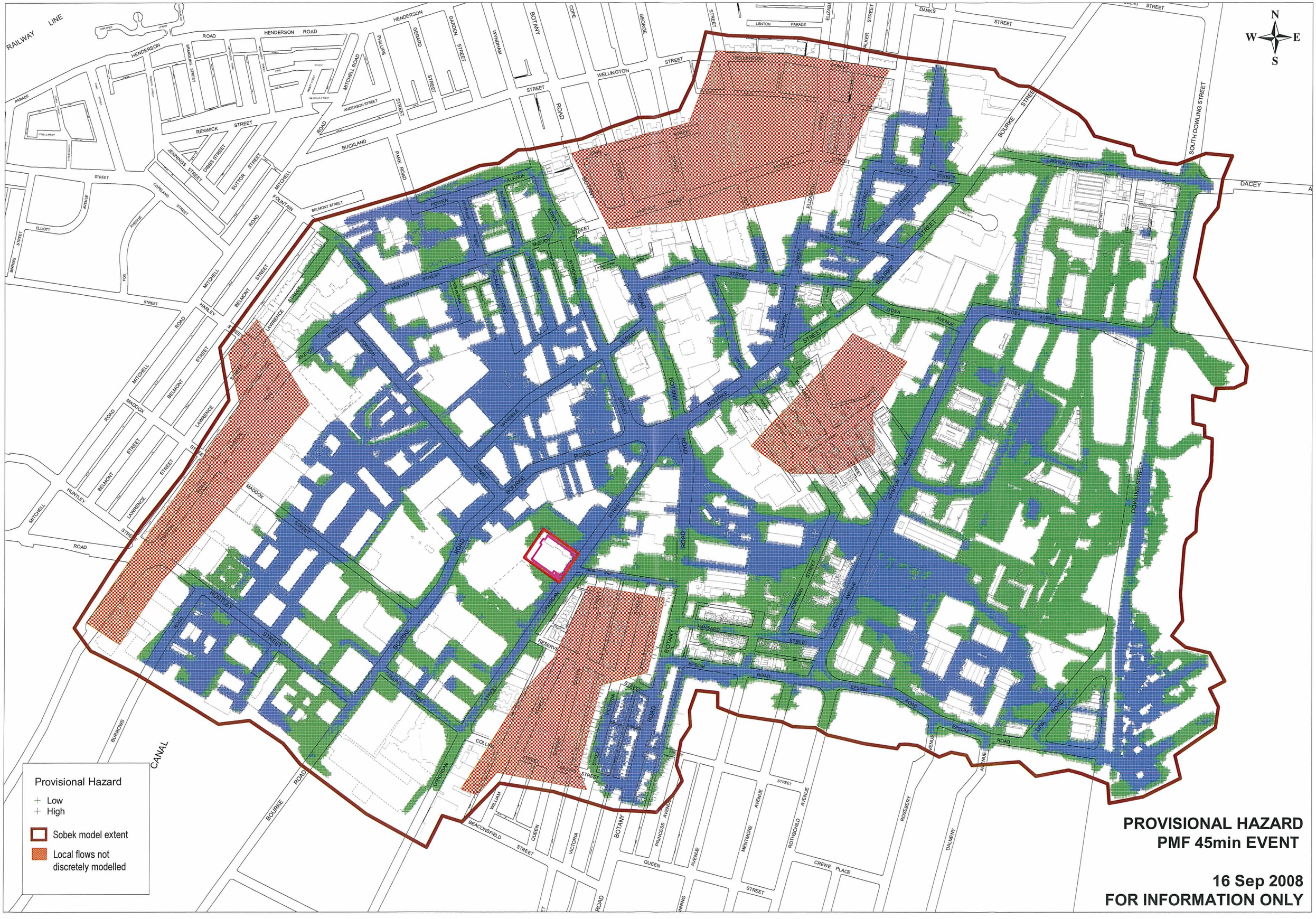
Attachment: Provisional hazard figures for PMF 45 min and 1% AEP 60min.

N
W E
S

Provisional Hazard
+ Low
+ High
Sobek model extent
Local flows not discretely modelled

PROVISIONAL HAZARD
100y ARI 60min EVENT

16 Sep 2008
FOR INFORMATION ONLY


N
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PMF 45min EVENT
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