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13 September 2013

Attention: James Lidis

Dear James

Re: Precinct 47 – Flood Liability Report

This report addresses the flood affectation of Precinct 47. It specifically describes the flood affectation and the implications this may have for future development options throughout the Precinct.

Introduction

Figure 1 identifies the broad location of Precinct 47 within the Sydney Metropolitan area.

Precinct 47 is flood affected by overland and mainstream flows related to the Marrickville Valley catchment, but is also partially flood affected by the Cooks River in the PMF event. Figure 2 shows combined flood affectation constraints due to the Cooks River PMF, Cooks River FPA (inclusive of climate change scenarios) and overland flow as per the Marrickville Valley Flood Study (MVFS).

To improve clarity, Precinct 47 has been split into four sub-areas which are named Area 1, 2 3 and 4. These areas have been further divided into sub-areas, of which there are 16 in total, based on the street network.

Figures 3-6 show areas impacted by the PMF extent as well as 1% AEP hydraulic categories. Areas impacted by the PMF will be subjected to controls (depending on the type of development, inclusive of residential). Floodway areas will be less able to be developed than other areas subject either to flood fringe or flood storage.

Marrickville City Council Flood Related Development Controls

Council has a 2011 DCP which outlines how development in flood prone areas is to occur.

In the first instance it defines flood prone land as land being within:

- The Cooks River FPA;
- Any overland flow FPA; and/or
- Flood liable land outside the two FPAs defined above.

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Further controls can exist for development that occurs within the Cooks River PMF extent.

The DCP does not state that where flood affectation exists there should be no development. Rather, it states the following objectives:

- Where development occurs there should be no impact on flood levels in adjoining property, i.e. a flood problem cannot be shifted elsewhere and neighbours cannot be disadvantaged;
- Development needs to be appropriate given flooding conditions; and
- Safe occupation and evacuation of flood prone land.

Under Council's DCP for specific types of development occurring within the PMF extent, a study examining flooding will be required. Specific types of development requiring such studies are listed in Councils DCP (2.22) under heading 2.22.3 "Development Affected". These types of development are:

- Caravan Parks;
- Correctional Centres;
- Emergency Services Facilities;
- Hospitals;
- Residential Accommodation (except houses, secondary dwellings or dual occupancies); and
- Tourist/Visitor Accommodation.

Twenty eight controls are then articulated in the DCP. These controls relate to general development (Controls 1 to 4) and then specific types of development including New Residential (C5, C6 and C7), Sub-divisions (C19, C20) and others.

Generally speaking controls are most onerous in regard to residential development. As such the residential development controls will be summarised herein. Firstly the general controls are articulated:

- C1 – for proposed development, consideration must be given to the nature of floodwaters, the flood classification of the area in question and the risk posed to the development by floodwaters;
- C2 – Any applicant seeking to develop flood prone land must demonstrate:
 - That the development will not increase the flood hazard or risk to other properties and that details have been provided regarding structural adequacy of any building to be built in a flood prone area;
 - That proposed building materials are suitable;
 - Siting is optimal with respect to avoid floodwaters and facilitate evacuation; and
 - Electrical services be adequately flood proofed.
- C3 – All DAs shall include a survey plan and a consideration of whether construction and/or filling are likely to affect flooding behaviour and whether other authorities need to be consulted; and
- C4 – Compliance with the flood management controls must be balanced with other areas of DCP compliance.

Residential Development Controls

Council have the following controls in place for New Residential development:

- C5 – freeboard is 0.5 m applied to "standard flood" (i.e. 1% AEP) unless minor overland flow (< 2 m³/s and < 300 mm depth) in which case a freeboard of 300 mm may apply;

- C6 – any flood prone building must be constructed using flood compatible materials and a list of these is provided in Schedule 1 (see DCP); and
- C7 – flood free access must be provided where practicable.

A further note from Council's DCP is the requirement for underground car parks to have an entrance level of at least the 1% AEP event plus freeboard (typically 0.5 m).

Summary of Council Controls relating to Flooding

Essentially Council controls may be interpreted as follows:

- Residential development in substantially flood impacted areas (based on PMF results) will be complicated by evacuation issues;
- Residential development in floodways will likely not be allowed on the basis that such development is not compatible with a floodway classification; and further
- Any proposed development in Precinct 47 will require a relatively extensive study in order to cover flooding related aspects of the proposed development.

Precinct 47 Flood Liability

Figure 2 indicates the flood affectation of Precinct 47. Flood liability is then further resolved in Figures 3-6 that show Marrickville Valley Flood Study results only (i.e. no Cooks River PMF is plotted). This has been done since MVFS results are critical for Precinct 47.

Sydenham Road is a major flow path at the southern extent of the Precinct. It runs from high to low as it moves east past the southern extent of the Precinct and is clearly shown to backwater from East Channel East. 9 m³/s enters via Sydenham Road in the 1% AEP event. Victoria Road, with 3 m³/s flowing south into Precinct 47, is another significant flow path.

Other flows into the Precinct are relatively minor overland flows with the following inputs noted:

- 0.4 m³/s from the north-west (York Street vicinity);
- 0.7 m³/s from the east on Addison Road;
- 0.6 m³/s from Chapel Street in the west and 0.4 m³/s from Gorman Street.

Outflows from the Precinct will tend to be via the south-eastern corner, although for large floods discharge is retarded by the elevated Eastern Channel East.

Both mainstream and overland flow flood mechanisms impact on Precinct 47. Mainstream flooding is where a watercourse exists and flooding results from this flow rising and then spilling over its banks. Overland flow is not associated with a watercourse and instead tends to result when runoff overwhelms stormwater systems (pits and pipes).

Flooding in and around the channel which runs from approximately York St in the north-west of the Precinct down to Fitzroy Street (near intersection with Smith Street) may be considered mainstream flooding, as might the flooding that occurs in the south-eastern corner of the Precinct (which is backwater from East Channel East). Other flood affectation is due to overland flow¹.

In the PMF flood event the south-east corner of the Precinct is substantially backwatered and subject to deep flood waters.

¹ The implication of flooding being mainstream or overland flow will tend to relate to the applied freeboard (0.5 m and 0.3 m respectively) and ease of evacuation (easier for overland flow, less so for mainstream flooding generally).

Constraints and Opportunities

The following is a discussion of the precinct on a sub-area by sub-area basis.

Each sub-area is discussed in the context of constraints and opportunities vis a vis flood affectation and Council requirements for development versus flood liability. Main issues constraining development where there is some flood affectation are as follows:

- Within a floodway (will tend to rule out any development as high risk and development are likely to lead to unacceptable off-site impacts);
- Does flooding worsen significantly as events get rarer (implications for evacuation and risk);
- Are egress routes available once flooding starts (given a lack of warning time as exists in this case)
- And so, in summary, we can say that a development can occur whilst complying with the following conditions:
 - Basement car park entrances at 1% AEP event height plus 0.5 m;
 - Evacuation possible;
 - No impact on surrounding property; and
 - No exacerbation of flood risk.

Essentially the issue is that highly flood prone lots will be better utilised for industry, as workers are far more mobile than residents in the event of flooding. Businesses are more capable of adapting practices to flood liability than residents. Businesses, if well prepared (as in have adapted business practices to suit flood liability), will suffer substantially less losses than residences.

Area 1

A minor open channel runs through this area but despite this, most flooding may be described as being overland flow.

- Sub-Area #1

Sub-area 1 is bounded by Addison Rd, Enmore Rd, Victoria Rd and Cook Rd. Flood affectation to the north, east and south is relatively minor overland flow. The worst flooding in the sub-area is near the intersection of Cook Rd and Victoria Rd.

Difficulties for evacuation on the southern end of Cook Road would tend to make this area preferable for non-residential use (evacuation issue). Alternatively development here might have street egress on Victoria Road (preferably as far north-east as possible).

All other areas, whilst flood affected, are suitable for the widest range of uses including residential as egress is available during flooding from Addison Road, Enmore Road and Victoria Road. The northern half of Cook Road would also be suitable for a range of uses, as again egress appears to be achievable.

A further positive is that flooding, such as it is in sub-area 1, will not scale for larger events due to the fact that a minor local catchment supplies flow.

In regard to potential flood impact associated with development, again it is the case that all areas of sub-area 1 will be a low risk of unacceptable flood impacts, barring the southern end particularly the Cook Road side.

- Sub-Area #2

Sub-area 2 is substantially impacted by a significant flow path coming from the west. It is bounded by Meeks Lane to the west, Jabez St to the north, then Denby Street and Addison Road and finally Cook Rd to the east and Brompton St to the south.

Floodway's are defined in Denby and Jabez Streets as well as Cook and Addison Roads and Brompton Street. As such evacuation is an issue.

If Brompton Street could be extended through to Shepherd Street egress for the sub-area would be improved, although some accompanying stormwater works would likely be required to reduce flood affectation on Shepherd Street as it currently stands.

Sub-area 2 has less developable area (as a fraction of the total area of sub-area 2) than sub-area 1 which is relatively clear of flooding internally.

The northern end of Cook Road and the side facing Addison Road appear less constrained than those areas further south.

- Sub-Area #3

Whilst sub-area 3 has an open channel running through it, flood affectation here is relatively slight, barring the Victoria Road frontage. The area is bounded by Brompton St to the north, Victoria Road and a small section of Cook Road to the east, Shepherd Street and Meeks Lane to the west and Chalder Street to the south. Of these street frontages, it is the Victoria Road, Cook Road and Brompton Street frontages which are not suited to egress. Good egress from the sub-area is available via Chapel Street but both the Chalder and Chapel Street frontages as well as Shepherd Street have good egress to higher ground. The Meeks Lane frontage on the north-west is impacted by deep floodwaters and so again is not suited to egress.

Within sub-area 3 the area south of the channel is little flood affected, has good egress and is near existing residential development. As such it must be seen as a site with near unlimited development potential from a flooding perspective. By contrast the area north of the channel has relatively less access to flood free land (if any) and owing to existing extent of flood affectation, has less development potential.

- Sub-Area #4

Sub-area 4 has Chapel Street to the north, Chalder Street to the south and a substantially flood affected Victoria Road to the east. Flood affectation on Chalder and Chapel Streets is relatively slight and good egress appears to be available albeit to the west of the sub-area.

The developable extent of land within sub-area 4 is close to 100% of that land available.

- Sub-Area #5

This area is bounded by Addison Road to the north (some flood affectation but likely still trafficable), Denby Street (floodway and unsuited for egress), Jabez Street (a floodway) and Shepherd Street to the west (also a floodway). As such egress is only possible to the north (Addison Road) and even then only Perry Street near the centre is a suitable access to higher ground.

Developable extent is good although as can be seen some flood affectation within the area does occur.

Overall the sub-area is significantly constrained with respect to egress with three of four street frontages being floodways and hence unable to be used in evacuation.

- Sub-Area #6

Similar to sub-area 5, sub-area 6 is highly constrained due to lack of evacuation route. Sub-area 6 has no street frontage suitable for egress.

Also sub-area 6 is further significantly flood affected with a large fraction of its total area subject to flood inundation in the 1% AEP event.

Area 1 Summary

Based on the above descriptions, the best sub area for development potential to the worst are as follows: 1, 3, 4, 2, 5 and 6.

Area 2

- Sub-Area #7

Sub-area 7 is bounded to the north by Edinburgh Road (near entirely flood free and leading to higher ground), to the east by Fitzroy Street (again near entirely flood free and a good egress route), Smith Street which is flood affected, most severely at the western end where it intersects with Victoria Road but is a good source of egress for most events on its eastern half. To the west sub-area 7 is bounded by Victoria Road which is not flood affected in its northern half but is severely flood affected in the southern half. Overall, there is good egress from the sub-area except for the south-western corner.

The developable extent is close to 100% of the total land area.

On the whole sub-area 7 will, except the south-west corner, be ideal for a wide variety of uses vis a vis its flood affectation.

- Sub-Area #8

Sub-area 8 is bounded to the north by an open channel, a heavily flooded Fitzroy Street to the east (classified a floodway and as such unsuited to egress), a flooded Chapel Street to the south which fails to link to any flood free links to higher ground and then a floodway classified Victoria Road to the west. As such egress for sub-area 8 is very poor.

Furthermore the sub-area is heavily flood affected (close to one third of land area approximately) and as such less land is available for development (without likely causing unacceptable flood impacts).

- Sub-Area #9

Sub-area 9 is bounded by the channel to the south, Victoria Road to the west (floodway), Fitzroy Street to the east (again a floodway, although flood affectation ceases near the intersection with Smith Street) and Smith Street to the north which is heavily flood affected to the west but less so for on the eastern half.

It is possible egress is available for sub-area 9 via Smith Street and then Fitzroy Street.

Area of flood affectation is relatively large. Given egress issues and extent of land inundated certainly not the least constrained sub-area vis a vis flood liability.

Area 2 Summary

As described above, sub-area 7 is the most preferable sub-area in Area 2. 9 is more preferable to 8 albeit more on the eastern end of 9 (western half has no egress). Sub-area 8 has severe egress issues.

Area 3

All of area 3 is severely impinged with respect to egress. On the Victoria Road side some evacuation is possible, albeit not by car due to a lack of flood free roads linking from Victoria Road to higher flood free ground. So pedestrian access would be possible to higher ground, but not vehicular egress.

- Sub-Area #10

Sub-area 10 is relatively free of any flood affectation but does suffer egress difficulties as described above.

Possible egress to the west (from north-west corner of sub-area 10) is possible and pedestrian access to higher ground is certainly possible to the west.

- Sub-Area #11
Uses of sub-area 11 will be constrained by its rather severe flood affectation. Deep flood waters (metres deep in the 1% AEP event) at the SE corner, substantial flood affectation and a total lack of egress all imply that uses are likely to be constrained by flooding. Also total land area is substantially impinged on by flooding and so developable area is relatively low.
- Sub-Area #12
Sub-area 12 suffers from a near total lack of egress, although that said, flood affectation is not as severe (mainly with respect to depth) as sub-area 11. Developable area is relatively good, however, uses will be constrained by a lack of ability to evacuate in the event of a flood.
- Sub-Area #13
Sub-area 13 has a relatively high amount of flood affectation, but unlike most lots in Area 3, it has potentially decent vehicular egress and certainly good pedestrian egress.
- Sub-Area #14
Sub-area 14 is Wicks Park. Ease of evacuation is not good and current degree of flood affectation in the 1% AEP event is 50% or higher. Given the Park is open space in a heavily built environment, and given flood affectation, it ranked very low in potential for development.

Area 3 Summary

Overall Area 3, being located in the south-east corner of the Precinct which has previously been described as the most flood affected part of the overall Precinct, has poor access to higher ground and this, along with reasonably large areas of flood affectation, will tend to constrain its development potential to those uses that don't aggregate people and hence won't exacerbate existing levels of flood risk.

In order to classify the sub-areas from best to worst for development potential vis a vis flooding, 13, 10, 12, 11 and then 14 would be a fair indication

Area 4

This area is in the south-western corner of the overall Precinct and it has relatively little flood liability.

- Sub-Area #15
Sub-Area 15 is near entirely flood free and egress is possible via Farr and Thompson Streets. Flooding poses no constraint.
- Sub-Area #16
Sub-area 16 is bounded by Farr Street to the west (good source of egress), has no street frontage to the north, Victoria Road to the east (floodway for most of it) and then Sydenham Road to the south (again a floodway).

Overall flood affectation is a very low fraction of available area.

Development potential may be impinged for areas fronting Victoria Road and Sydenham Road; however areas fronting Farr St are not flood affected.

Area 4 Summary

With little potential for flooding to constrain development, with the exception of land fronting Victoria Road and Sydenham Road, Area 4 is relatively unconstrained to development. Between the two sub-area, 15 is barely affected by flooding and hence the preferable of the two.

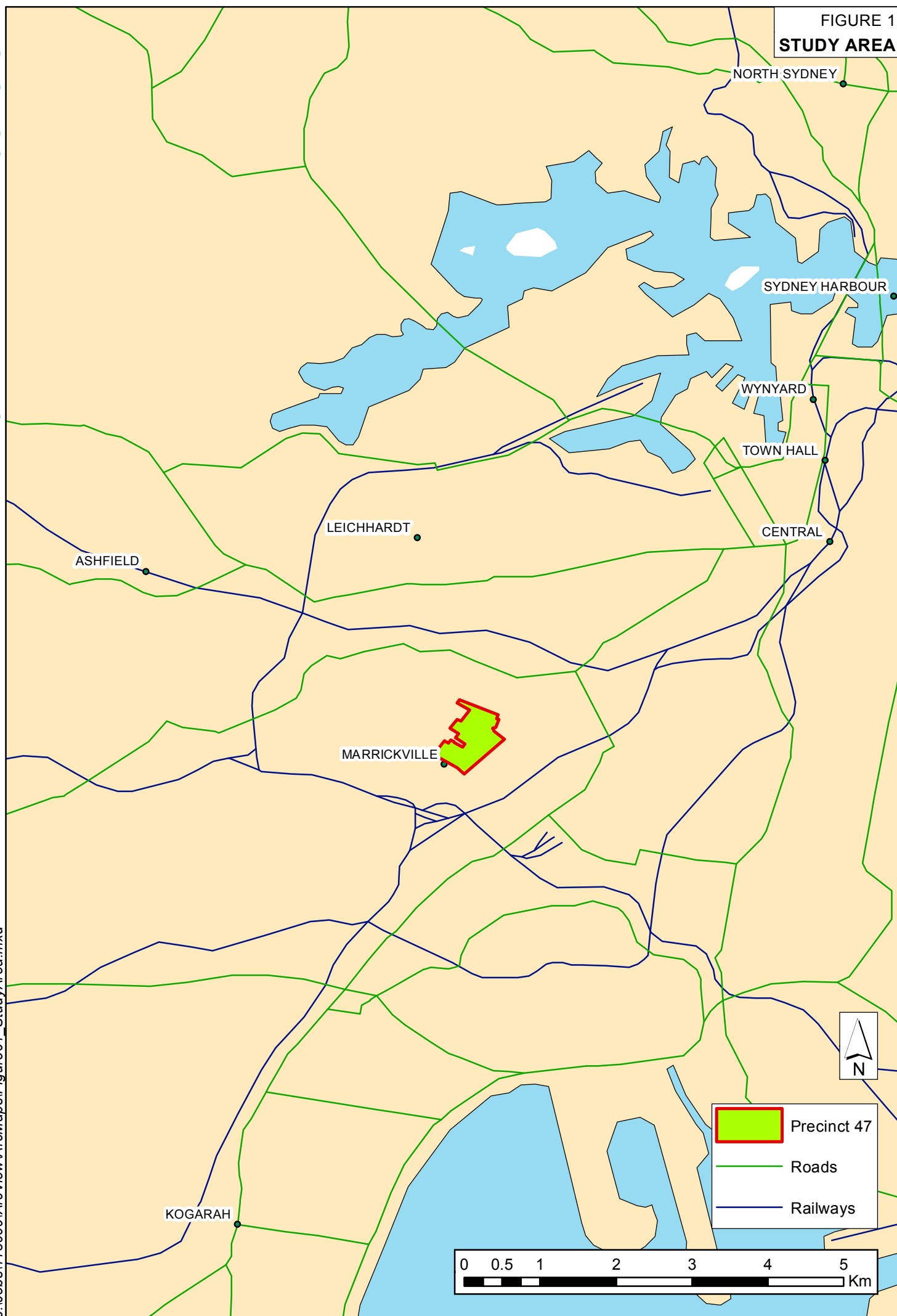
Summary

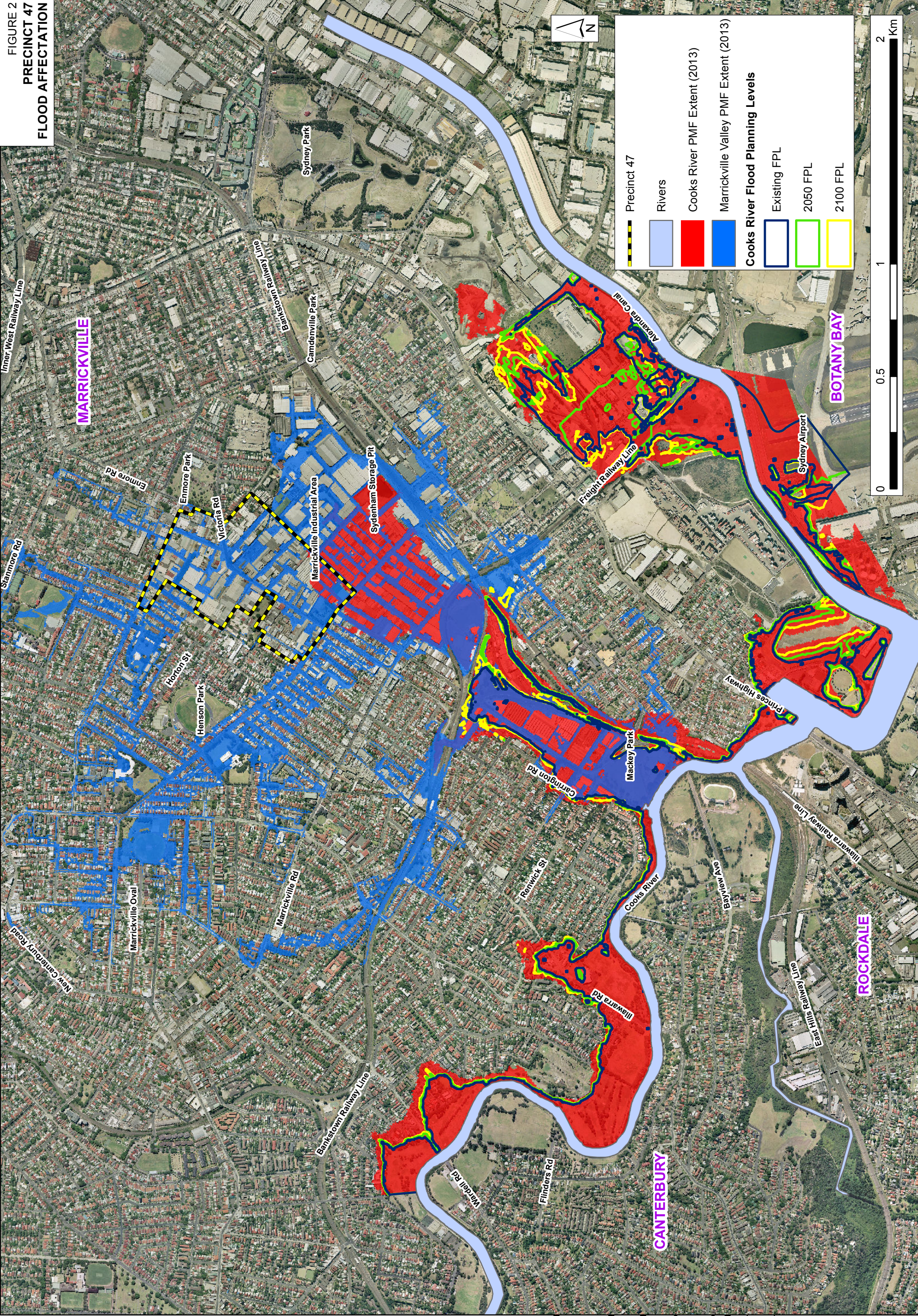
Figure 7 illustrates the development potential within Precinct 47. Based on Council's DCP and the Precinct's flood affectation, the 16 sub-areas have been classified into three groups: no constraint, some constraint and constrained. Flood affected lots tend to be the most concentrated into the north and east of Precinct 47.

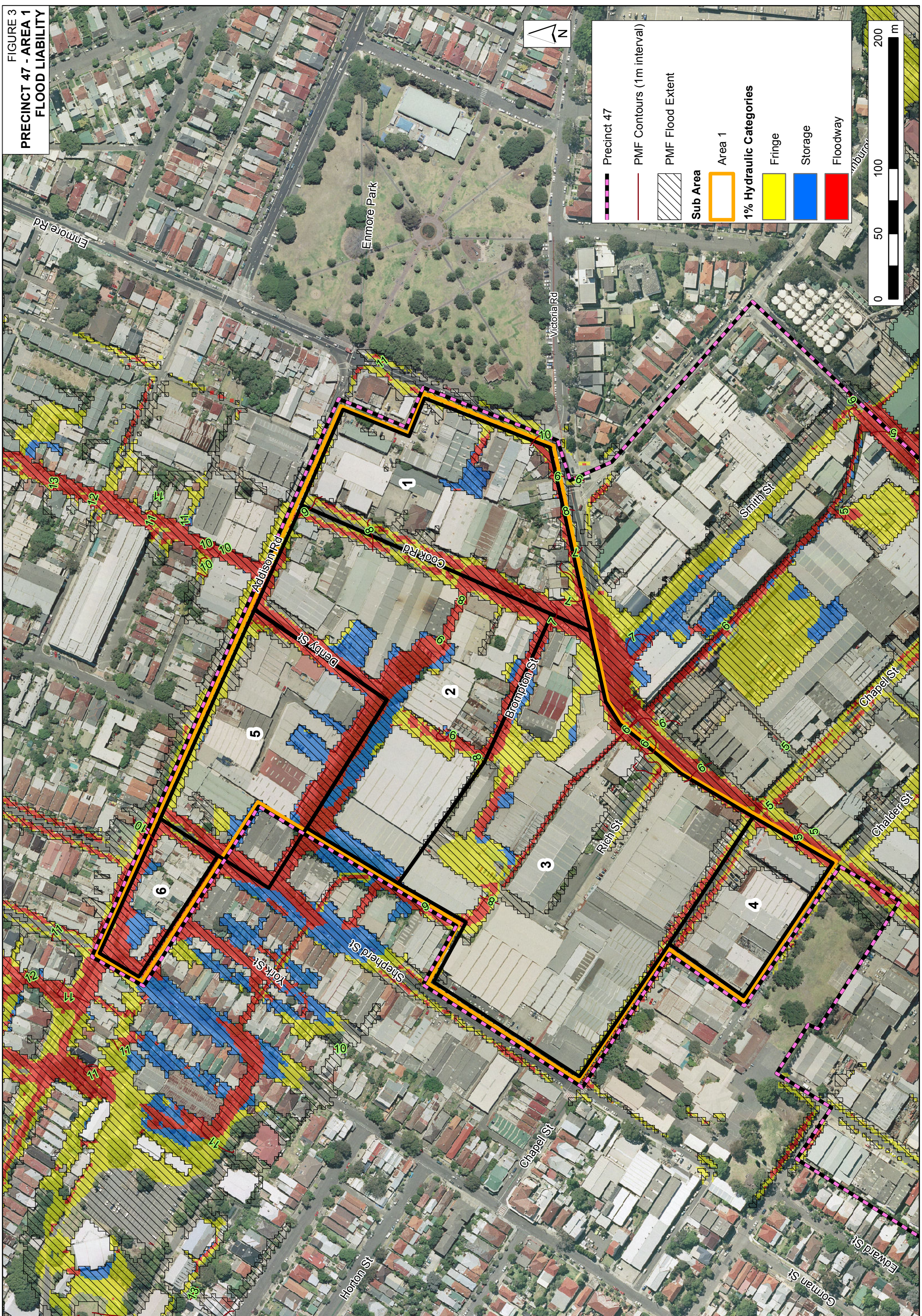
Yours Sincerely,
WMAwater

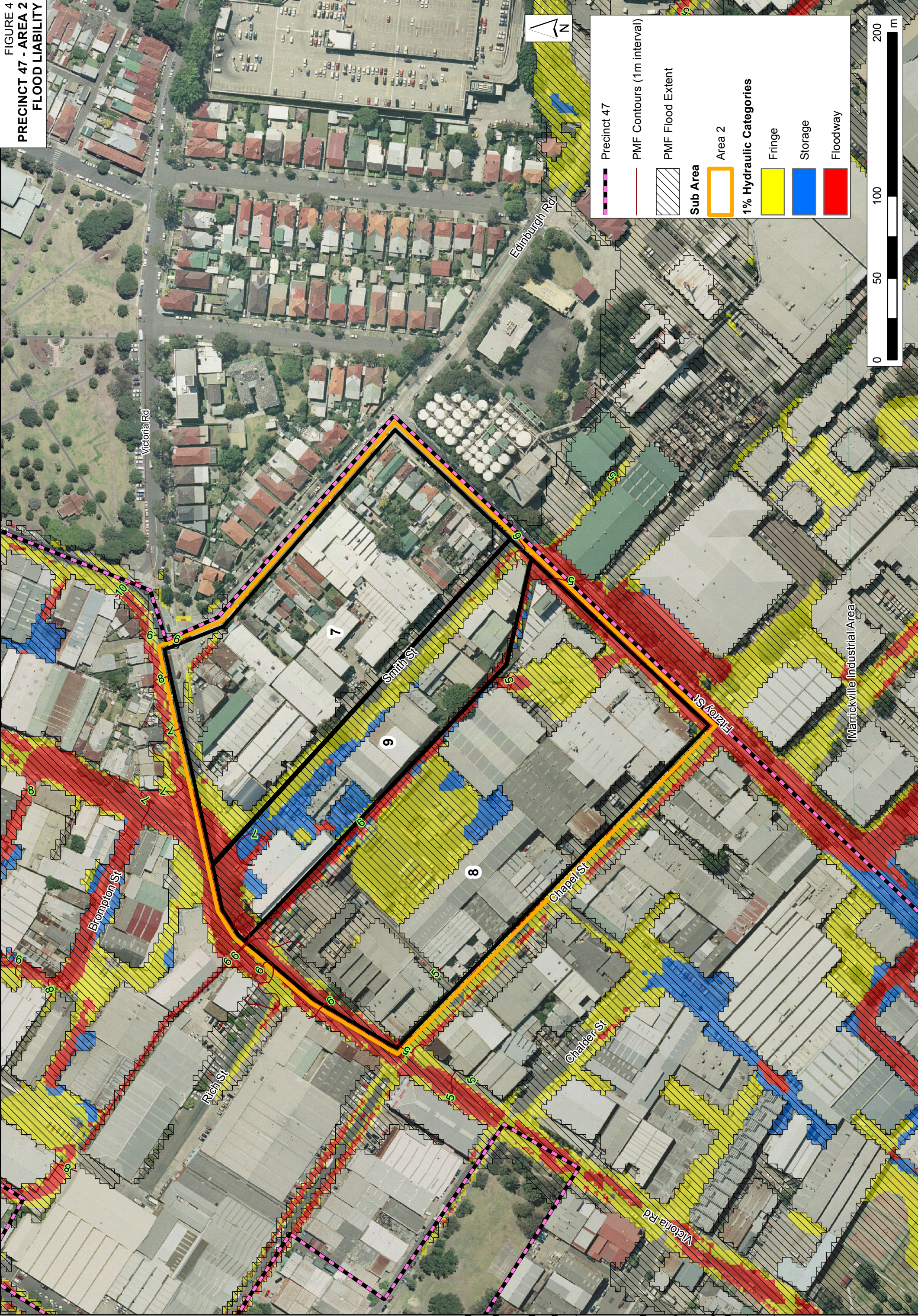
Stephen Gray
DIRECTOR

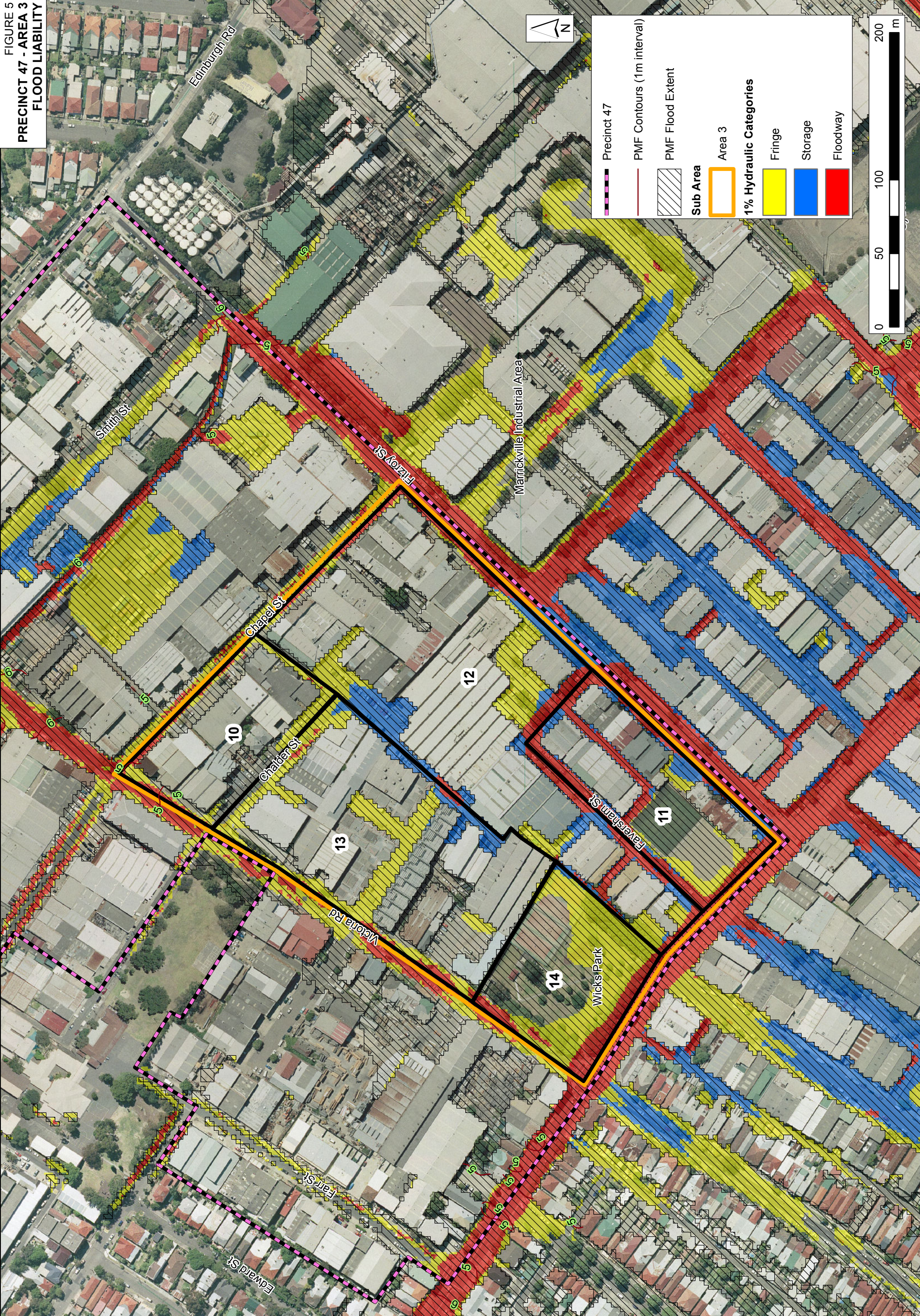
FIGURE 1
STUDY AREA











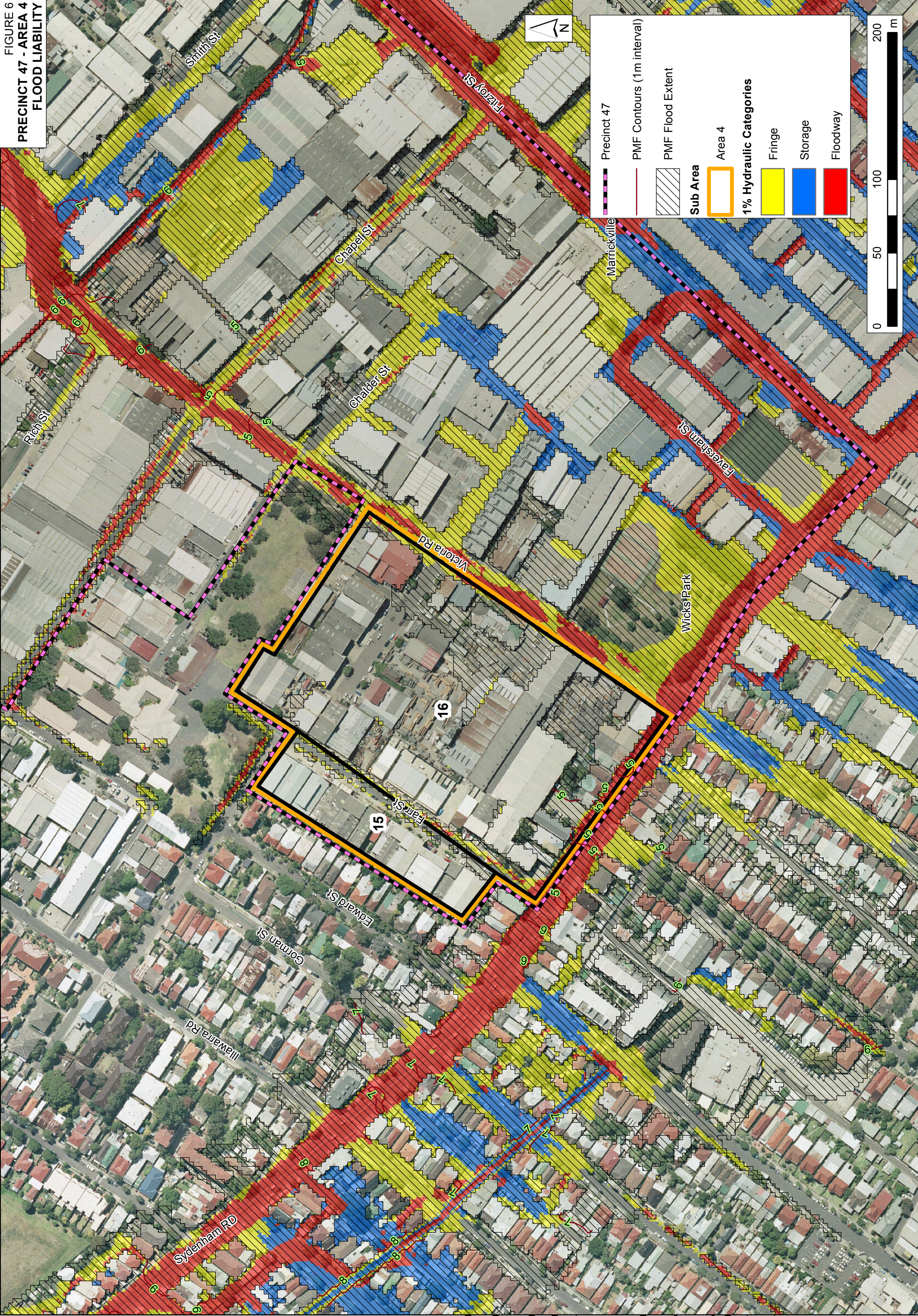


FIGURE 7
PRECINCT 47 - ALL AREAS
DEVELOPMENT POTENTIAL

