Fitzpatrick Investments Pty Ltd
22-24 Junction St
FOREST LODGE NSW 2037

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4 August 2015

Attention: **Jamie Stewart**
Project Director

Dear Jamie,

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

As per WMAwater's previous correspondence the proponent seeks to develop the above referenced site. Since WMAwater's last report the design has been modified, with the items relevant flood affectation being the proposed raising of the open car parking space to the 5% AEP level.

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. Further the potential for the works to impact on flood levels is considered.

Background
WMAwater recently completed 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. Consequently for the 1% AEP event, very limited 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).

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 at rear (to the west). The locations where the flood levels and depths are sampled is indicated in Figure 2.

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

	Larkin St Depression (point 2 in Figure 2)	
Event	Peak Flood Level (mAHD)	Peak Flood Depth (m)
5% AEP	13.1	3.5[1]
1% AEP	13.9	4.3
PMF	18.5	8.9

Rates of rise are ~ 20 mm per minute for the 1% AEP event and four times this for the Probable Maximum Flood event (which is ~ 1,000-10,000 times less likely than the 1% AEP event). The significance of such limited rates of rise are that people have ample time to seek higher flood free ground.

Flood Planning Level Requirements

In regard to the proposed open car park level requirements are outlined in City of Sydney's *Draft Interim Floodplain Management Policy (2013)*. These are that the open car park must be at the 5% AEP flood level at a minimum. That is, as per Table 1 above, the car park must be at the level of 13.1 mAHD (or more).

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).

Flood Risk

Previous correspondence from WMAwater has discussed the flood risk associated with residential development on the site. The focus herein is on the proposed open car park.

Clearly an issue is that during a flood event threatening inundation of the car park, car owners may seek to access the car park and remove vehicles. The following elements of the proposed works and specific local flood characteristics tend to mitigate potential flood risk:

1. The hazard of floodwaters is low. Modelled flow velocity at the location of the proposed car park is near zero. This is due to the fact that floodwaters are not flowing through the site but rather building up behind Pyrmont Bridge Road. As such hazard (the velocity depth product) of flood waters in the 1% AEP is low as per the NSW Floodplain Development Manual (NSW, 2005);
2. The rate of rise of flood waters facilitates evacuation. During a 1% AEP event the time for floodwaters to reach a depth of 0.3 m is slightly less than 15 minutes. As reported above rate of rise is ~ 20 mm per minute. Given the widest point of the car park to the west (from the high side at Junction St) is 40 m, ample time exists for a person to experience some level of flooding and then walk to the fire escapes facing Junction St and access higher ground; and finally
3. Higher ground is readily accessible. The site fortunately includes higher ground on the eastern side (Junction St). From both ends of the site (north and south) as well as via several fire escape stairs that lead to Junction St, those pedestrians exposed to flooding have the ability to access safe higher flood free ground.

Flood Impacts

To minimise flood impact the car park will be built at the 5% AEP level with a void retained underneath. As such the flood storage volume lost in the 1% AEP event is limited to the volume of the slab and supporting piers. Given a slab of 0.25 m and a calculated area of ~ 2,400 m^2 the volume lost is ~ 600 m^3. It is estimated that this is less than 1% of total runoff for the 1% AEP event. As such it may be presumed that the flood level impact of the slab is minimal and in the writer's opinion modelling is not required to quantify the impact.

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

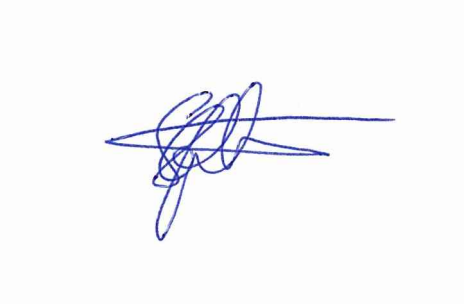
Summary
Previous correspondence from WMAwater described flood affectation of the proposed development site and required levels for proposed development.

The work herein focuses on the open car park proposed to be built at the 5% AEP level as per Council requirements.

An assessment of flood behaviour indicates that the floodwaters are slow rising and low hazard. Further means of egress and higher flood free ground are readily accessible. Together these factors tend to minimise any flood risk associated with the proposed car park facility.

Further the potential for the car park to impact on 1% AEP flood levels is considered. Given that the car park is to be built on a slab with void retained underneath, and given the limited volume of the construction in the 1% AEP flood extent, it is demonstrated that any impacts will be trivial.

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

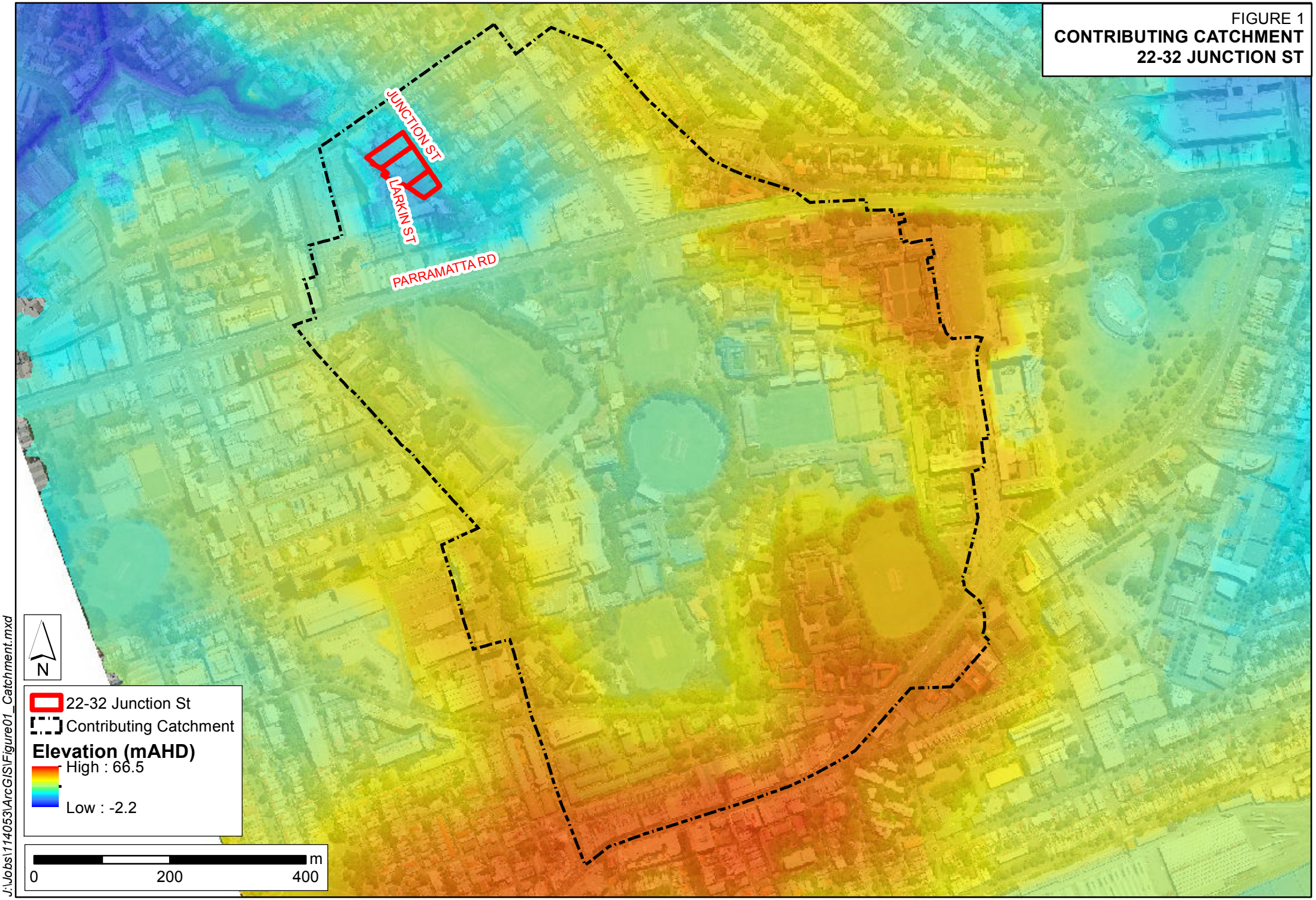


FIGURE 1
CONTRIBUTING CATCHMENT
22-32 JUNCTION ST
JUNCTION ST
LARKIN ST
PARRAMATTA RD
N
22-32 Junction St
Contributing Catchment
Elevation (mAHD)
High : 66.5
Low : -2.2
0
200
400
m
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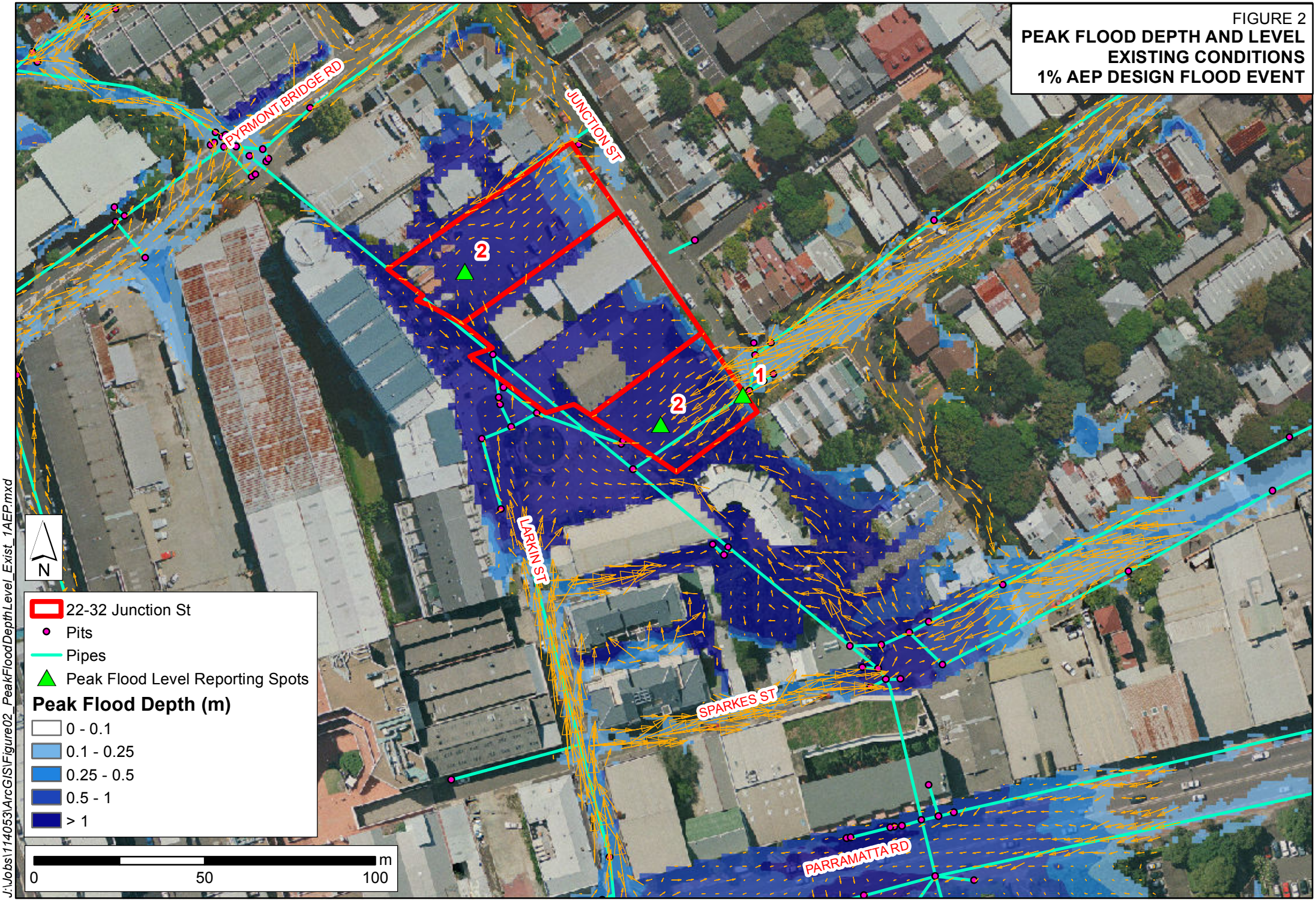
FIGURE 2
PEAK FLOOD DEPTH AND LEVEL
EXISTING CONDITIONS
1% AEP DESIGN FLOOD EVENT
PYRMONT BRIDGE RD
JUNCTION ST
LARKIN ST
SPARKES ST
PARRAMATTA RD
1
2
2
N
22-32 Junction St
Pits
Pipes
Peak Flood Level Reporting Spots
Peak Flood Depth (m)
0 - 0.1
0.1 - 0.25
0.25 - 0.5
0.5 - 1
> 1
0
50
100
m
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