

Fitzpatrick Investments Pty Ltd 22-24 Junction St FOREST LODGE NSW 2037 L140925_22-32JunctionSt_Rev.docx

25 September 2014

Attention: Jamie Stewart Project Director

Dear Jamie,

Re: 22-32 Junction St, Forest Lodge Preliminary Flood Assessment

The proponent seeks to develop the above referenced site. A mixed use development is proposed comprising car parking, commercial and residential premises. In the 1% AEP flood event (that is the flood event likely to occur on average once every one hundred years) the site is subject to limited inundation due to its location in the Larkin Street depression with flood waters backing up due to the elevated and controlling Pyrmont Bridge Road downstream. A flow path contributing to inundation in the Larkin Street overland flow path which also impacts the site with some very limited overland flow flooding.

This report discusses the specific nature of the flooding the site is subject to and how the proposed development can be carried out in such a way that flood risk is not exacerbated.

Background

WMAwater recently completed the draft reports for the *Johnstons Creek Catchment Flood Study (2012)* and *Johnstons Creek Catchment Floodplain Risk Management Study and Draft Plan (2014)*. The description of results we supply herein is based on these studies as well as additional runs carried out specifically for the work reported upon herein.

Existing Flood Behaviour

Referring to Figure 1, the total catchment area contributing to Larkin Street depression is approximately 79 hectares. Four major flow paths discharge to the depression as per the list below (also refer to Figure 2):

- 1. The bulk of the flows originate from the University of Sydney Camperdown campus which either enters the Sydney Water trunk drain (Orphan School Creek Branch) or as overland flow (once the trunk drain is at capacity) crossing Parramatta Rd and flowing onto Larkin St;
- 2. Flow path originating from Arundel St/Sparkes St through a drainage reserve;
- 3. Flow path along St Johns Rd; and
- 4. Flow path originating from Bridge Rd which enters Junction St and discharges to this low point. Note it is this flow path that is the second mechanism of albeit minor overland flow flooding that impacts the subject site.

The Sydney Water trunk drain that traverses the site is full in the 20% AEP (event likely to occur once every 5 years). Consequently for the 1% AEP event, portions of the site experience significant inundation depths (> 2 m) albeit with low velocity as floodwaters accumulate behind Pyrmont Bridge Road (which acts as an embankment).

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Level 2, 160 Clarence St, SYDNEY NSW 2000 Phone: 02 9299 2855 Fax: 02 9262 6208 Email: enquiry@wmawater.com.au Website: wmawater.com.au To summarise then in the 1% AEP the subject site is subject to rising flood waters from the rear with a velocity near zero and shallow overland flow at the front facing Junction Street.

Flood Depths, Levels and Rates of Rise

Table 1 provides the peak flood levels and depths for the 5% AEP, 1% AEP flood and PMF events for the subject site differentiating between front and rear levels. The locations where the flood levels and depths are sampled are indicated in Figure 2.

	Junction St (point 1 in Figure 2)		Larkin St Depression (point 2 in Figure 2)	
Event	Peak Flood Level (mAHD)	Peak Flood Depth (m)	Peak Flood Level (mAHD)	Peak Flood Depth (m)
5% AEP	14.2	0.2	13.1	3.5 ¹
1% AEP	14.3	0.5	13.9	4.3
PMF	18.5	5	18.5	8.9

Table 1: Peak Flood Levels and Depths for 22-32 Junction St, Forest Lodge

In regards to reported levels as per Table 1 above it is noteworthy that the model has assumed:

- That various buildings located on Pyrmont Bridge Road (southern side) effectively block the PMF such that flood levels reach a height of 18.5 mAHD which is ~ 3.3 m higher than Pyrmont Bridge Road at its lowest in this vicinity;
- That if it is assumed that flow does make its way though some of these buildings then the PMF flood levels declines to ~ 17.7 mAHD and whilst this level is unlikely to be definitive it is indicative of sensitivity; and that
- Buildings in the depression do not fill with water but instead exclude water and hence the available storage volume is underestimated. Whilst this is an appropriately conservative assumption for setting design flood levels it does mean that levels are higher than might otherwise be. Sensitivity testing undertaken shows levels decline by ~ 0.4 m for the 5% AEP and by ~ 0.5 m for the 1% AEP runs.

Rates of rise apply only to the Larkin Street depression flooding and are \sim 1.25 m per 15 minutes for the PMF event and \sim 0.35 m per 15 minutes for the 5% AEP and 1% AEP flood events.

Flood Planning Level Requirements

Flood planning levels (FPLs) are outlined in City of Sydney's *Draft Interim Floodplain Management Policy* (2013). Any new developments on site will have to comply with these requirements (as summarized in Table 2 over the page).

Based on Table 2 applicable flood planning levels for the site are as follows:

•	Residential floor level (fronting Junction St)	: 14.8 mAHD (1% AEP + 0.5m)
•	Residential floor level (fronting Larkin St depression)	: 14.4 mAHD (1% AEP + 0.5m)
•	Commercial floor level (Junction St)	: 14.3 mAHD (1% AEP)
•	Commercial floor level (Larkin St)	: 13.9 mAHD (1% AEP)
•	Above ground open car park (Larkin St)	: 13.1 mAHD (5% AEP)

Note that it is also a requirement of the policy that a registered engineer must certify that any proposed development on site must be able to withstand forces applied to it by floodwaters (inclusive of debris and buoyancy).

¹ Peak depths far exceed average depths due to the fact that the subject site is steeply sloping.

Table 2: Relevant Flood Planning Levels from City of Sydney's Interim Floodplain Management Policy

Development		Type of flooding	Flood Planning Level
Residential	Habitable rooms	Mainstream flooding	1% AEP flood level + 0.5 m
		Local drainage flooding	1% AEP flood level + 0.5 m or Two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood is less than 0.25 m
	Non-habitable rooms such as a laundry or garage (excluding below-ground car parks)	Mainstream or local drainage flooding	1% AEP flood level
Commercial	Business	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of 1% AEP flood level
Below- ground garage/ car park	All other below-ground car parks	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or the PMF (whichever is the higher)*
Above ground car	Car parks	Mainstream or local drainage flooding	1% AEP flood level
park	Open car parks	Mainstream or local drainage	5% AEP flood level
Critical Facilities	Floor level	Mainstream or local drainage flooding	1% AEP flood level + 0.5m or the PMF (whichever is higher)
	Access to and from critical facility within development site	Mainstream or local drainage flooding	1% AEP flood level

* This level applies to all possible ingress points to the car park such as car park entrances and exits, ventilation ducts, windows, light wells, lift shaft openings, risers and stairwells.

Flood Risk

The flood risk of the site relates to two issues and these are as follows:

- Residential buildings are located on flood prone land. This risk is abated by evacuation in place at levels above flood levels. Such is facilitated by the fact that all residential floor levels are set at the 1% plus 0.5 m level as per Council policy and also by the fact that multi-storey buildings are proposed. Even in the event of PMF residents will be able to find levels within buildings which are above PMF levels; and also that
- The open car park is proposed to be on ground ranging from ~ 11 mAHD to ~ 13.5 mAHD and as such is subject to flood risk. The issue is that some residents may seek to retrieve vehicles and in doing so may place themselves at risk. This risk is abated by two elements which are:
 - Firstly the fact that the proposed car park is on land with rising road access and as such if the car can be accessed then it can be safely driven out to higher ground; and secondly
 - by provision of an alarm device located at the lots lowest level adjacent to the fence line facing Larkin Street. At a height of 9.6 mAHD the alarm will provide a reasonable period of warning time prior to the beginning of inundation of the car park. Further given a rate of rise for floodwaters in the 5% AEP and 1% AEP events of ~ 0.35 m per 15 minutes, substantial time exists between the initial alarm sounding and deeper flood waters impacting the car parking area.

Mitigation Works as part of the Johnstons Creek FRMS&P (2014)

As part of the Johnstons Creek Catchment Floodplain Risk Management Study and Draft Plan (2014), WMAwater, under the guidance of City of Sydney, have developed flood mitigation options for identified hot spots within the Johnstons Creek catchment including the Larkin St low area. These options are developed to alleviate flood risks for these hot spots by reducing peak flood levels for various flood events as well as reducing flood damages for residential properties located in the vicinity. In addition, a cost-benefit analysis of the proposed options has been conducted to assess their feasibility and the results are presented in the Johnstons Creek Catchment Floodplain Risk Management Study and Draft Plan (2014). Even though these drainage works would be beneficial for properties including the aforementioned site, they are recommended to the City of Sydney for implementation in the medium to long term (20-50 years). The relevant options are shown in Figure 3 and Figure 4 (note Figure 4 has not been recommended in the Study). For the recommended option (FM-JC02 shown in Figure 3), conceptually up to 1.4 m reduction in the 5% AEP peak flood levels can be expected at the Larkin St depression (down to ~11.7 mAHD) once the drainage upgrade is implemented and 2.2 m reduction in the 1% AEP peak flood levels (down to ~ 11.72 mAHD). These estimates are based on the assumption that the proposed pipe sizes indicated in Figure 3 are adopted as well as enhancement of the local pits to allow floodwaters enter into the trunk system without restriction.

Yours Sincerely, WMAwater

Steve Gray DIRECTOR

Attachments

Figure 1: Contributing Catchment

Figure 2: Peak Flood Depth and Level – Existing Conditions – 1% AEP Design Flood Event

Figure 3: Flood Impact Map – Drainage Upgrade at Sparkes St and Johnstons Creek Channel Works

Figure 4: Flood Impact Map – Flow Path under Bridge Rd







