

Owners of Strata Plan 50411

**Planning Proposal 153-157 Walker
Street, North Sydney**

**Civil Infrastructure and Stormwater
Report for Planning Proposal**

153-157 Walker Street - Civil Infrastructure and Stormwater
Report for Planning Proposal

Issue | 22 March 2021

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Job number 277336-1




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1 Background

1.1 Overview

APP Corporation Pty Ltd has engaged Arup to provide civil engineering and stormwater advice for the 153-157 Walker Street Planning Proposal at North Sydney, which includes a commercial tower and podium.

This report will identify the high-level civil engineering, stormwater and flood planning level requirements for the Planning Proposal to North Sydney Council. This advice is based on a desktop review of:

- *North Sydney LGA Flood Study, Final Report*, February 2017, WMAwater
- *Public Domain Style Manual and Design Codes*, April 2016, North Sydney Council
- Ground and utilities survey for the Site by LTS Survey dated 15th July 2020.

1.2 Concept Design Scope

The proposed concept design features a 40-storey commercial office tower, sub-divided by two mid-level plant rooms and a rooftop plant zone. There are also four basement levels. Refer to the Site Plan in Figure 1.1 and the Site Description in Table 1.1 for further details.

The concept design proposal comprises:

- A commercial office tower with 54,430 m² of gross floor area (GFA)
- Three lower ground levels for lobby/retail space
- 35 levels of A-Grade commercial office space, which is sub-divided by two mid-level open area plant/terrace spaces and a rooftop open plant zone
- Four basement levels for the loading dock, back of house (BOH), end of trip (EOT) facilities and 104 car parking spaces.

1.3 Project Address

The proposed site includes two existing properties whose ownership is split between several stakeholders. The existing buildings will be demolished and a new multi-storey commercial tower constructed in their place. The existing buildings are:

- 153 Walker Street, Lot 0/SP50411, and
- 157 Walker Street, Lot 1 DP84729.

The Site has frontages to Walker Street along its western boundary and Little Walker Street to the east.



Figure 1.1 - Site Plan

As the proposed development is currently at the concept design phase, the advice contained within this report is intended to be generic and applicable to a range of applications.

1.4 Site Breakdown

Table 1.1 - Existing Site Breakdown

Lot	153 Walker Street	157 Walker Street
Registered owner	Multiple stakeholders	Multiple stakeholders
Lot	Lot 0/SP50411	Lot 1 DP84729
Site Area (Approx.)	641 m ²	1,287 m ²
Site dimensions (Approx.)	14.63 m Walker Street, 43.8 m northern boundary	29.38 m Walker Street, 43.8 m northern boundary
Frontage	Walker Street and Little Walker Street	Walker Street and Little Walker Street
Zoning	B3 Commercial Core	B3 Commercial Core
Heritage – NSW State Heritage Register (SHR)	No	No
Levels Above Ground (Approx.)	12	13

2 Review of Existing Flood Study

The flood behaviour at the Site is described in the *North Sydney LGA Flood Study, Final Report* (WMAwater, February 2017). The report documents flood modelling undertaken for the area using TUFLOW 2D hydrodynamic modelling, which modelled a 2 m grid size and rainfall on grid hydrology using Australian Rainfall and Runoff 1987 data. Relevant extracts from the flood study have been included in Appendix A.

A review of the flood maps included within the study indicates that:

- The proposed Site is positioned at the top of a relatively steep hydrological catchment identified as M5 in the *North Sydney LGA Flood Study*. Catchment M5 includes a predominantly urban area and drains in a south-easterly direction towards Milson Park in Kirribilli, as shown in Figure 2.1 (sourced from the North Sydney Catchment figure in Appendix A).
- The steep topography local to the Site drains surface water runoff in a southerly direction down Walker Street and Little Walker Street towards the Pacific Highway. Refer to Figure 2.2 for details.
- For the 1% Annual Exceedance Probability (AEP) flood event, the peak flood depth is between 1 mm and 150 mm adjacent to the Site, and is contained entirely within the kerbed sections of the Walker Street and Little Walker Street roadways without overtopping the kerbs. The reason for the range of flood depths is because the flood study maps show the lowest depth band of 1% AEP flooding as 1-150 mm. Therefore, the exact 1% AEP flood depth is currently unknown. Refer to Figure 2.3 for details, sourced from the Peak Flood Depth 1% AEP event flooding figure in Appendix A.
- For the Probable Maximum Flood (PMF), the peak flood depth is also less than 150 mm adjacent to the Site and contained entirely within the kerbed sections of the Walker Street and Little Walker Street roadways without overtopping the kerbs. Again, the flood study maps show the lowest depth band of flooding as 1-150 mm for the PMF event. Therefore, the exact PMF depth is currently unknown.
- Peak flood depths across the wider area have the potential to reach above 1 m at the Walker Street and Mount Street intersection during 1% AEP and PMF events. This is due to the presence of a local sag which accumulates surface water runoff from the northern portion of the catchment. This low point is located approximately 130m southwest of the site. Refer to Figure 2.4 for details (sourced from the Peak Flood Depth PMF event flooding figure in Appendix A).

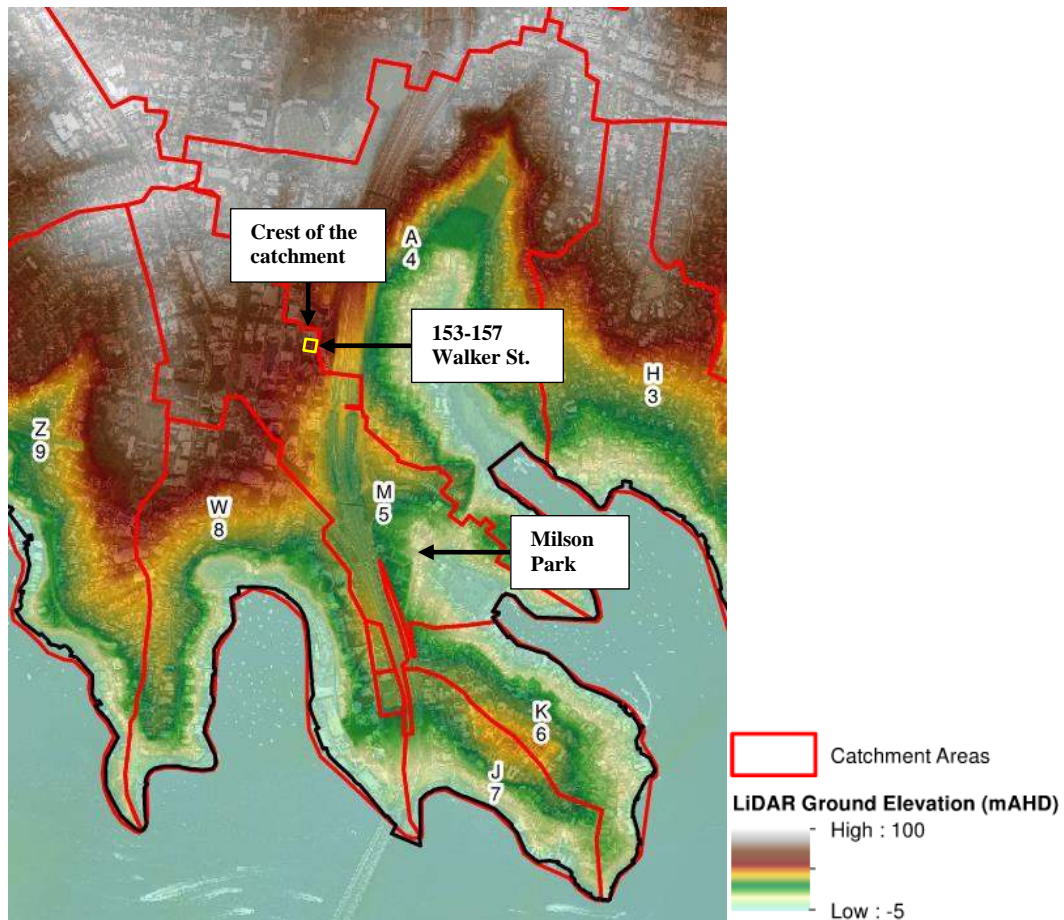


Figure 2.1 - 153-157 Walker Street location within Catchment M5 (Source: *North Sydney LGA Flood Study*)

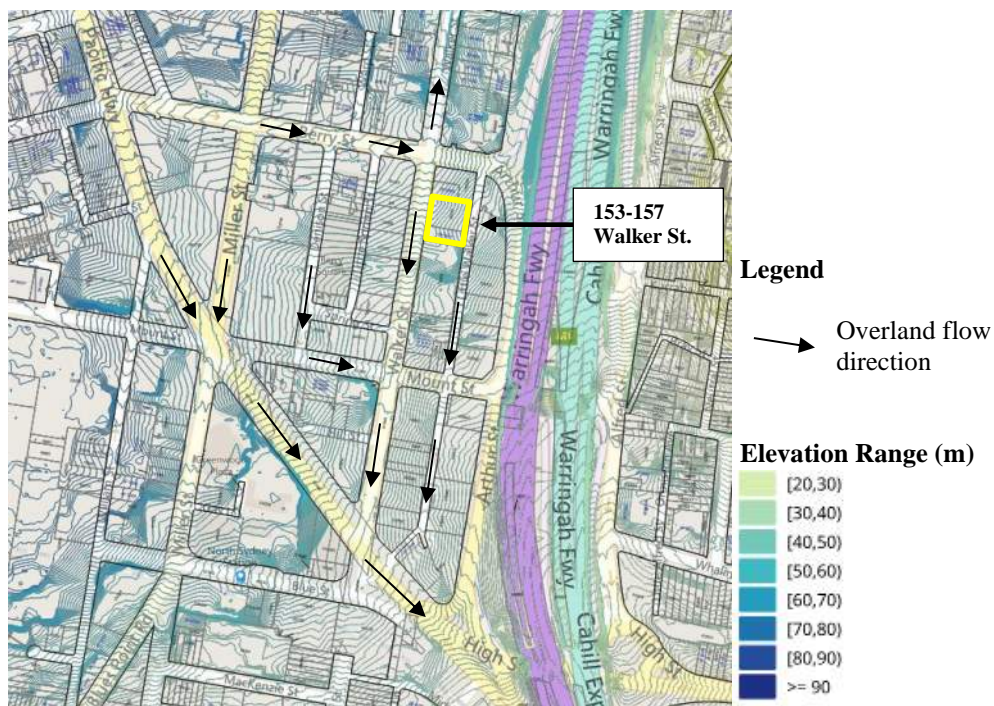


Figure 2.2 - 153-157 Walker Street location with reference to the North Sydney Council contours database at 0.5m intervals (Source: *North Sydney Council Contours*, 2013)

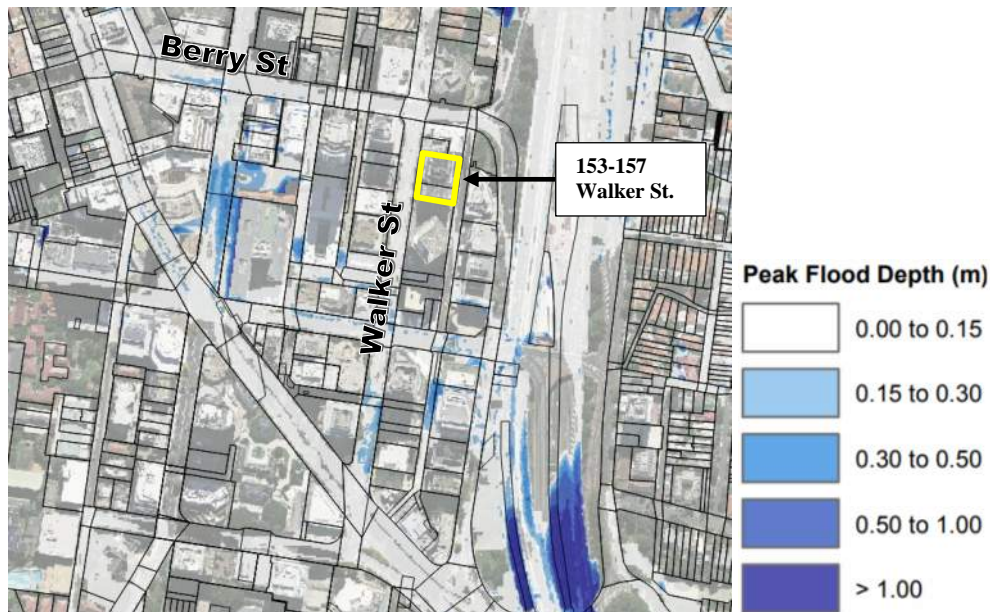


Figure 2.3 - 153-157 Walker Street Peak Flood Depths for the 1% AEP flood event
(Source: *North Sydney LGA Flood Study*)

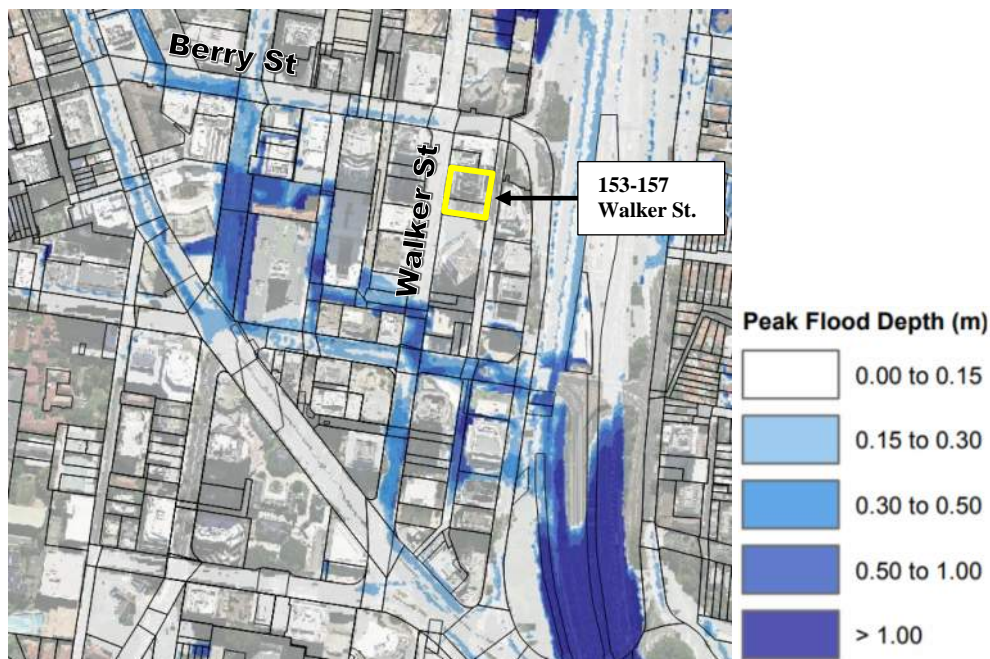


Figure 2.4 - 153-157 Walker Street Peak Flood Depths for a PMF event (Source: *North Sydney LGA Flood Study, 2017*)

The *North Sydney LGA Flood Study* (2017) defines a floodplain as “an area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land”. As the PMF peak flood depths within Walker Street and Little Walker Street adjacent to the Site are a maximum of 150 mm and entirely contained within kerb, the frontages of the Site are considered to be outside of the floodplain.

The 1% AEP and PMF event provisional hydraulic hazard maps (Refer to Figure 2.5 and Figure 2.6) show that only low provisional hydraulic hazard is present

within the kerbed area of Walker Street adjacent to the Site. There is no identified provisional hydraulic hazard within Little Walker Street adjacent to the Site for both the 1% AEP and PMF events.

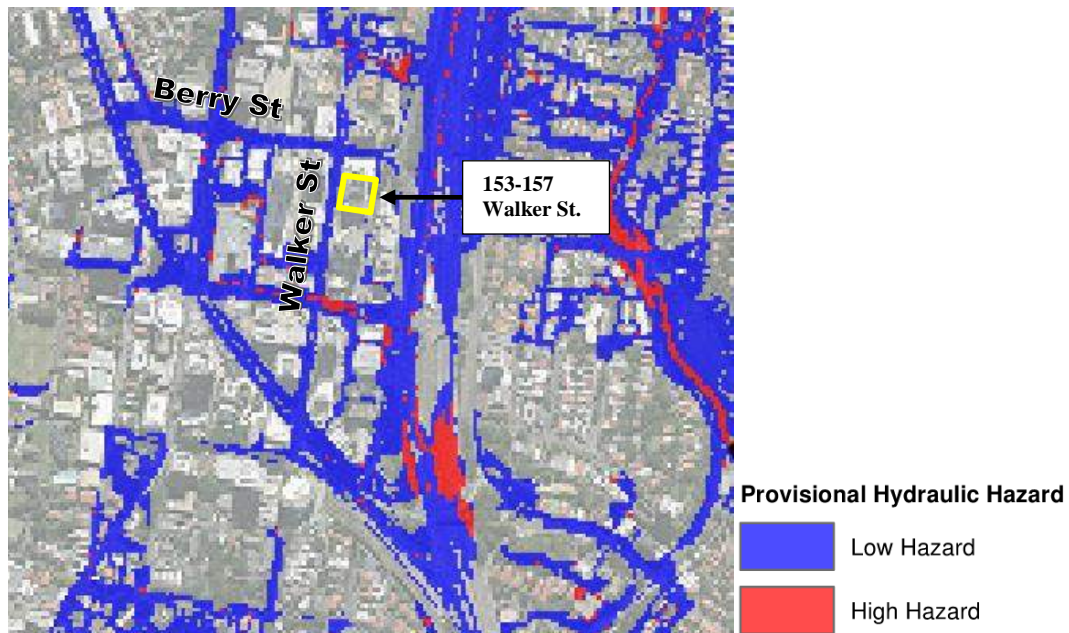


Figure 2.5 - 153-157 Walker Street Provisional Hydraulic Hazard for a 1% AEP flood event (Source: *North Sydney LGA Flood Study*)

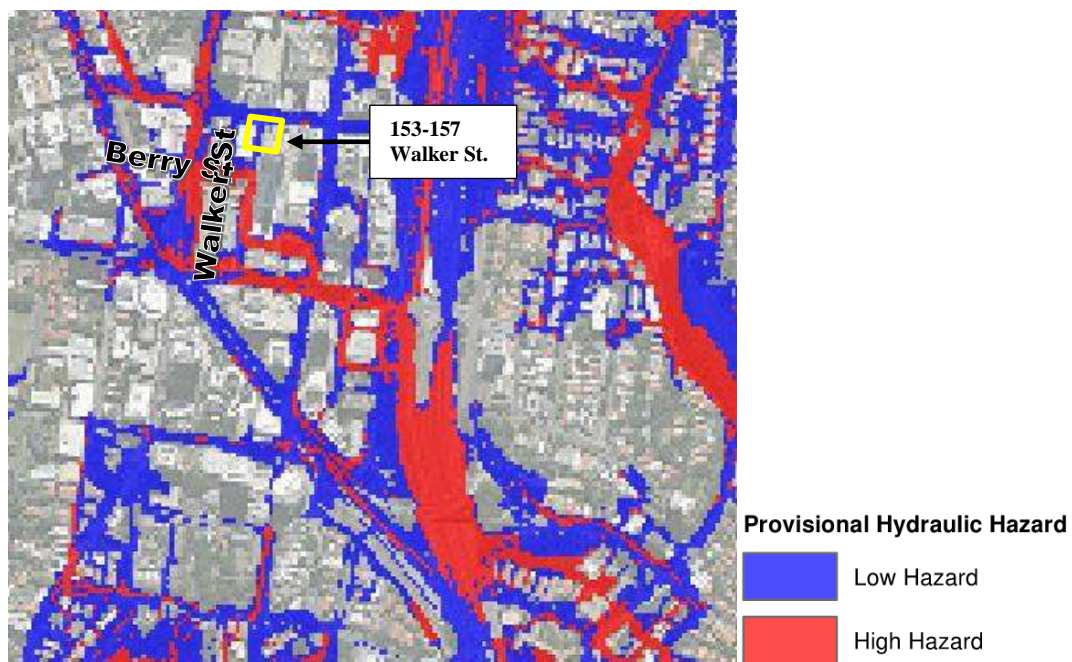


Figure 2.6 - 153-157 Walker Street Provisional Hydraulic Hazard for a PMF event (Source: *North Sydney LGA Flood Study*)

Based on the *North Sydney LGA Flood Study* review, the proposed Site is not anticipated to be impacted by flooding during 1% AEP and PMF events. Refer to Sections 3 and 4 for details of the Site flooding compliance.

3 Flood Design Criteria

There are no flood planning controls in the North Sydney Council *Development Control Plan* (DCP, 2013) or *Local Environmental Plan* (LEP, 2013). Flood planning levels (FPLs) represent the minimum permissible building floor levels. On the 27th of August 2020, North Sydney Council provided an excerpt from their in-house standard conditions that are generally imposed on large-scale developments. The excerpt states “*floor levels adjacent to overland flow paths are to be minimum 500 mm above the 1 in 100-year flood level*”. This document is not publicly available, and North Sydney Council have noted that these standard conditions may be amended to suit each particular development case.

4 Development Requirements

Section 2 concluded that due the local topography surrounding the project footprint, there is little likelihood of the Site flooding from Walker Street or Little Walker Street during 1% AEP and PMF events. This observation is supported by the North Sydney LGA flood study maps, which indicate that overland flows along Walker Street and Little Walker Street during 1% AEP and PMF events do not exceed 150 mm in depth (flooding is wholly contained within the road reserve and is no deeper than the top of kerb). As such, the additional 500 mm freeboard specified in the North Sydney Council standard conditions would be several times the 1% AEP and even PMF flood depths.

Based on past experience at North Sydney, we are aware that other project locations with similarities to 153-157 Walker Street – at the top of catchments with relatively shallow 1% AEP and PMF flood depths contained wholly within kerb – have not adopted the 1% AEP flood depth + 500 mm freeboard FPL requirement. The following strategies were instead adopted for these projects:

- 100 Mount Street: Similar to 153-157 Walker Street, the local topography featured steep roads adjacent to the Site. As flooding risk was also found to be minimal at this Site (1% AEP and PMF depths were wholly within kerb), the proposed ground floor levels were instead determined based on the maximum ground floor level required to meet Disability Discrimination Act (DDA) compliance (1:40 grade footpaths), with no freeboard required above the adjacent 1% AEP flood level.
- 110-122 Walker Street: Also similar to 153-157 Walker Street, 1% AEP flood depths were fully contained within the road reserve (maximum of 100 mm above the existing road surface). As such, the FPLs for habitable floor levels were set at a minimum of 1% AEP + 300 mm freeboard or PMF flood levels + 150 mm freeboard (whichever was higher).

The following sections outline the proposed flood planning level development strategy along the building frontages of 153-157 Walker Street which would achieve appropriate flood immunity.

4.1 Walker Street

The ground floor of the proposed development will be accessed by two revolving doors fitted along the Walker Street frontage. The internal space will be designed for commercial/business uses and will serve as the lobby of the building. Several elevators will be included to provide vertical transportation from the ground floor to the upper levels and basement floors.

The ground floor requires a flood planning level that is applicable to ground and basement floor access, as the basement levels will be directly accessible from the ground floor through several elevator shafts and staircases. Additionally, to ensure DDA compliance, the back of footpath area to the building entrance along Walker Street must maintain a maximum 1:40 grade.

In order to achieve DDA compliance from the existing Walker Street back of footpath level located perpendicular to the proposed northern revolving door, a ground floor level of 60.15 mAHD must be achieved as a maximum. Based on the ground survey that was collected by LTS on 15th July 2020 (refer to Appendix C), the existing top of kerb is 59.93 mAHD, which will result in a freeboard of 0.22 m above the maximum possible 1% AEP flood depth (which is assumed to be top of kerb in this assessment, although in all likelihood is probably considerably lower as even the maximum PMF depth does not exceed top of kerb level). A summary of these FPL's is outlined in Table 4.1.

Table 4.1 - Flood Planning Level Summary for Walker Street

Walker Street	Levels (mAHD)
Existing top of kerb level adjacent to the northern revolving door entrance to the ground floor lobby	59.93 mAHD
Existing back of footpath level adjacent to the northern revolving door entrance to the ground floor lobby	60.13 mAHD
Maximum required ground floor level to achieve DDA compliance from existing back of kerb (1:40 grade)	60.15 mAHD
Resulting freeboard above the 1% AEP flood level (assuming the 1% AEP peak flood depth is equal to the top of kerb)	0.22 m

Assuming that the PMF depth is a maximum of 150 mm (as shown by the flood map depth bands, and because PMF flooding is located entirely within the standard kerb height of 150 mm), it is highly likely that the peak 1% AEP flood depth would be less than 150 mm. Therefore, by designing to meet DDA compliance, the resulting freeboard in addition to the 1% AEP flood depth is likely to be greater than 0.22 m.

Similar to the projects at 100 Mount Street and 110-122 Walker Street, this approach would achieve DDA compliance and provide 300 mm freeboard or greater in addition to the 1% AEP flood depth. Given that the 1% AEP and PMF flood depths are both below the top of kerb, and noting that a PMF event has a return period of approximately once in every ten million years, a building flood planning level that is greater than 300 mm above the 1% AEP and PMF levels would achieve an appropriate level of flood immunity.

It is understood that the design will be further refined at the next design stage to incorporate DDA compliant public domain outcomes in consultation with North Sydney Council.

4.2 Little Walker Street

There will also be a basement car park driveway access at the rear of the development along Little Walker Street. The driveway will grade downwards away from Little Walker Street and will provide vehicular passage to the basement levels and back of house and end of trip facilities.

Similarly to Walker Street, the 1% AEP and PMF flood depths within Little Walker Street are both less than 150 mm and contained within the kerbed section of the road. Therefore, a flood planning level above the top of kerb level would provide flood immunity from 1% AEP and PMF events, with a currently unknown freeboard depth included for the 1% AEP event (and potentially the PMF event too – based on the assumption that the 1% AEP flood depth will be notably lower than the PMF flood depth, which in turn is lower than top of kerb height).

Table 4.2 - Flood Planning Level Summary for Little Walker Street

Little Walker Street	Levels (mAHD)
Top of kerb level adjacent to the proposed basement ramp	56.39 mAHD
Resulting freeboard above the 1% AEP flood level	Unknown at this stage, although potentially anywhere between 1 and 150 mm

Additionally, assuming there will be no change to kerb alignments or road and footpath levels, the future shared zone proposed within Little Walker Street should have little impact on existing flooding and the proposed FPLs for the Site.

As discussed in the previous sections of this report, given the local topography, flood study results and the fact that the project footprint is located at the top of the catchment, it is assumed that the Site is not within a flood prone area or at risk of flooding from 1% AEP or PMF events. However, further interrogation of the flood model may be undertaken at the next design stage to confirm more accurate flood depths adjacent to the Site for the 1% AEP and PMF events. If the Site is proven to be located within the floodplain following flood model interrogation, the above advice will need to be re-assessed.

5 Stormwater

5.1 Stormwater Drainage Design

A survey of the major utilities and ground levels surrounding the Site was undertaken by LTS on the 15th of July 2020 (refer to Appendix C for details).

The survey did not document any stormwater pipe alignments along the development frontages of Walker Street or Little Walker Street. Dial Before You Dig (DBYD) Sydney Water stormwater data collected for the Site area also did not indicate any stormwater drainage pipe alignments along these frontages. The North Sydney Council Geographic Information System (GIS) database online indicates a series of Council owned stormwater drainage pipes and pits along Walker Street on the opposite side of the road.

However, the LTS survey did indicate that there are two blocked stormwater kerb inlet pits adjacent to 153 Walker Street and a kerb inlet pit at the rear of the building along Little Walker Street, even though stormwater pipe alignments are not shown in between these stormwater pit locations. A cross-reference of the survey with Google Streetview and a site visit conducted by Arup Civil Engineers on the 27th of August 2020 confirmed the pit locations. The site visit also confirmed that the two stormwater kerb inlet pits adjacent to 153 Walker Street are blocked by sediments and litter (refer to Figure 5.1).

A high flow inlet pit (three concurrent kerb inlet pits) located adjacent to 121 Walker Street appears to represent the nearest downstream unblocked stormwater inlet along this frontage (refer to Figure 5. 2).



Figure 5.1 – Stormwater drainage pits along the Walker Street frontage (Left: upstream pit adjacent to 153 Walker Street; Middle: downstream pit adjacent to 153 Walker Street; Right: downstream pit adjacent to 121 Walker Street)



Figure 5. 2 - High flow stormwater inlet pits adjacent to 121 Walker Street

The kerb inlet pit at the southeast corner of the Site along Little Walker Street is in poor condition and may require renewal (refer to Figure 5.3). Any stormwater pit replacements should match the North Sydney Council *Public Domain Style Manual and Design Codes*.

The nearest downstream stormwater pit along Little Walker Street identified during the site visit is positioned adjacent to 132 Arthur Street (refer to Figure 5.4). Based on observations undertaken during the site visit, it is assumed that the stormwater drainage pipe alignment along the western side of Little Walker Street begins at this location, with what appears to be a 375 mm diameter pipe.



Figure 5.3 - Little Walker Street Stormwater Kerb Inlet Pit at the rear of 153 Walker Street



Figure 5.4 - Stormwater drainage pit adjacent to 132 Arthur Street on Little Walker Street

Three Site stormwater discharge options are recommended for this concept design at the pre-development application stage (refer to Figure 5.5):

1. Discharge to the nearest stormwater drainage pit along Walker Street, which is positioned adjacent to the proposed Site. This pit and the next two pits downstream will need to be unblocked and the receiving stormwater pipe diameters confirmed before connection from the proposed building is made.
2. Discharge to the Little Walker Street kerb inlet pit located at the rear of 153 Walker Street. This pit may need to be replaced and the receiving stormwater pipe diameter confirmed before connection from the proposed building is made.
3. A combination of Options 1 and 2.

5.2 On-Site Detention (OSD)

The North Sydney DCP stipulates that for commercial and mixed-use developments, on-site detention (OSD) should be included where practicable to minimise and filter stormwater runoff. Furthermore, North Sydney Council's *Stormwater Management and Disposal Design Plan* details that the maximum permissible site discharge does not exceed a 1 in 5-year storm of 1-hour duration. The OSD should be sized to accommodate for all other stormwater run-off from the site for all storms up to a 1 in 20-year storm event, where it will be retained on-site for gradual release to the kerb and gutter or local piped drainage system. This would be provided in an OSD tank to be located in the building basement.

4. Since the Site is approximately 90 m away from the nearest Sydney Water stormwater pit and does not discharge directly into the Sydney Water network, there is no obligation from Sydney Water to provide an OSD.



Figure 5.5 - Stormwater discharge options for 153-157 Walker Street

5.3 Water-Sensitive Urban Design

The North Sydney DCP requires all commercial developments to integrate Water-Sensitive Urban Design (WSUD) on-site within their designs to mimic pre-development or natural drainage systems. The DCP also stipulates that:

- All developments must demonstrate how the run-off from the site will be minimised and the how the quality of the water leaving the site will be improved.
- All developments, including major alterations, need to install a rainwater tank. These tanks need to be utilised with appropriate end-uses, including and not limited to, garden irrigation and toilet flushing.

- All commercial developments with a GFA greater than 2,000 m² should demonstrate that the development will achieve certain post-development pollutant load standards (refer to the North Sydney DCP for details).
- Post-development stormwater quality should be improved from pre-development levels.

A combination of the following technology and WSUD measures would aim to ensure the development's compliance:

- Rainwater tank harvesting
- Gross Pollutant Traps (GPT)
- Proprietary Stormwater Treatment Products (e.g. Jellyfish Filters)
- Raingardens.

6 Erosion and Sediment Control

As part of the North Sydney DCP, an *Erosion and Sediment Control Plan* for the construction of a commercial building is required. As a minimum, it is recommended that the erosion and sediment control for the Site should include the following measures in accordance with *Volume 1 of Managing Urban Stormwater: Soils and Construction* (Landcom, 2004, 'The Blue Book'):

- Any overland flow or groundwater should be collected within a designated sump / basin during excavation. A pump at its lowest invert level should be included in the basin. This pump will discharge any collected rainwater to the nearest local stormwater system through a rising main (minimum discharge capacity should be 3 L/s). Based on the site boundary level, a maximum building site area of 1,928 m² and the Blue Book requirement to capture all stormwater runoff from the site for a 3-month average recurrence interval (ARI), 12 hour duration event, the sump for 153-157 Walker Street is estimated to require a minimum volume of 75 m³ (this value has not considered groundwater inflow, which will need to be measured on site or determined from a groundwater analytical calculation). There is an opportunity to reuse water from the sump for construction site dust suppression, as required.
- Sediment fences should be placed around the downstream border of the Site to prevent sediment-laden overland flow from leaving the Site boundaries.
- Temporary construction vehicle entry/exit ramps should be installed at the site access zones to capture any loose sediment stuck to tyres before vehicles enter/exit Site.
- Portable gravel kerb inlet sediment traps or geotextile filter fabric stocking drop inlet sediment traps should be placed around the immediate downstream stormwater inlets on Walker Street and Little Walker Street.

The sediment traps will capture sediment within gutter flows before it can enter the underground stormwater system.

A preliminary erosion and sediment control plan outlining these measures, notes and example details is included in Appendix B.

7 Utilities

The LTS survey conducted on the 15th of July 2020 maps out the locations of major utilities in the vicinity of the Site, including DBYD findings (refer to Appendix C for the survey plans).

Along the Walker Street frontage exists potable water, two communication cables and underground electricity cables within the footpath. Additionally, an existing gas main is located beneath under the road carriageway. Along the Little Walker Street frontage there is also potable water, two gas mains, underground electricity cables and a sewerage line beneath the road carriageway, although no utilities appear to be positioned within the footpath.

In conclusion, the survey does not include any utilities within the Site boundary. It is also worth noting that the DBYD survey identified a ground and sub-transmission ground substation at the rear of both the 153 and 157 Walker Street buildings.

North Sydney Council requires a minimum safe distance of 1 m from any active parking sensors during major works. The DBYD survey indicates a series of parking sensors along Walker Street adjacent to the proposed Site. However, it does not appear that the sensors are within 1 m of the project footprint and should therefore not present a significant issue during construction.

Caution must be taken when working near underground utilities, and it is worth noting that DBYD information is not necessarily of the highest quality and may only provide indicative locations of some utilities. Intrusive investigations (e.g. slot trenches) should be undertaken to identify accurate locations for key utilities prior to commencing works on site.

8 Public Domain Requirements

It is understood that all civil works to be undertaken in the public domain along Walker and Little Walker Street must be in accordance with the North Sydney *Public Domain Style Manual and Design Codes* (September 2019). The timeline of photographs included within Google Streetview indicate that the Walker Street public domain has recently been upgraded to reflect the style palette of a main road in North Sydney Centre. Upgraded elements include granite pavements, kerbs, gutters and vehicle ramps. Refer to the site photograph in Figure 8.1 for details.



Figure 8.1 - Public domain along the Walker Street frontage

Any upgrade works associated with the public domain pavements, vehicular ramps and kerbs along Little Walker Street will be considered in coordination with North Sydney Council requirements and DDA requirements at subsequent design stages.

9 Conclusion

Following a review of the *North Sydney LGA Flood Study*, the key points regarding the existing flooding conditions at the Site include:

- The North Sydney Council flood maps indicate a maximum flood depth of 150 mm for 1% AEP and PMF events within Walker Street and Little Walker Street. This means that all floodwaters will be contained entirely within the kerbed areas of these road reserves and will not spill onto the footpaths or cross the Site boundaries. As a general rule, the 1% AEP flood depth is likely to be notably less than the PMF flood depth, which should equate to a level that is markedly lower than top of kerb level.
- The proposed access and ground floor level on Walker Street, and the basement access threshold level on Little Walker Street, have been designed at an elevation greater than top of kerb level and therefore include a flooding operability that is greater than both the 1% AEP and PMF events. A PMF event has a return period of approximately once in every ten million years.
- In the unlikely event that both the 1% AEP and PMF levels are equal to the top of kerb level on Walker Street, the ground floor level with access to the basement through elevator shafts and staircases will be provided with at least 290 mm freeboard above these very rare and extreme flood events.

- Similarly, in the event that the PMF level is equal to the top of kerb level on Little Walker Street, the vehicle ramp threshold level with access to the basement and back of house and end of trip facilities will be provided with a currently unknown amount of freeboard above the 1% AEP event and flooding operability during the PMF event.
- The exact flood depths within Walker Street and Little Walker Street in the form of a flood model or flood model results files have been requested from North Sydney Council. If provided, these levels can be assessed in more detail at the next design stage in consultation with North Sydney Council and the proposed ground floor and basement access threshold levels adjusted as required.

Following a review of DBYD survey and ground and utilities survey collected on site during 15th July 2020, three stormwater design options have been proposed to facilitate a suitable stormwater connection from the Site. Existing stormwater pit upgrades and maintenance (unblocking) will be required before connections from the proposed building can be made to either Walker Street and/or Little Walker Street.

Additionally, an OSD tank will be required and should be sized at subsequent design stages to contain stormwater run-off from the Site for all storms up to a 1 in 20-year storm. WSUD and associated technologies will also be implemented at the next design stage to ensure compliance with the North Sydney Council DCP.

A preliminary erosion and sediment control plan has been prepared and includes sediment fences, stormwater inlet pit protections and other relevant measures to prevent disturbance to the surrounding Site during construction.

Furthermore, it is understood from recent survey data that no existing utilities will be impacted by the project footprint as they are all located underneath the footpath or within the trafficked road corridor beyond the Site boundaries.

Finally, the refinement of DDA compliant public domain areas within the through site link and along the Walker Street and Little Walker Street frontages will be included at the next design stage in coordination with North Sydney Council and in accordance with the North Sydney *Public Domain Style Manual and Design Codes* and DDA requirements.

Appendix A

North Sydney Council Flood Maps

A1

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FIGURE 2
LiDAR SURVEY

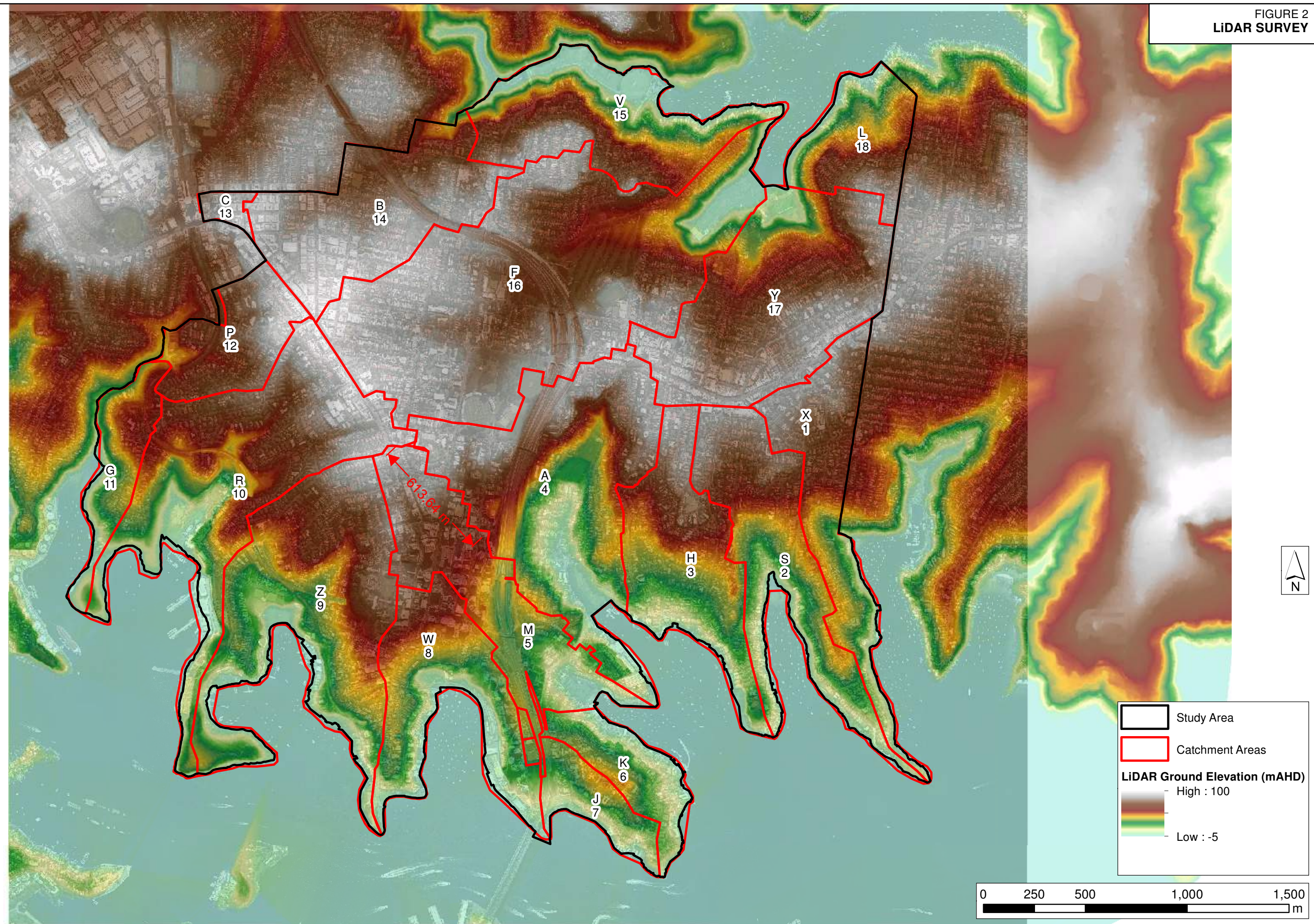


FIGURE 22
PEAK FLOOD DEPTH AND
FLOOD LEVEL CONTOURS
1% AEP

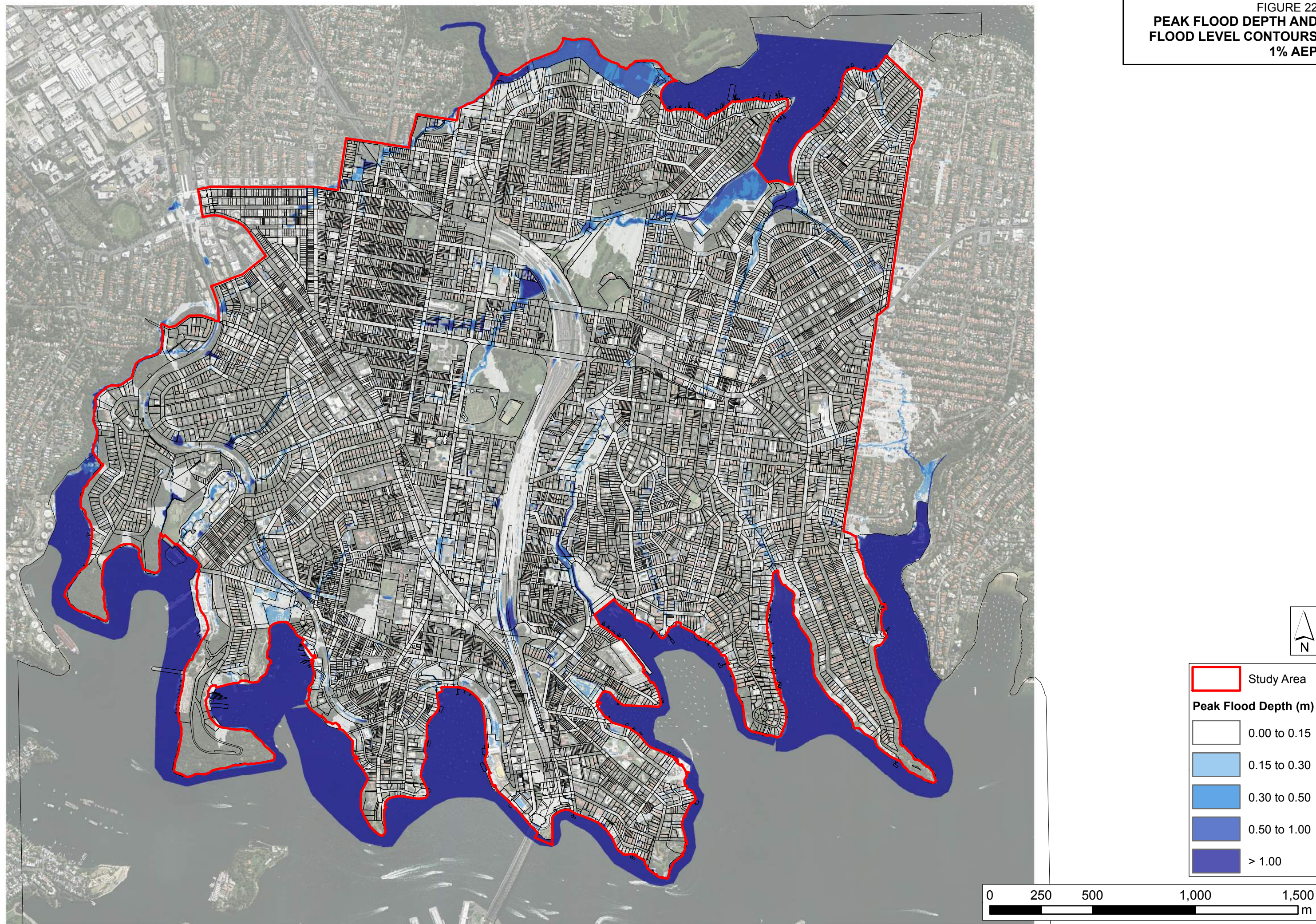
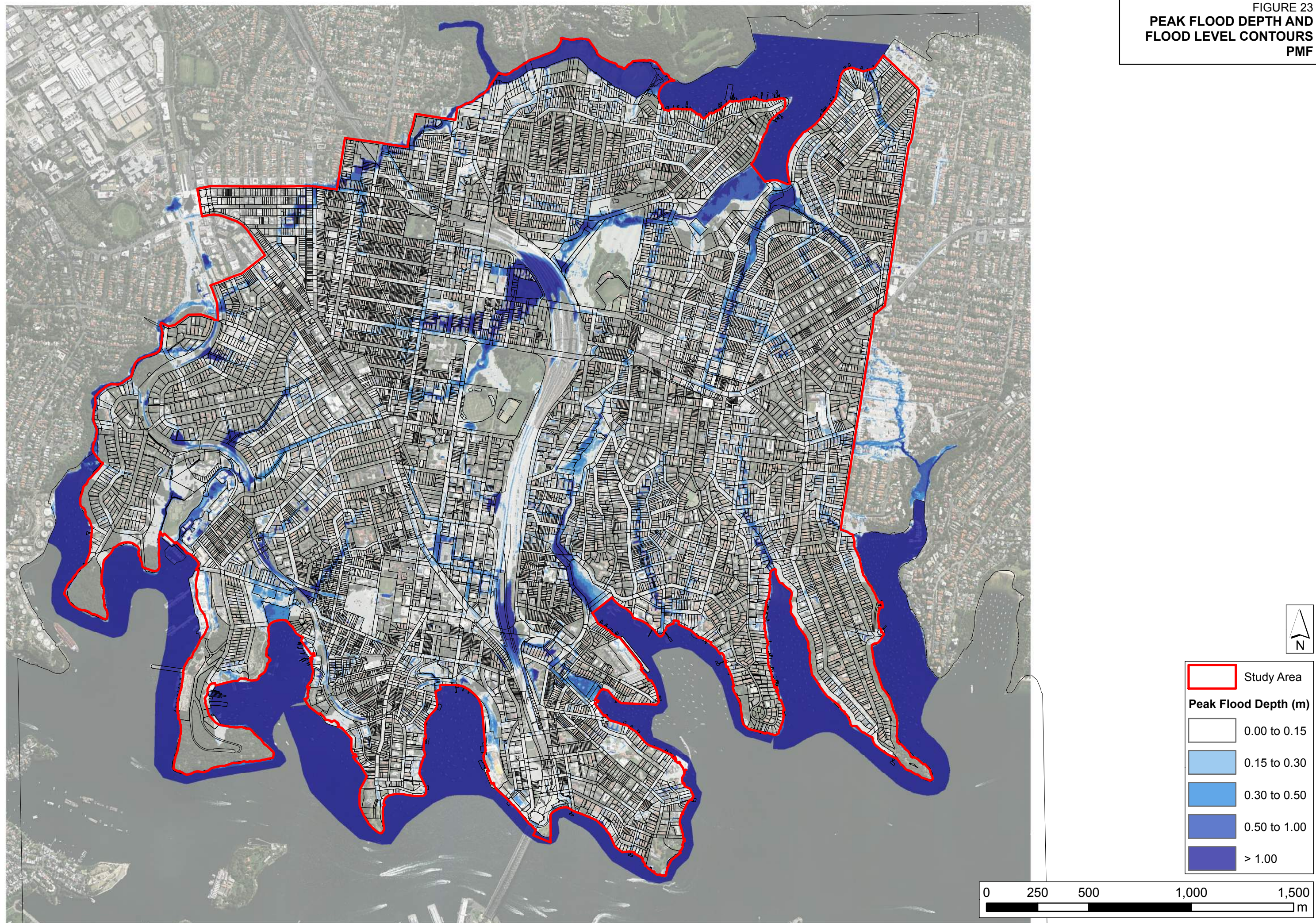


FIGURE 23
PEAK FLOOD DEPTH AND
FLOOD LEVEL CONTOURS
PMF



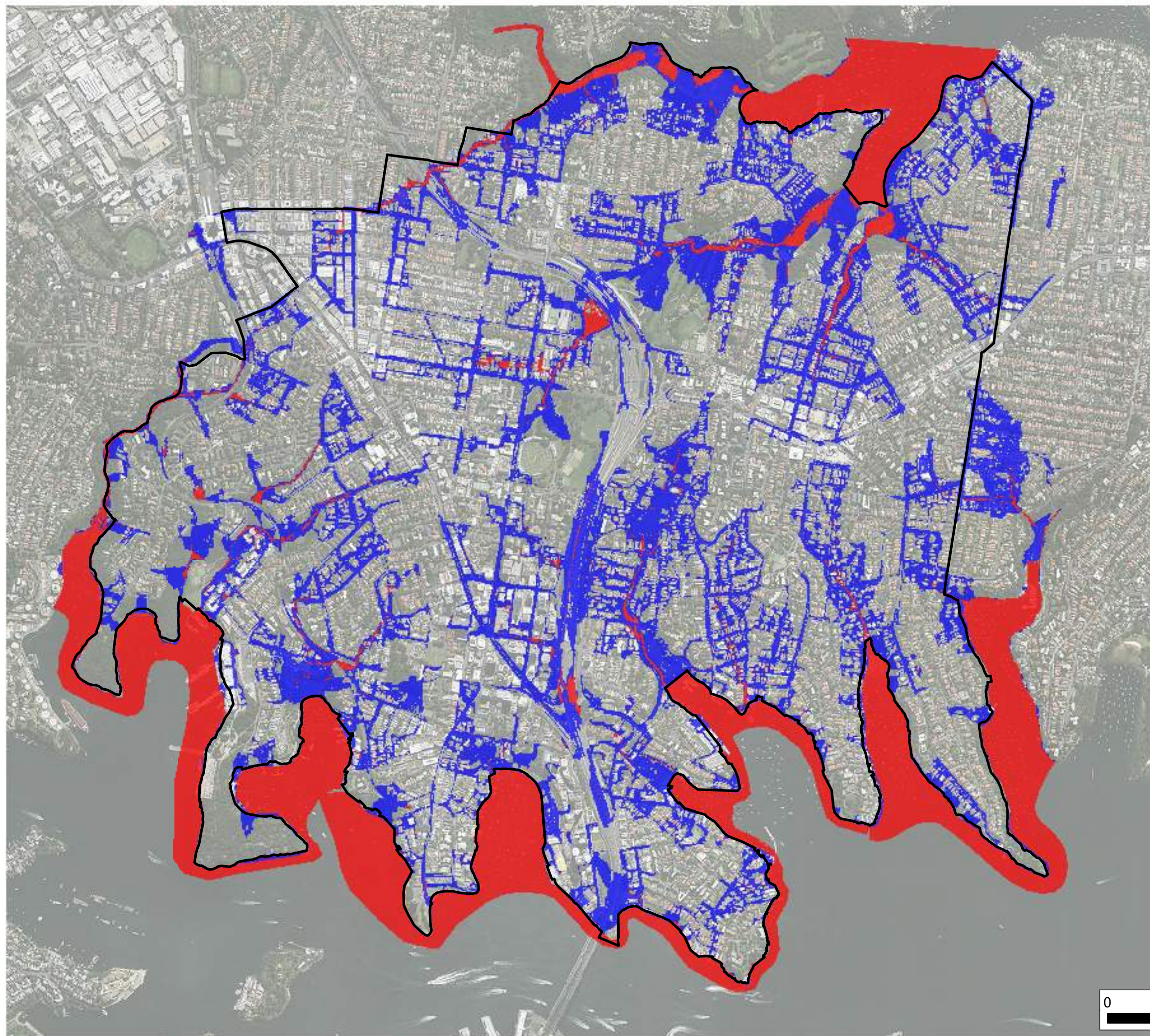
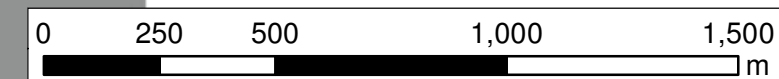


FIGURE 26
PROVISIONAL HYDRAULIC HAZARD
1% AEP



- Study Area
- Provisional Hydraulic Hazard**
- Low Hazard
- High Hazard



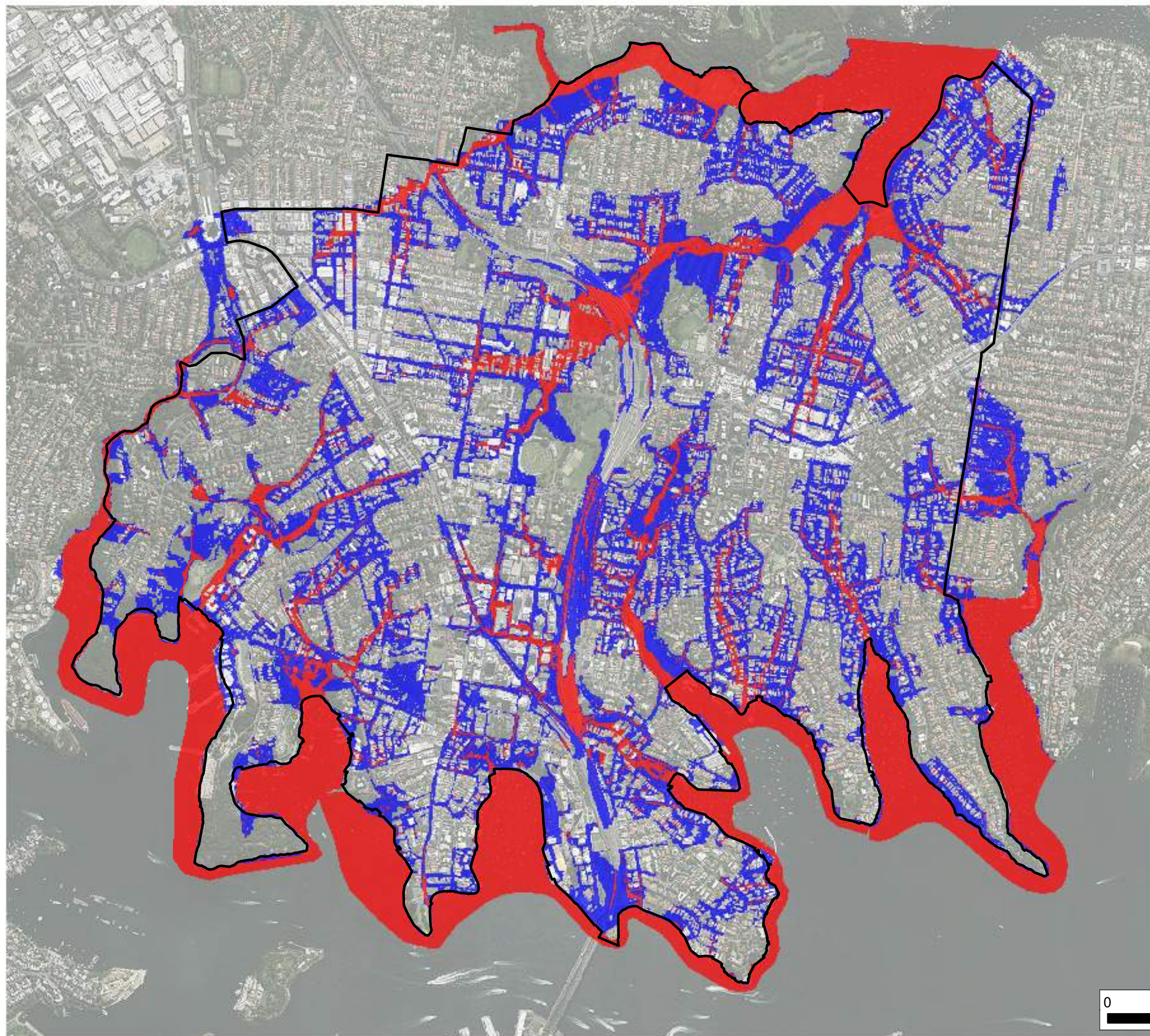


FIGURE 27
PROVISIONAL HYDRAULIC HAZARD
PMF

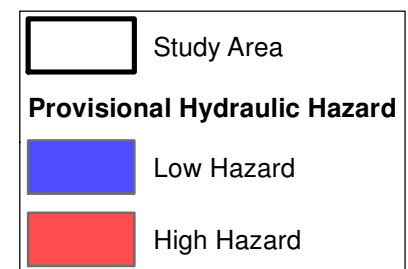


FIGURE 30
PROVISIONAL HYDRAULIC CLASSIFICATION
1% AEP

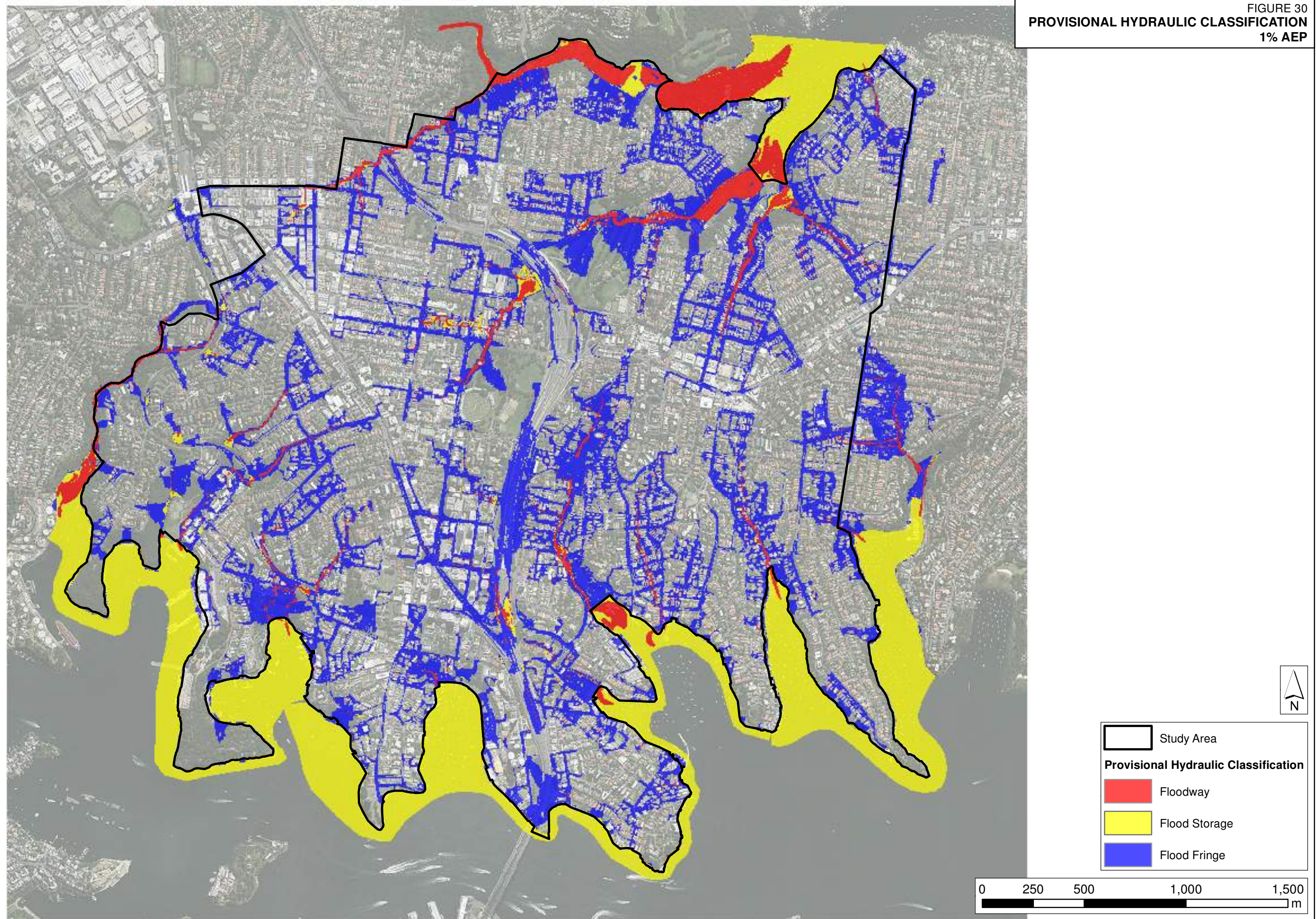
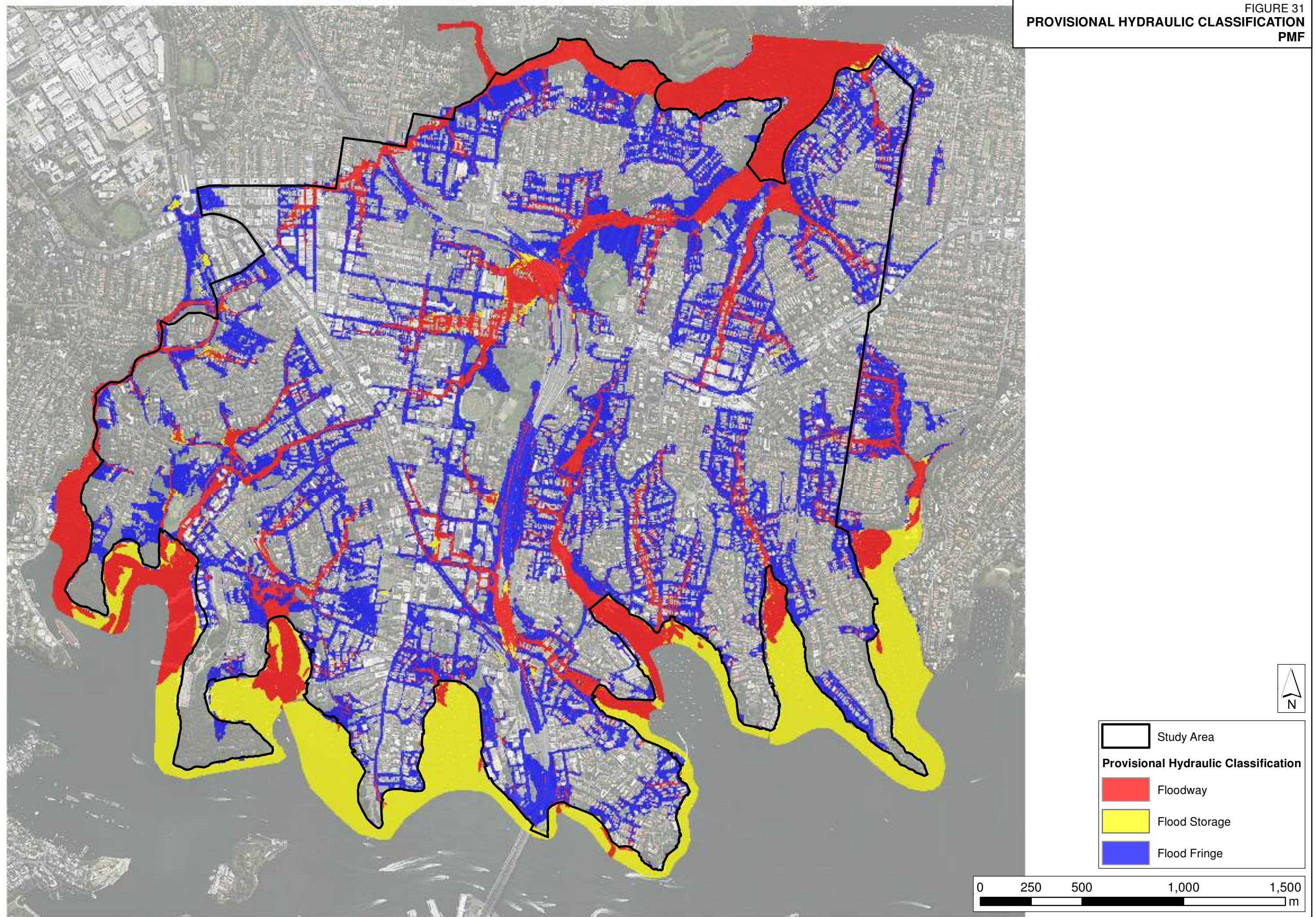


FIGURE 31
PROVISIONAL HYDRAULIC CLASSIFICATION
PMF



Appendix B

Preliminary Erosion and Sediment Control Plan and Example Details

B1

**SKETCH 001 - 153-157 WALKER STREET PRELIMINARY
EROSION AND SEDIMENT CONTROL PLAN
ARUP 27/08/2020**



Legend



Assumed area of disturbance

Indicative sump with pump within base of excavation
(location to be determined from earthworks modelling)

Indicative rising main alignment (discharges from
pump to local stormwater system)

Indicative stormwater inlets located immediately
downstream (locations to be determined on site)

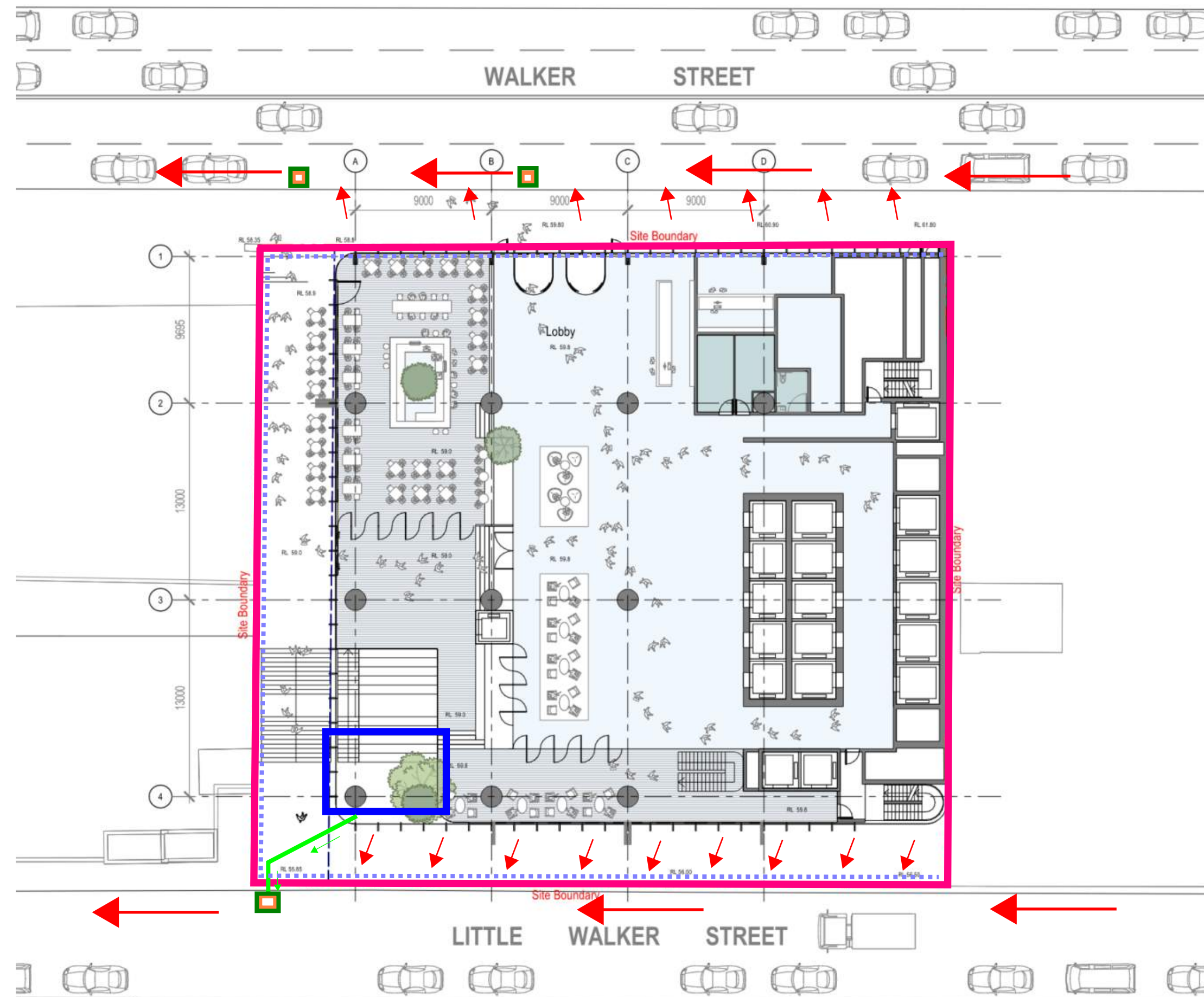
Direction of overland flow

Indicative stormwater inlet sediment trap (arranged
around stormwater inlet perimeter)

Silt fence with construction entrances/exits included
where required

Notes

1. Refer to Sketch 002 for detailed notes.
2. Refer to Sketch 003 for details of example erosion and sediment control measures.

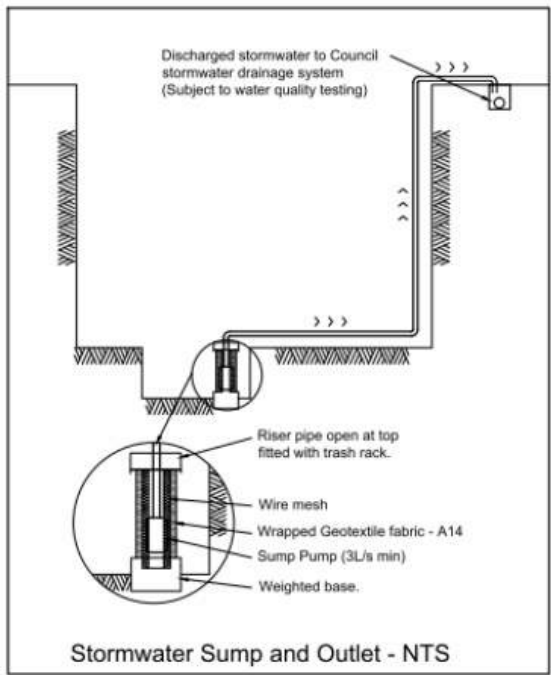


SKETCH 002 - 153-157 WALKER STREET PRELIMINARY EROSION AND SEDIMENT CONTROL NOTES

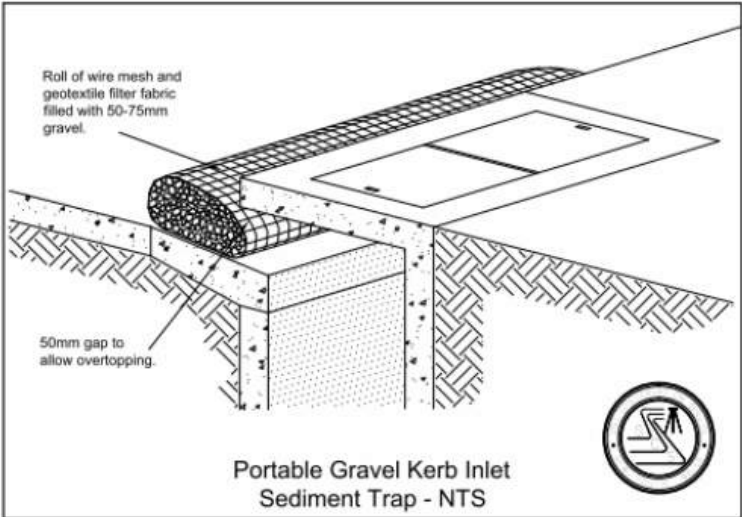
ARUP 27/08/2020

1. THE EROSION AND SEDIMENT CONTROL PLAN ADDRESSES THE MANAGEMENT OF ON SITE STORMWATER RUNOFF DURING CONSTRUCTION.
2. THE PLAN IS CONCEPT ONLY. SITE CONDITIONS AND PHASING OF WORKS ARE LIKELY TO INFLUENCE CONTROL MEASURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AMENDING THE SCHEME TO SUIT CONDITIONS AT THE TIME OF WORKS AND CONSTRUCTION PROGRAM.
3. THE CONTRACTOR IS TO INFORM ALL BUILDERS AND SUBCONTRACTORS OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO ROADWAYS AND WATERWAYS.
4. THE CONTRACTOR IS TO IMPLEMENT AN APPROPRIATE ENVIRONMENTAL MANAGEMENT PLAN INCLUDING SPILL/ POLLUTION CONTAINMENT AND TREATMENT PROCEDURES. THE CONTRACTOR IS TO ENSURE THAT ANY SPILL/POLLUTION COLLECTED IN THE STORMWATER SUMP IS IMMEDIATELY TREATED.
5. WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, i.e. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
6. ALL SOIL AND WATER CONTROL MEASURES ARE TO BE PROVIDED IN ACCORDANCE WITH THE GUIDELINES FOR EROSION AND SEDIMENT CONTROL ON BUILDING SITES (COS, 2004), LANDCOM SOIL AND CONSTRUCTION MANUAL VOLUME 1, MARCH 2004. ('BLUE BOOK') AND THE NSW PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997.
7. STOCKPILE LOCATIONS TO BE DEPENDENT ON THE LOAD OUT LOCATION AND THE POINT OF EXCAVATION. STOCKPILE LOCATIONS TO BE MARKED ON THE SITE PLAN AT THE SITE OFFICE AS THE PROJECT PROGRESSES.
8. SHOULD ANY MATERIAL BE WASHED FROM EQUIPMENT, SUCH AS CONCRETE SLURRIES FROM CONCRETE TRUCKS, A WASHING/CLEANING AREA WITH APPROPRIATE SEDIMENT CONTROL MEASURES IS TO BE SET UP ON A FLAT AREA OF THE SITE.
9. THE CONTRACTOR SHALL MAINTAIN A LOG BOOK DETAILING:
 - (i) RECORDS OF ALL RAINFALL (I.E. DAILY RAINFALL)
 - (ii) CONDITION OF SOIL AND WATER MANAGEMENT CONTROL MEASURES
 - (iii) ANY ADDITIONAL REMEDIAL WORKS REQUIRED.THE LOG BOOK SHALL BE MAINTAINED ON A WEEKLY BASIS AND BE MADE AVAILABLE TO ANY AUTHORISED PERSON UPON REQUEST. THE ORIGINAL LOG BOOK SHALL BE ISSUED TO THE PROJECT MANAGER AT THE COMPLETION OF THE WORKS.
10. DUST CONTROL MEASURES SHALL BE IMPLEMENTED CONTINUOUSLY DURING CONSTRUCTION WORKS TO THE SATISFACTION OF THE SUPERINTENDENT.
11. CONTROL MEASURES AFFECTED BY WORKS ARE TO BE RE-ESTABLISHED PRIOR TO THE COMPLETION OF EACH DAYS WORK.
12. ALL CONTROL MEASURES ARE TO BE CLEANED AND MAINTAINED AT LEAST WEEKLY OR AFTER EVERY RAINFALL EVENT.
13. FOLLOWING THE COMPLETION AND RESTORATION OF SITE, THE CONTRACTOR IS TO REMOVE ALL CONTROL MEASURES.
14. PERMANENT DRAINAGE STRUCTURES INCLUDING PIPES AND PITS ARE TO BE HANDED OVER IN A CLEAN CONDITION AT THE COMPLETION OF THE CONTRACT MAINTENANCE PERIOD.
15. TEMPORARY STORMWATER SUMP (LOCATIONS TO SUIT SITE PHASING) SHALL INCLUDE:
 - (i) MINIMUM VOLUME = 65 m³
 - (ii) DISCHARGE PUMP NOM. FLOW RATE = 3L/s
 - (iii) RUNOFF COEFFICIENT = 1.00
 - (iv) SIZING OF SUMP BASED ON STORAGE REQUIRED FOR A 3 MONTH ARI STORM EVENT UP TO 12 HOURS IN DURATION INTENSITIES FROM AUSTRALIAN BUREAU OF METEOROLOGY IFD DATA SYSTEM.
16. PRIOR TO DISCHARGING COLLECTED WATER TO STORMWATER DRAINAGE, IT IS TO BE TESTED TO ENSURE COMPLIANCE WITH WATER QUALITY REQUIREMENTS. SHOULD TESTING GIVE RESULTS THAT DO NOT COMPLY WITH THE ABOVE, TREATMENT MEASURES (SUCH AS THE APPLICATION OF A pH NEUTRAL FLOCCULANT) AND SUBSEQUENT RETESTING ARE REQUIRED. DOCUMENTARY RESULTS OF WATER QUALITY TESTING PRIOR TO DEWATERING ARE TO BE KEPT. A FILE IS TO BE KEPT ONSITE OF ALL WATER TESTING/DEWATERING EVENTS. FOLLOWING DEWATERING THE SUMP IS TO BE CLEARED OF SEDIMENT AND THE GEOTEXTILE ON THE PUMP WELL IS TO BE REPLACED.
17. ALL STORMWATER PITS TO BE COVERED OR DROP INLET SEDIMENT TRAPS SHALL BE PROVIDED. KERB INLET TRAPS ARE TO BE INSTALLED AFTER COMPLETION OF PAVING.
18. ALL SERVICE TRENCHES MUST BE FILLED IN AND COMPACTED IMMEDIATELY AFTER SERVICES HAVE BEEN LAID.
19. ROADS AND FOOTPATHS AFFECTED BY THE WORKS MUST BE SWEEPED CLEAN DAILY. SOILS MUST BE RETAINED BEHIND CONTROL DEVICES.
20. CONTRACTOR MUST ENSURE THAT ALL VEHICLES LEAVING SITE ARE HOSED DOWN (OR SIMILAR) TO REMOVE SEDIMENT.

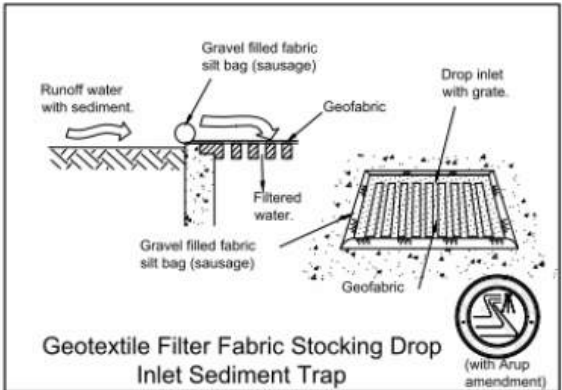
SKETCH 003 - DETAILS OF EXAMPLE EORSION AND SEDIMENT CONTROL MEASURES
ARUP 27/08/2020



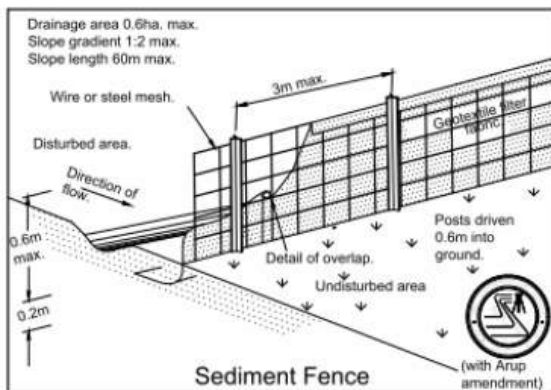
DETAIL A



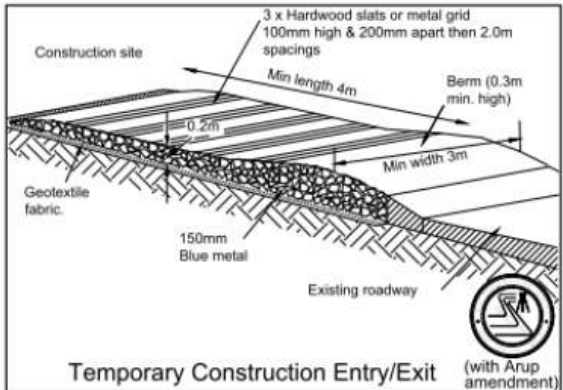
DETAIL B



DETAIL C



DETAIL D

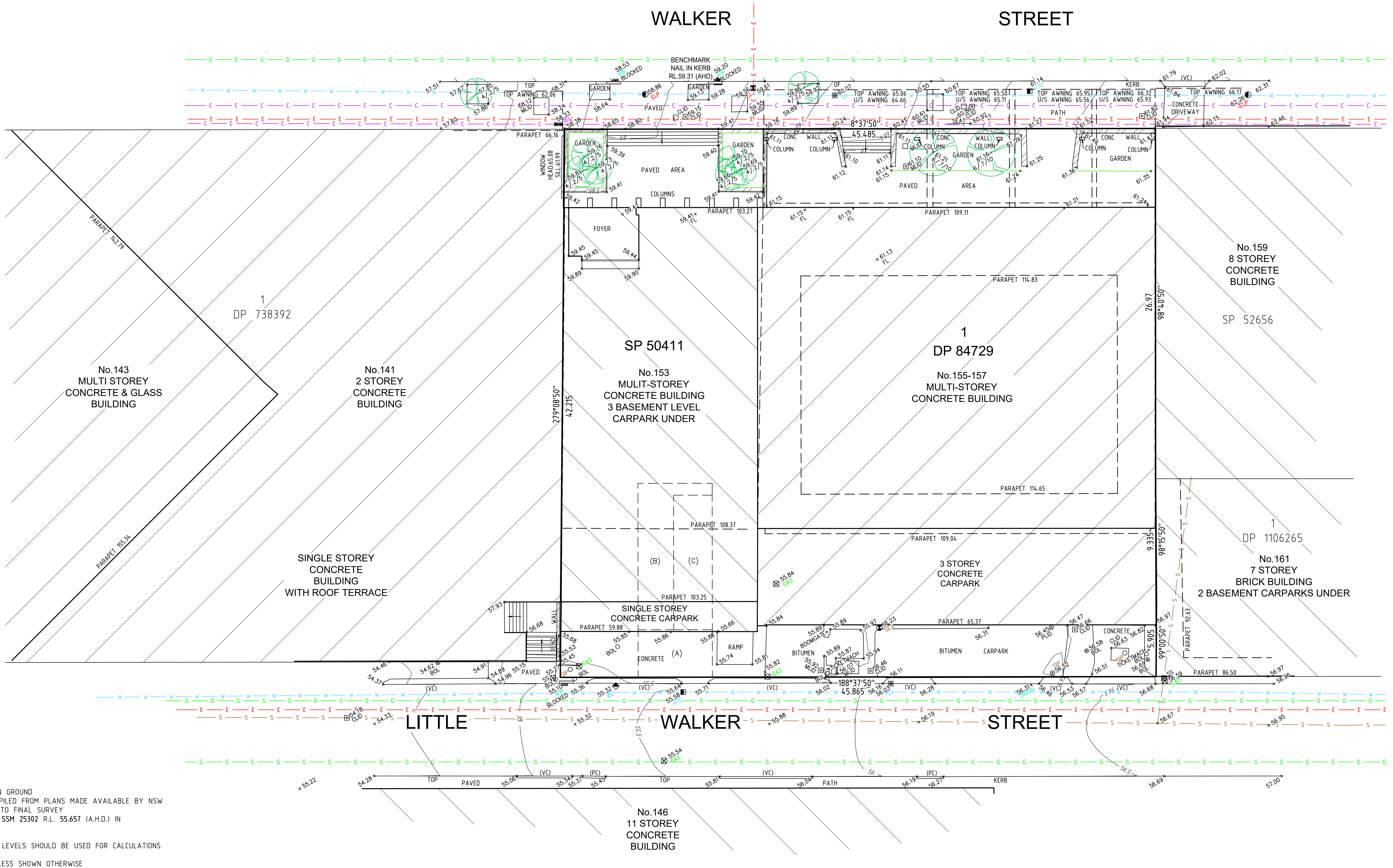
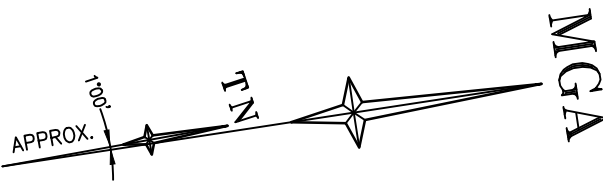


DETAIL E

Appendix C

LTS Survey from 15th July 2020




C1



LEGEND	
BENCH MARK	▲
TELSTRA PIT	TEL
ELECTRIC LIGHT POLE	ELP
ELECTRICITY BOX	EL
PIT WITH PLASTIC LID	PLID
PIT WITH CONCRETE LID	CLID
PIT WITH METAL LID	MLID
STREET SIGN	SS
BOLLARD	BOL
KERB INLET PIT	KIP
SEWER INSPECTION POINT	SIP
SEWER VENT	SEV
STOP VALVE	SV
HYDRANT	HYD
WATER VALVE	WV
GAS VALVE	GAS
VEHICLE CROSSING (VC)	
PRAM CROSSING (PC)	
GAS (DBYD)	G
COMMUNICATIONS (DBYD)	C
WATER (DBYD)	W
SEWER (DBYD)	S
ELECTRICITY (U'GROUND) (DBYD)	E


- NOTES
1. THE BOUNDARIES HAVE NOT BEEN MARKED ON GROUND
 2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY NSW LAND REGISTRY SERVICES AND ARE SUBJECT TO FINAL SURVEY
 3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM SSM 25302 R.L. 55.657 (A.H.D.) IN ARTHUR STREET
 4. CONTOUR INTERVAL 0.5 m
 5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
 6. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
 7. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
 8. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
 9. 8/4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
 10. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

(A) RIGHT OF WAY AND EASEMENT FOR ELECTRICITY PURPOSES 5.715 WIDE (N845529)
(B) RIGHT OF WAY 2.745 & 3.05 WIDE (N845529)
(C) SUBSTATION PREMISES NO.3291 (N845529)



SCALE 1:150 @ A1

H	00/00/00	—	00	D	00/00/00	—	00
G	00/00/00	—	00	C	00/00/00	—	00
F	00/00/00	—	00	B	00/00/00	—	00
E	00/00/00	—	00	A	00/00/00	—	00
Revision	Date	Description	Reference	Revision	Date	Description	Reference



THIS IS THE PLAN REFERRED TO IN MY LETTER DATED: _____

Registered Surveyor NSW

Client Roderick Holdings Pty Ltd

Drawing title PLAN OF DETAIL AND LEVELS OVER LOT 1 IN DP 84729 AND SP 50411, KNOWN AS 153-157 WALKER STREET, NORTH SYDNEY

datum AHD

site Area 1928m² (CALC)

LGA NORTH SYDNEY

reference number 50871 003DT

scale 1:150

date of survey 15/07/2020

SHEET 1