UTS

UTS CB13 and CB15

Master Plan Report

Final ISSUE

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ARUP

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1 Introduction

The document has been prepared for University of Technology Sydney (UTS) on behalf of Ethos Urban to provide input into a Master Plan submission to the Department of Planning, Industry and Environment (DPIE) in relation to the UTS CB13-15 site under the General Requirements for Pyrmont Peninsula Place Strategy.

The proposed uses for Building CB13-15 include:

- Indigenous Residential College
- Arts Centre
- Teaching Spaces
- Library
- Courtyard gardens
- Dinning

This report addressing the following input:

- Structural
- Vertical Transportation
- Infrastructure / Utilities
- Flooding and Stormwater

1.1 Information

The report has been prepared based on the Arup Due Diligence Report for CB13-15 dated April 2021, DBYD Information, discussion and meetings with local Authorities including, City of Sydney Stormwater, Jemena Gas Network, Sydney Water, Ausgrid, Architectural concept prepared by BVN, review CoS stormwater network and engineering calculations suitable for input into the Master Plan

1.2 Limitations

This report is based on information provided by UTS, Ethos Urban and BVN along with the above discussion with Utilities and available As Built drawings and Reports.

The works are limited to assessment from information described above.

No responsibility is undertaken to any third part in the use of this report.

No detailed calculations or quantitative assessments of the adequacy or compliance of the building to current design codes or the National Construction Code (NCC) were carried out as part of this survey, nor was any physical materials testing carried out, nor enquiries made of statutory authorities in connection with the building. No statistical analysis was undertaken in the determination of trends noted.

2 Structure

A desk study has been undertaken to assess the existing CB15 structure for current and possible future capacity and options for reuse of the existing asset. Documents reviewed include the structural drawings provided by UTS (one drawing of the floor plan per floor), and a large number of documents obtained by Arup from the City of Sydney Archives and Development Application Tracker. This included a *Heritage Impact Statement* dated August 2017, more than 50 drawings dating from 1952 to 1954 from the original construction of the building and DA application drawings from 2014 and 2017.

The purpose of this report is to assist with options for a potential development of the site comprising Building CB15, existing on grade carpark CB14 and an adjacent two storey building.

Below is extract from heritage Impact Statement document showing the site, prepared by Paul Davies Pty LTD dated August 2017.

Figure 4: Extract of City of Sydney LEP 2012 Heritage Map - Sheet HER_008, showing the subject site (indicated with blue arrow) in the vicinity of the Harris Street HCA No. 67 (to the north) and opposite Heritage Item No. I2051

Figure 1 Extract from 2017 Heritage Impact Statement showing subject site

2.1 History of Existing CB15 Structure

The development history of the site and the structural systems of CB15 are described below.

CB15 is a concrete framed building, with a partially underground Ground Floor used as a loading dock and delivery area, First Floor designed as offices and workshop, and Second and Third Floors designed for storage but converted to office and training rooms.

Construction of the building was completed in 1955, and it was owned by the National Cash Register Company. The original design had the roof at the Third Floor, but this was amended before construction to have the Third Floor as storage and the roof at the Fourth Floor. There is a concrete flat roof, and a motor room roof above that. Records show that during construction an unexpected fault in the rock beneath the site was bridged by an additional ground beam.

It was purchased by the Department of Technical and Further Education in 1976 and converted to training rooms and workshops for teaching space. Since then the space has undergone a series of cosmetic enhancements and refurbishments, but the concrete structure has, to our knowledge remained largely unchanged or amended.

It can be seen on the plans below which portions of the vertical structure are concrete (**green** – generally columns) and which portions are concrete blockwork (**red**). It is unclear if the any of the blockwork is loadbearing (rather than no—structural partitions), and this should be clarified during detailed site investigation if any structural changes are to be undertaken. This is of particular note around the lift cores and infill between the windows.

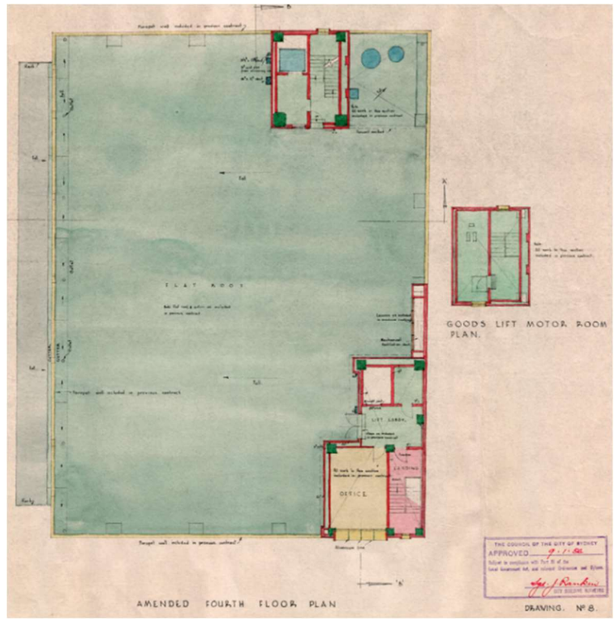


Figure 2 Original Fourth Floor (Roof) plan, dated 1956, after construction was complete.

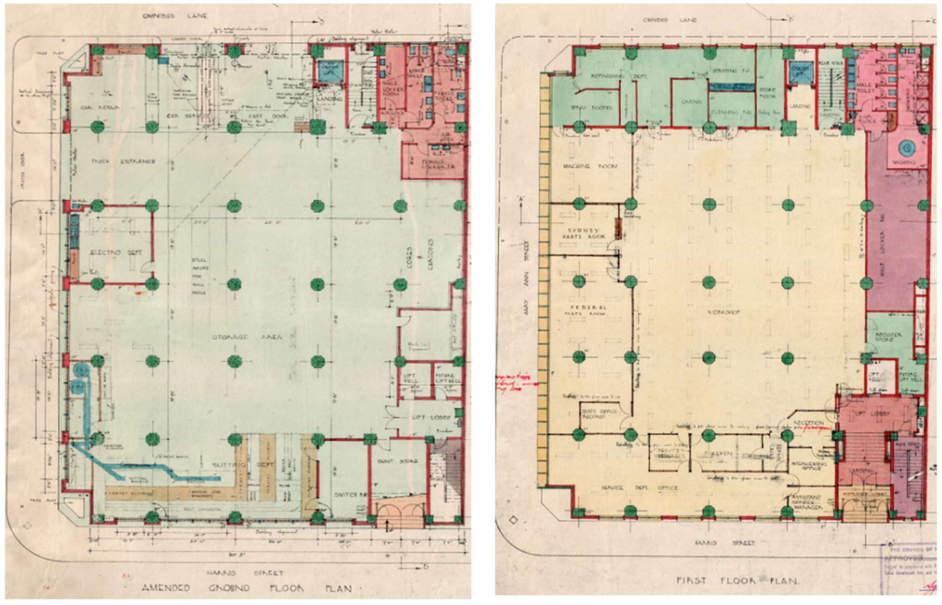


Figure 3 Original Ground Floor and First Floor plans, dated 1956 (post-construction).

Figure 4 Original Second and Third Floor plans, dated 1956 (construction).

2.2 Current Building Status

The building is currently in use as a teaching facility and start-up open-plan office space. It is in good condition, commensurate with its age, despite exceeding the standard building design life of 50 years. The finishes are quite minimal, with exposed concrete structure and services, no suspended ceiling and very few partitions throughout the building.

2.3 Existing Building Structural Capacity

Any future design scenario which involves re-using the existing structure will need a good understanding of the existing building's structural capacity. First it is necessary to understand the loads which it was originally designed to support, then the additional capacity for future usage scenarios may be assessed.

2.3.1 Floor Loading

Original drawings lodged with Council in 1953-1956 show indications of allowable live loading for the Ground and First floors. Since loading indications for the Second and Third floors are not available, we have assumed the colour coding on the original floor plans relates to the usage of the space and have correlated the live load allowance on the Second and Third Floors. No loading information for the roof was found among the original drawings. However, the report "UTS building 15 rooftop – concept design report" from September 2019 provided by UTS has some roof loading recommendations from SDA Structures, based on some investigative work including reinforcement scanning undertaken for a study of options for future use of the roof space. It recommends live loading of up to 5kPa for gathering spaces, interspersed with planted zones, with up to 300mm of soil for planted zones along column grids, and up to 900mm of soil for trees over columns.

Figure 2 Comparison of Original Live Load allowances and current usage

Floor	Original Live Load - allowance in lb/ft^2	Original Live Load Allowance in kPa	Estimated Current Live Load Usage (kPa)
Ground	500	23.9	3 (Office)
First	300	14.3	3 (Office)
Second (inferred from colour codes)	500	23.9	3 (Office)
Third (inferred from colour codes)	500	23.9	3 (Office)
Roof	Unknown	Unknown - (5kPa recommended in 2019 concept design report)	0.25
TOTAL		91	12.25

The current use of the building, as an open plan office type space, has a much lower live load allowance than that of the original storage and warehouse usage. Relatively closely spaced columns and high original design live load will allow lots of flexibility in terms of use of the space and future changes to the floor plate in terms of possible atria or interconnecting stairs.

2.3.2 Columns

Typically, columns are on a grid of 6m x 6m, centre to centre. Typically, columns have the same shape for the whole height of the building but reduce in dimensions and amount of reinforcing as they go up. Typical interior columns are 37” (940mm) octagonal at Ground Floor to Second Floor, reducing to 33” (838mm) octagonal from Second to Third Floor.

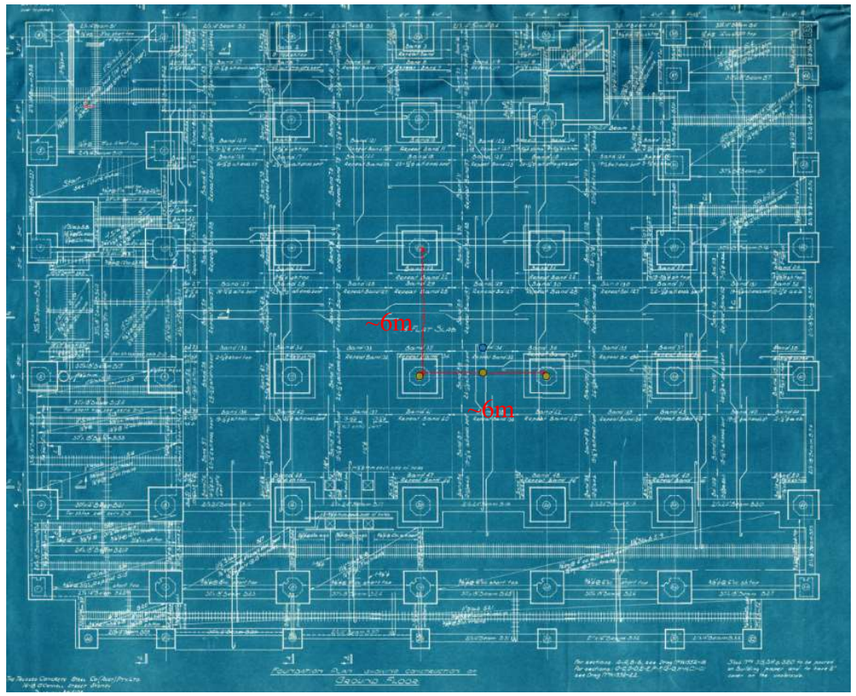


Figure 3 Ground Floor Column Layout Plan

In the Column Schedule, columns are generally listed as a “1-1-2 Mix”, and whilst they do not note expected concrete strengths, historical data on concrete mix design suggests it is reasonable to expect 12MPa for 1:2:4 Mix, 16MPa for 1:1.5:3 Mix and 20MPa for 1:1:2 Mix (converted from the UK cube strengths for concrete mixes listed on the website of the Base Concrete Company, https://www.baseconcrete.co.uk/different-types-of-concrete-grades-and-their-uses/ accessed 1/02/2021). Generally, in columns, 1 1/4” round bars have been used, which is approximately 32mm diameter, assumed to have 230MPa yield stress.

At the live loading listed for the estimated current usage, along with an estimated Superimposed Dead Load (SDL) of 2kPa, a typical column at the First Floor would have an axial load of approximately 1500kN (ULS). For the listed original live loads, the column between L1 and L2 holds approximately 3700kN (ULS), both well within the column capacity which we estimated to be approximately 7800kN.

2.3.3 Foundations

A note on the foundation drawing indicates the piers go down into rock with 20ton/ft2 capacity; approximately 2145kPa allowable bearing capacity. A pier under a typical column is listed as having “1:2:4 Mix” concrete, approximately equivalent to 12MPa concrete with 20No. 32 diameter round bars.

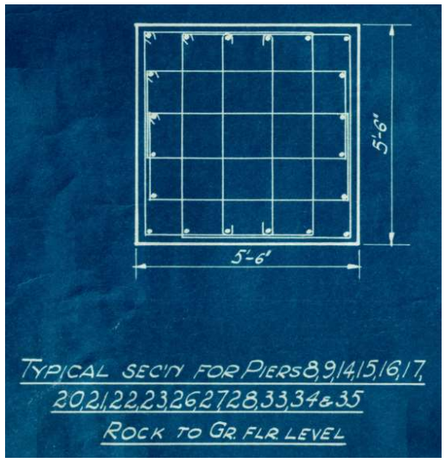


Figure 4 Original Structural drawing for Pier under a Typical column, founded down to rock.

The allowable bearing stress listed on the existing drawings suggests that a 5’6” pier (approximately 1.65m x 1.65m) would have a bearing allowance of 5835kN. Given the strength of the columns, unless further indication of stronger rock can be found, this may be the limiting factor on any additional floors, though this may be able to be increased with further geotechnical investigation on site. At foundation level, with the current usage, the load on a typical pier at bearing surface is approximately 3100kN, well within the above allowance.

2.3.4 Lateral Stability System

A high-level examination of the available drawings from the original construction shows that it is unlikely the lift and stair cores have been used for stability, meaning there would be some future flexibility in the locations of stairs and lifts. The columns may act as part of a sway frame to provide stability for any lateral loads such as wind or earthquake.

Whilst it is reasonable to assume that the existing building was designed in accordance with the standards for structural loading and materials applicable at the time of design, it does not appear that the structure was detailed in such a way as to meet the current standards for resistance to lateral loads. As such new stability elements are likely required

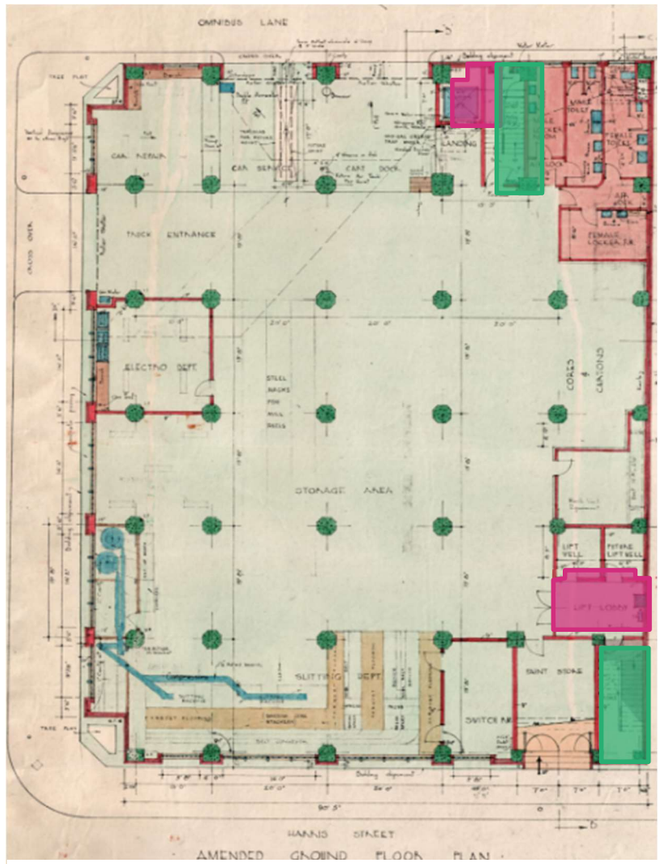


Figure 5 Original Ground Floor plan showing location of lift wells (pink) and stair cores (green).

2.3.5 Existing Building Performance Criteria

It is assumed that the existing building has been designed in accordance with the Standards for structural loading and materials applicable at the time of design. For refurbishments that do not result in modifications to the original structure or the loading on it, there is no statutory requirement for existing structures to be upgraded to meet the current NCC or Australian Standards.

However, any new structural elements will need to be designed to the current NCC and Australian Standards. Should modifications result in changes to the loading on existing structure or changes to the stability system, the capacity of that whole structure will need to be assessed to current codes, and the structure upgraded if necessary. Increases in load may include extra gravity loads from the addition of levels or change in use, with increased seismic or wind loads as a result. In the case of increased seismic loads, there may be an opportunity to assess the structure to AS3826 - Strengthening Existing Buildings for Earthquake, instead of AS1170.4, the earthquake code for new buildings. AS3826 allows for reduced seismic loading criteria to be adopted for existing buildings in certain circumstances.

Depending on the future use of the building, an assessment of the fire rating requirements of the building may be required (by a fire engineer or BCA consultant), to determine compliance to current fire ratings, or if any passive fire protection to the structure is needed.

2.3.6 Capacity for Future Expansion

Depending on the type of construction and future usage of the spaces, it may be possible for 3-4 additional floors to be added on top of the existing structure in future.

Given the bearing allowance on the foundations and additional capacity available in the typical columns checked, high level initial calculations suggest this might be possible with a similar usage to the current – lightly loaded offices with a Superimposed Dead Load of 2kPa and a Live Load allowance of 3kPa at each floor.

However, the self-weight of a concrete framed building to match the existing would be likely mean some strengthening of the existing structure may be necessary and a lighter material, such as steel or timber may aid in achieving all these additional floors. Seismic strengthening might include addition of external steel bracing or shear walls, in the form of concrete lift or stair cores.

Further checks and calculations on the column and foundation drawings would need to be undertaken prior to any detailed design of any additional structure, as well as confirmation of the physical characteristics of the concrete and reinforcement in the columns and foundations, as well as the founding rock characteristics.

2.3.7 General Considerations for Reuse of Existing Building

Key structural issues for the existing building to be considered in design and construction of any modifications include the following:

- Demolition and construction sequencing.
- Alignments of demolition with new structure located on the adjacent CB13 site.
- Temporary works requirements, including:
    - Support of heritage masonry façades.
    - Support of edges of floor structures to be retained.
- Reuse of existing structure:
    - Capacity of floors – Based on initial review, they appear to have sufficient capacity for their future use.
    - Capacity of columns and foundations.
    - New openings in floors (e.g. for lifts, stairs and services risers).
    - Lateral stability for wind and seismic loading.
    - Condition of existing structure, such as possible damage to concrete or masonry, corrosion of reinforcement.

- Structural implications of building services work, including new substation and new services plant.
- Interfaces of new foundations with existing utilities, such as water and sewer mains and zone of influence.
- NCC requirements, with upgrades possibly required to suit fire, wind and seismic design criteria.

2.3.8 Specific Considerations for Masterplan for Existing Building

Some specific considerations based on our review of the current masterplan concept are as follows.

- **Line of demolition:** With respect to cutting through the existing CB15 building to join to the new adjacent building; the proposed cut location, approximately 1.5m from the face of the existing columns, is structurally prudent and would likely not require strengthening of the existing slab. However, the cut slab edge could not new floors linking the new tower with the existing building, so provisional of new columns at the edge of the new floors next to the cut line is appropriate.
- **Basement extent:** The northern wall of the basement is proposed to be immediately adjacent to some existing footings of CB13 and may undermine them. Geotechnical investigation would confirm the foundation conditions, to determine whether any underpinning of the existing foundations is required, or the basement wall could be moved away from the existing foundations. A similar issue exists at the southern boundary, in relation to the adjacent building at 646 Harris Street (not owned by UTS).
- **Rooftop garden:** As discussed in 2.3.1, no information on the existing roof slab is contained in the original drawings that have been sourced to date. However, the rooftop concept design report from September 2019 provided by UTS has some roof loading recommendations based on preliminary investigative work including reinforcement scanning. It recommends live loading of up to 5kPa for gathering spaces, interspersed with planted zones, with up to 300mm of soil for planted zones along column grids, and up to 900mm of soil for trees over columns. It is understood that the landscaping concept for the masterplan includes rooftop planting including trees, gathering spaces for events and general use by students, with shade structures and sculptures. These uses are consistent with the recommendations of the 2019 report, subject to location and weight constraints which may be refined with further information on the existing structure, such as original drawings, surveys and structural investigations such as slab scanning.
- **Lateral stability:** Major change to the existing structure will require a review of the stability system against current seismic and wind loading standards. Enhancements to the stability system are likely to be required, and may be achieved by adding steel cross bracing or concrete shear/core walls for the full height.

2.3.9 Structural Considerations for Masterplan for New Building

Based on our initial review of the architectural masterplan concept for the new tower on site CB13, some key structural items for further considerations are as follows.

- **Foundations and Retention**:
  - Geotechnical investigations will be required to confirm the existing ground conditions, to enable the selection of a foundation system and requirements for retention at the perimeter of the site. Investigations will also permit assessment of potential undermining of foundations of adjacent buildings, including the existing CB15 building to which the new building will be linked.
  - A preliminary desk study has been undertaken by JK Geotechnics. Key points from the desk study include:
    - A dyke runs through the site. Allowable bearing pressures for foundations will be significantly lower than elsewhere in the presence of the dyke. A geotechnical investigation is proposed to confirm its location and extent, and to provide parameters for the design of affected foundations.
    - Piled foundations are likely to be recommended for the majority of the site, with pad footings only feasible where sandstone is close to the surface towards the south of the site.
    - Shoring is likely to be required around the four sides to permit construction of eth basement.
    - Groundwater appears to be lower than the basement level, permitting a conventional drained basement.
- **Column and wall locations:** Column and walls should be arranged to provide an efficient typical floor plate. Columns supporting the edge of the new building should be located as close as possible to the existing building to control the length of cantilevered floors above.
- **Floor plates**: The floor system will be appropriate for the column/wall arrangement and spans, with a flat plate system being ideal for ceiling heights and services reticulation. The current plans shown some long spans which would require upstand or downstand edge beams. Some areas will need to be designed for higher capacity to permit plating including trees.
- **Lateral stability:** Stability will be provided by core walls, possibly supplemented by other shear walls.
- **Cantilever over existing building** – There is a possible scenario to increase the tower envelope by cantilevering the structure by up to 5.5.m over the existing building. To achieve a cantilever of this length, a transfer structure is likely the most efficient solution. This may consist of either 1-2 storey concrete transfer walls from the lift/stair core or 1-2 storey steel transfer trusses. These would best be placed at the bottom of the tower for simplicity of construction, but if this were not an option architecturally they could also be placed at the top, with hanging columns to support the floors below. Whilst the columns of the existing building in this area could take an additional 3-4 levels, supporting the full height of the tower would not be possible without considerable strengthening of the columns and footings. We therefore recommend that the tower is supported independently of the existing building.

3 Façades

3.1 Existing Conditions

The building is four stories high with a combination of rendered brickwork and aluminium framed facades. The upper levels to the north exhibit aluminium framed windows with expressed louvres, whilst the east and west exhibit punch windows in masonry facades.

Masonry Elements

It appears that the facade to the north may have some load bearing capacity. Whilst it is likely that it is self-supporting, it may also have some support for the overall structure.

The condition of the facade appeared relatively good. We did not identify any significant structural defects (e.g. cracking). We are also not aware of any water ingress defects. The windows did appear low performing but in reasonable condition. An internal acoustic glazing was noted to the North facade, but it did not appear to be installed correctly with airgaps noted.

Windows

There were two main types of windows identified on the building; timber framed windows with an internal acoustic glazing and an aluminium framed floor to floor system with an internal acoustic glazing.

The timber framed windows appeared to be in generally serviceable condition, albeit with some paint defects. Whilst we could not inspect the windows up close (due to the internal acoustic glazing), we did not observe notable rot or deterioration.

The aluminium system appeared in serviceable condition albeit aged and deteriorated.

Both window types appeared to be of low performance thermally and acoustically.

3.2 Heritage Significance

The façade has local aesthetic significance. Of significance is the Post-War International styling of the building with its cubic form, louvres and vertical fins. It would seem that these elements are some of the first to be implemented in Australia following a new international passive design trend in the 50s. These original façade elements have been nominated as highly intact.

According to the Paul Davies' HIS and a search of the heritage database it is apparent that the facade is of heritage significance. Based on the information available, we believe that changes to the façade will need to be justified and assessed against the heritage significance.

Figure 6: North-west view of the building. The two facades in pictured are of heritage significance.

Figure 7: South-west view of the building. The two elevations pictured are of heritage significance.

4 Electrical, ICT

The following provides a description of the existing building systems capacity, age and condition with regard to:

- Electrical Services Supply and Reticulation
- Communications Infrastructure

4.1 Existing Conditions

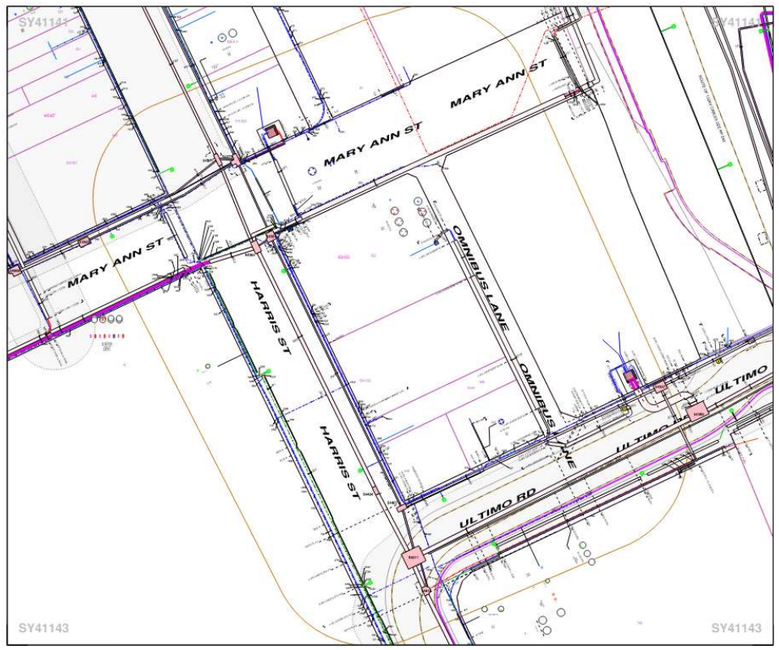
The University of Technology's Block CB-15 is comprised of four levels building currently served from a main switchboard located on level 1 on grade, noting there are no basement levels.

The existing electrical infrastructure will be decommissioned and make good for the new refurbishment of new spaces for Arts Centre and Education spaces and integration with the new IRC spaces to level 20.

4.1.1 Building Main Electrical Infrastructure

4.1.1.1 Utility Substation

The University of Technology is currently a low voltage customer and has a network of existing underground HV and Ausgrid substations located within the campus. Electricity for the UTS CB15 is supplied by a 630A feeder from Substation S.6403 Distributor no.4.



The substation is located on offsite with a link box on Omnibus side entry to the building. Further engagement with Ausgrid will be required to obtain historical data and assessment for future potential increase in available capacity on S.6403.

As confirmed by Ausgrid, the available capacity for the UTS CB15 is **800A** as an external supply, therefore the increase in area for Indigenous Residential College will require an upgrade including a new Chamber Substation, main switchroom and associated infrastructure.

Ausgrid Advice

- ❑ Substation S.6043 basement CBD substation with a non-firm rating of 5400 amps. The substation can only supply an 800 amp 3 phase connection for the above side address

4.1.1.2 Site Main Switchboards

The design drawings were reviewed, and a site inspection was carried out on site on 22nd January 2021.

The incoming supply into the development is via Ausgrid owned substation S6043 located on offsite and was not visually sited during the inspection. As access is controlled by Ausgrid the substation could not be inspected during the site visit. The main switch room is located on level 1 Harris Street entry, room 01.013

Figure 8: Main Switchboard

The 800A Incoming Supply no.1 rated Main switchboard section generally supplies mechanical services, lighting and power, lifts and fire services life safety.

The existing main switchboard is new being replaced in the 2016 and compliant with current AS3000:2007 and the requirements for a form 3B factor. In a future development there will be a requirement for two points of exit and clearances around main switchboard.

These requirements will impact the main switchroom as the new switchboard will be significantly larger.

4.1.1.3 Maximum Demand Estimate

The potential redevelopment option of CB15 will be for an additional 16 levels of residential accommodation an increase of approximately 12000sqm of available area above the existing ~4600sqm, based on a preliminary assessment the maximum demand will be as follows. As per AS3000 the max demand calculations are as follows:

Summary		Space Type	GBA			VA /m2	VA	kVA	Amps
INDOOR SUMMARY (FECA)		IRC - BASEMENT	1,347	617	730	5	6,735	7	10
		PLANT - ROOFTOP	606		606		0	0	0
		KNOWLEDGE HUB	328	325	3	100	32,800	33	48
		UTS EDUCATION	3,312		3,312	100	331,200	331	480
		IRC - INDOOR SPACE	9,521	8,503	1,018	100	952,100	952	1,380
		ARTS CENTRE - INDOOR SPACE	906	866	40	80	72,480	72	105
TOTAL INDOOR GBA (FECA)		16,020		10,311	5,709				
OUTDOOR SUMMARY		ARTS CENTRE - OUTDOOR SPACE	407	400	7	5	2,035	2	3
	EXTRA EXTRA	IRC - OUTDOOR SPACE	860	850	10	5	4,300	4	6
		UTS INDIGENOUS GARDEN	817		817	5	4,085	4	6
		IRC GREEN ROOF	340		340				
		TOTAL OUTDOOR SPACE	2,423	1,250	1,173				
PUBLIC DOMAIN		OMNIBUS LANE	275	450	-175	5	1,375	1	2
		MARY ANN ST	680		680	5	3,400	3	5
TOTAL PUBLIC DOMAIN		955		450	505		Total	1,411	2,044

The preliminary calculations the existing supply 800A from substation S6403 confirm does not have the capacity for additional area, with the expected load to be approximately 2000A subject to final electrical provisions to the individual apartments.

Noting that the future loads will exceed 800A, there will be a requirement for an additional HV supply i.e. substation within the CB15 development for a 100-150m2 Chamber substation and a new main switchroom within the footprint of the building to cater for the any future development. The chamber substation will be located on basement level accessible from ground

Provisions of ground floor above the Chamber Substation for a an equipment hatch (2.3mx1.7m) and personnel hatch in lieu of second egress stair and dedicated fire rated Ausgrid egress /access corridor to street on Harris street will need to be integrated in the design.

Ausgrid Advice

- ❑ The Ausgrid network does not have the capacity to connect the proposed 2000-amps 3 phase low voltage electricity connection. An extension/augmentation of the Ausgrid network is required. Following is the likely work(s) required to provide the request capacity.
  - Installation of a chamber substation.

4.2 Communications

4.2.1 Existing Services

The following communications services networks exist within or in proximity of the boundary of the development zone based on our interpretation of the DBYD information. Further discussions are required with the service providers to confirm existing arrangements. The utility communications cabling is generally installed in underground conduits on street verges with regular access points through manholes or pits. These services are:

- NBN - optic fibre network existing connection from existing pit on Harris Street
- AARNet – Optical fibre network conduit running along Harris St, providing existing connections.
- Optus - optic fibre network running along Harris Street.
- Nextgen Network - high performance data within Telstra duct conduit running along Harris St, no existing connections.
- Verizon – optic fibre network running along Harris Street on western side of the road.
- Vocus – optic fibre network at the corner of Harris and Mary Ann streets, no existing connection

Mobile coverage is currently provided to the precinct from various service providers.

4.2.1.1 Required Alterations

Required alterations to suit the new development are to be considered at a later stage which will include a new Main Distribution Room (5mx5m) with conduit provisions from two services providers.

The project will be registered with the relevant service providers to achieve the aspirations for this site.

4.2.2 MDF

Note the allowance for a new Comms Room onsite

5 Hydraulic Services

5.1 Introduction

The following section provides a description of the existing hydraulic systems and the findings from our review of the available as-builts documentation, Dial Before You Dig (DBYD) and site inspection undertaken on 17th December 2020 and attended by the UTS representatives and Arup Building Services and Structural Engineers.

The following section provides a description of the existing building systems capacity, age and condition with regard to:

- Domestic Cold-Water supply
- Sanitary Plumbing and Drainage
- Natural Gas Supply

The University of Technology's Building CB-15 is serviced by stand-alone plant located within the building footprint on the ground floor levels. There is no hydraulic or fire services plant located on Carpark site – CB14 and inground survey investigation would be required to verify any inground pipes crossing the site.

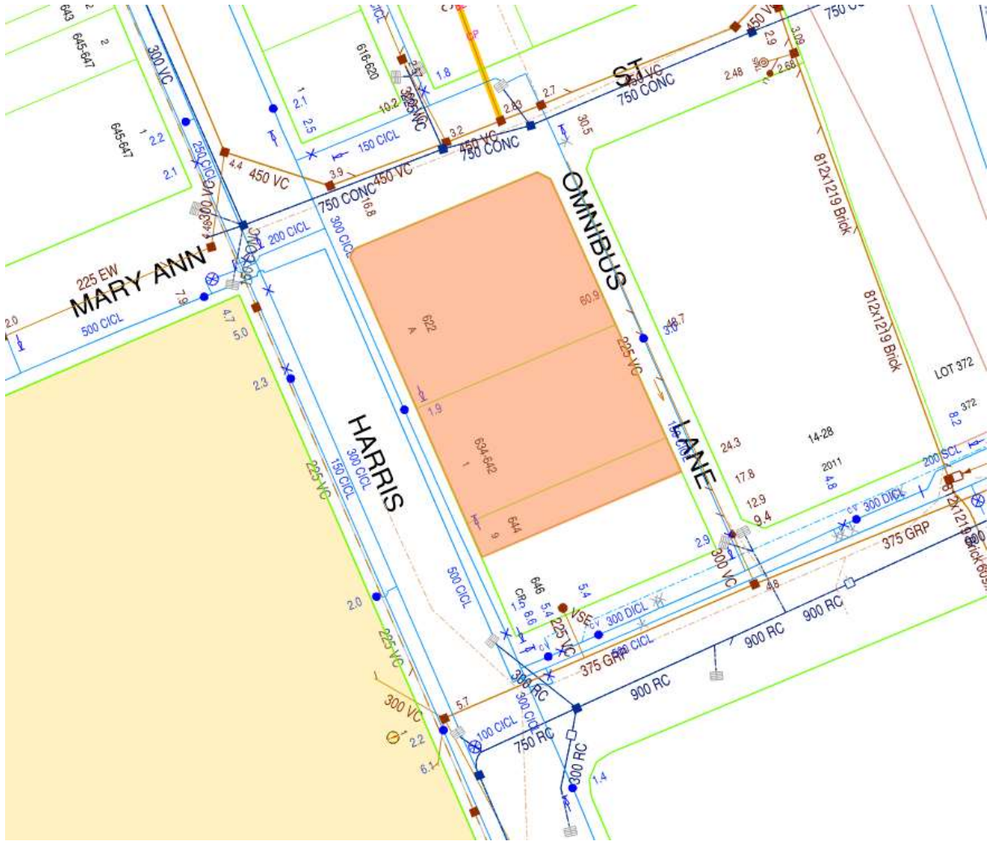
5.2 Existing Sydney Water Infrastructure

The existing 50mm Sydney Water meter and backflow prevention are located on level 1 in the stair exit to Omnibus Lane. The capacity of the incoming main will need to be upgraded to cater for new building loads. The incoming water supply will be upgraded to meet additional demand. Water saving initiatives and rainwater harvesting shall be considered to reduce the impact on the future demand.

Based on our initial review of the existing infrastructure the Sydney Water network is suitable to service any future development located on this site.

To verify and obtain Sydney Water advice the section 73 Application should be lodged during the design phase. Sydney Water confirmed that *There are a number of assets surrounding the site and to determine which asset to connect will depend on future reviews of the relevant applications submitted to Sydney Water for approval.*

The summary of the discussion with Sydney Water Account Manager | Infrastructure Development is attached to this report.



The existing site is (image above) is well serviced by Sydney Water network including

- Domestic Cold Water – DN300 CW located in Harris Street and DN300 CW in Ultimo Road suitable to provide supply for any future development.
- The 225mm Sewer line is available on Omnibus Lane (300 at Ultimo Rd). Multiple Junctions as available for connections.
- The 450mm VC sewer line Is available in Marry Ann
- The 375mm GRP line is available in Ultimo Road picking up 225mm sewer line from Omnibus Lane
- No Sydney Water Easements have been indicated on any available drawings

The pressure and flow application SW-28845512 has been submitted to Sydney Water to confirm available water supply and flow around the site for both domestic and fire services.

5.3 Water supply for Fire Services

The water supply for the fire services – hydrant and sprinklers – will be required to be provided for the development and it will be extended from existing Sydney Water Asset.

Any future extension of the building over 25m would require on site Fire Hydrant / Sprinkler storage tank.

Pressure and flow have been obtained from Sydney Water model and extract is shown below.

ASSUMED CONNECTION DETAILS

Street Name: Omnibus Lane	Side of Street: Middle
Distance & Direction from Nearest Cross Street	30 metres South from Mary Ann Street
Approximate Ground Level (AHD):	8 metres
Nominal Size of Water Main (DN):	150 mm (Nominated Asset ID: 2571897)

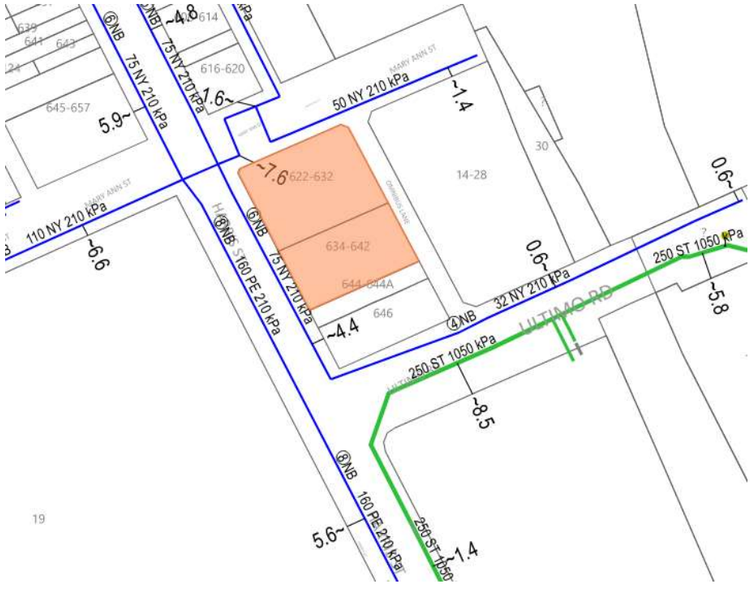
EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	67 metre head
Minimum Pressure	35 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	35
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	37
	10	37
	15	37
	20	37
	26	36
	30	36
	40	36
	50	35
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	35
	10	35
	15	34
	20	34
	26	34
	30	34
	40	33
	50	32
Maximum Permissible Flow	67	31

5.4 Existing Jemena Gas Network

The site is well serviced from the existing Jemena Gas Network as indicated below.



The existing gas meter is located on level 1 Harris Street, next to main Switch room. The current site is connected to 75NY medium pressure gas main 210kPa. Review of the capacity against future demand will require the gas meter upgrade and relocation to meet new building layout. The existing gas meter would need to be upgraded to cater for the future loads.

Application to Jemena would need to be lodged to verify the future upgrades. Based on our review of the current infrastructure and initial discussion with Jemena that there is no issue with the gas supply with options for connection to 210kPa in Harris Street or Ultimo Road or high pressure main 250ST @1050kPa in Ultimo Road. With the future development option for “No Gas” to site should be considered.

The correspondence with Jemena has been attached to this report.

6 Vertical Transportation

6.1 Existing Building CB 15

UTS Building 15 is comprised of 6 levels; 1, G, 2-5 (note level 1 is lower than level G). These contain both formal education spaces (seminar rooms etc.) and self-study/groupwork areas (breakout spaces, computer labs etc.). The higher demand areas are located on levels 1-2, with lower demand areas on level 3+. Levels 1-2 are linked by large visually obvious stairs, however levels 3+ appear to be only accessible through fire stairs or lifts. We therefore assume that stairs are the primary method of vertical transport between 1-2, and lifts are the primary method of transport for levels 3+.

6.2 Existing equipment

The building is serviced by 2 passenger lifts which between them serve levels 1-5.The lifts (as inspected) operated adequately with floor levelling, speeds, acceleration, door operation, indication, control buttons and car interior finishes all appearing to be acceptable. The lifts are reasonably compliant to the latest DDA requirements with tactile buttons, braille, buttons heights and handrails being acceptable. In one or two lifts the voice annunciation may be inactive. We believe Lift 1 may have a motor room but were not able to locate/access it on initial inspection.

6.2.1 Lift 1

Manufacturer: Otis (assumed), with recent modernisation by Schindler.

Type: Unknown, possibly machine room adjacent

Age: Age unknown, Modernisation assumed to be within 0-5yr

Rated load: 1350kg

Car size1950mm deep x 1400mm wide (with angled rear left corner)

Door width 1000mm side opening

Levels served: 1, 2, 3, 4, 5.

6.2.2 Lift 2

Manufacturer: Schindler

Type: MRL

Age: Assumed to be 0-5yr

Rated load: 1000kg

Car size1550mm deep x 1300mm wide

Levels served: 1, G, 2, 3, 4, 5.

6.3 Tower development

The proposed development of a new residential tower above this site would require significant alteration to the existing VT system. The functional requirements of the newly created spaces would need to be considered when developing the VT strategy for the site.

Key considerations for this development are;

- Equitable access to all areas of the building
- Acceptable lift performance for building occupants
- Redundancy in case of lift breakdown
- Lift access security
- Separation of passenger flows (i.e. residents and users of educational spaces not sharing lifts)
- Potential public access to roof terrace

Based on the above considerations, the minimum requirements for VT as we currently understand the proposal are as follows;

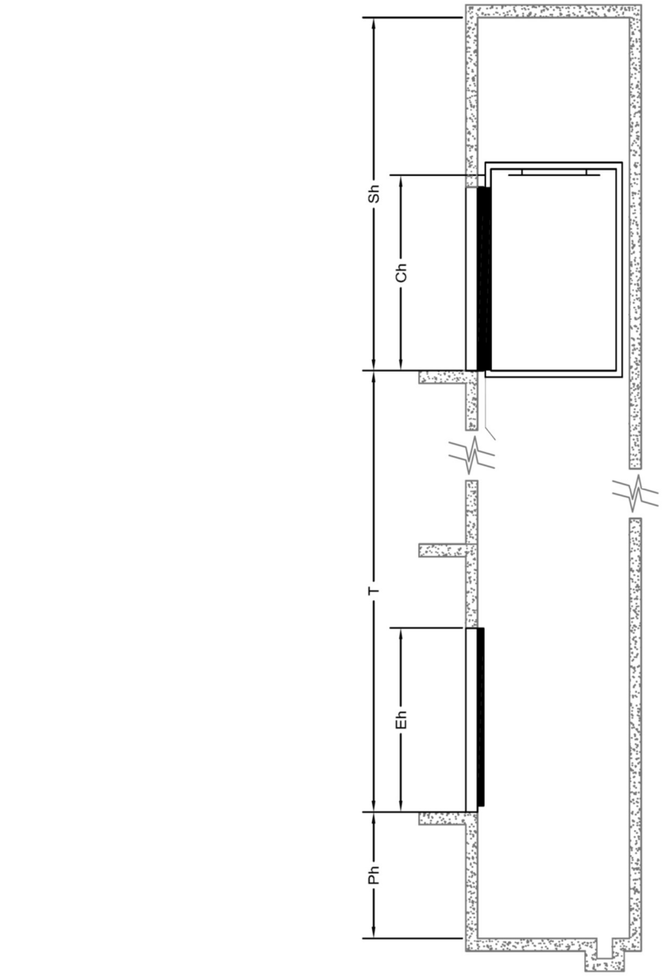
- 2 off MRL lifts serving the residential floors
- 1 off additional MRL lift serving the podium residential amenities
- 2 off MRL lifts serving the educational area

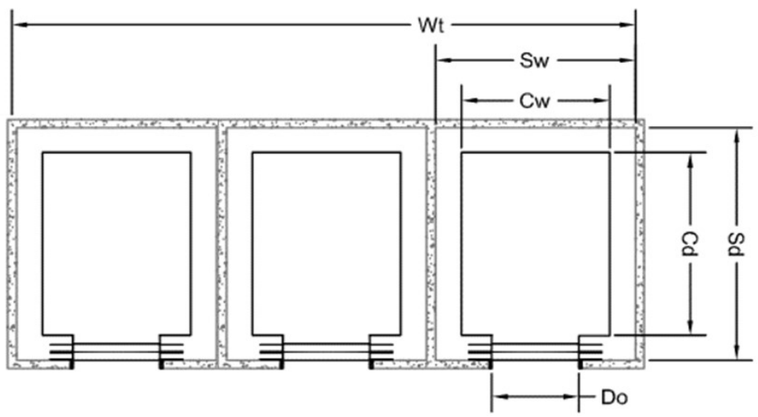
These will need to be reviewed and updated as the design progresses.

6.3.1 Lift sizing

To allow for high-level space planning, we would propose the following dimensions. Note these are indicative only, and subject to change as the design progresses and the functional requirements of the space becomes better defined;

Equipment Details		
Lift Number	**Tower lift core**	**Education building core**
Car Capacity (kg)	1600	1600
Car Capacity (passengers)	21	21
Speed (mps)	(Resi lift) | (Podium Lift) 2.5 | 1.0	1.0
Car Details		
Car Width (Cw)	1600	1600
Car Depth (Cd)	2050	2050
Car Height - Clear (Ch)	2400	2400
Car Height - Structural	2500	2500
Clear Door Opening (Do)	1000	1000
Clear Entrance Height (Eh)	2100	2100
Lift Shaft Details		
Shaft Height Overrun (Sh)	5000 | 4600	4600
Shaft Width (Sw)	2500 | 2400	2400
Core Width (Wt)	7600	7500
Shaft Depth (Sd)	2500	2500
Pit Depth (Ph)	2500	1800
Total Travel (T)	TBC	
Notes		
1. All dimensions are internal, in millimetres and represent a size that can accommodate the MRL product of most major lift contractors. Some variance in spatial requirements can be expected subject to selected lift contractor.		
2. Shaft Width Total (Wt) assumes 150mm dividing trimmer beams or structural wall between lift shafts.		
3. Lift car sizes are compliant with: a) AS 1735.12 Facilities for Persons with Disabilities. b) AS 1428.1 Design for Access and Mobility		
4. For landing entrance construction "Rough Opening" add 200mm to Do and 100mm to Eh.		





7 Flooding and Stormwater

7.1 Introduction

This section of the report identifies the relevant stormwater and flood management legislation applicable to the development site, likely flood planning implications and on-site detention requirements for the proposed development. Stormwater quality mitigation methods are also highlighted.

7.2 Relevant Stormwater and Flood Management Legislation

7.2.1 Sydney Local Environment Plan 2012

The Sydney Local Environment Plan 2012 (LEP) is the City of Sydney's principal planning document and governs all developments within the City of Sydney Local Government Area (LGA), including the proposed development site. The LEP outlines the following requirements which are related to flood planning.

7.15 Flood planning

(1) The objectives of this clause are as follows:

(a) to minimise the flood risk to life and property associated with the use of land,

(b) to allow development on land that is compatible with the land's flood hazard, taking into consideration projected changes as a result of climate change,

(c) to avoid significant adverse impacts on flood behaviour and the environment.

(2) This clause applies to land at or below the flood planning level.

(3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

(a) is compatible with the flood hazard of the land, and

(b) is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and

(c) incorporates appropriate measures to manage risk to life from flood, and

(d) is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and

(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.

(4) A word or expression used in this clause has the same meaning as it has in the NSW Government's *Floodplain Development Manual* (ISBN 0 7347 5476 0) published in 2005, unless it is otherwise defined in this clause.

(5) In this clause:

flood planning level means the level of a 1:100 ARI (average recurrent interval) flood event plus 0.5 metres freeboard.

7.2.2 EPA Act and NSW Floodplain Development Manual

The Environment Protection Act 1979 (*EPA Act 1979)* aims to provide a system of environmental planning and assessment within NSW. Direction 4.3 of Section 117(2) provides details on the objectives and requirements with which developments in flood prone land must comply. It also makes reference to the New South Wales Floodplain Development Manual (2005) (the FDM) which outlines the NSW Government's Flood Prone Land Policy.

The overarching intention of this policy is to minimise the impact of flooding and reduce the flood liability on the owners and occupiers of flood prone properties whilst mutually recognising the benefits arising from the use, occupation and development of flood prone land.

7.2.3 Sydney Development Control Plan 2012

The Sydney Development Control Plan 2012 (DCP) is another fundamental planning document for the City of Sydney, governing all developments within the City of Sydney's LGA including the proposed development site. The DCP dictates the controls related to flooding and stormwater management, in addition to other planning controls that must also be adhered to. Section 3.7 of the DCP outlines specific water and flood management controls.

Flooding

According to Section 3.7.1 of the DCP, a site-specific flood study will be required for development sites with land below the flood planning level. The aim of the site-specific flood study is to show that the post-development conditions do not worsen pre-development conditions.

Drainage and Stormwater Management

The controls relating to drainage and stormwater management are outlined in Section 3.7.2 of the DCP. Key requirements within this section include:

- For sites greater than 1,800m^2 in size, a local drainage management plan is required.
- For sites greater than 1,000m^2 in size:
    - Stormwater flows up to the 5% annual exceedance probability (AEP) are to be conveyed by a minor drainage system
    - Stormwater flows above the 5% AEP are to be conveyed by the major drainage system.
- Post-development stormwater volumes during an average rainfall year are to be:
    - 70% of the volume if no measures are applied to reduce the stormwater volume, or;
    - The equivalent volume generated if the site were 50% pervious.
- Stormwater detention devices are to be designed such that overflow and flowpath have sufficient capacity during all design rainfall events, and can discharge to the public stormwater system without affecting adjoining properties.

Stormwater Quality

The controls relating to stormwater quality for development proposals are outlined in Section 3.7.3. For developments greater than 1,000m^2 in size, the following stormwater pollutant reduction targets apply:

- Reduce the baseline annual pollutant load for litter and vegetation larger than 5mm by 90%;
- Reduce the baseline annual pollutant load for total suspended solids by 85%;
- Reduce the baseline annual pollutant load for total phosphorus by 65% and;
- Reduce the baseline annual pollutant load for total nitrogen by 45%.

A site stormwater quality assessment including water quality modelling will confirm the performance.

7.2.4 City of Sydney Interim Floodplain Management Policy 2014

The flood planning levels (FPLs) for the proposed development site will be dictated by the City of Sydney *Interim Floodplain Management Policy (2014)*. FPLs are defined as the permissible minimum building floor levels. Details of these levels are included in Table 1.

Table 1 Flood Planning Level Requirements

Development	Flood Planning Level (FPL)
Residential, Habitable rooms, subject to mainstream flooding	1% AEP flood level + 0.5m
Residential, Habitable rooms, subject to local drainage flooding	1% AEP flood level + 0.5m or two times the depth of flow with a minimum of 0.3m above the surrounding surface, if the depth of flow in the 1% AEP flood is less than 0.25m.
Industrial or commercial, business subject to mainstream or local drainage flooding	Merits approach with a minimum of the 1% AEP flood level
Industrial or commercial, retail floor levels subject to mainstream or local drainage flooding	Merits approach with a minimum of the 1% AEP flood level. Must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation.
Below-ground car park outside the floodplain*	0.3m above the surrounding surface
Below-ground car park subject to mainstream or local drainage flooding	1% AEP flood level + 0.5m or the PMF (whichever is higher)

*The criteria for below ground car park includes any intended use for spaces located below the surrounding surface levels e.g. car parking, retail, commercial uses, etc.

7.2.5 Sydney Water On-Site Stormwater Detention Policy 2014

For developments within the City of Sydney LGA, requirements relating to on-site detention (OSD) are outlined in the Sydney Water On-Site Stormwater Detention Policy (2014).

This policy states that, “the OSD system must be site-specific and off-set the stormwater run-off coming from the development”.

If an OSD is required, it must be able to store the run-off up to the 100-year Average Recurrence Interval (1% AEP equivalent) and ensure that the runoff is discharged in a controlled manner that downstream stormwater assets can handle.

The requirement for an OSD system is based on the development site area, location in the catchment, or whether it is an existing building that is being refurbished and the existing drainage system is being maintained. This requirement has been discussed with Sydney Water and it is confirmed that OSD is not required for the site.

7.3 Existing Site Stormwater Management

7.3.1 Existing Topography and Stormwater Infrastructure

The north-west corner of the proposed development site at the intersection of Mary Ann Street and Harris Street is the highest topographical point.

To the east of the proposed development, the recently resurfaced Omnibus Lane grades down from north to south, towards Ultimo Road.

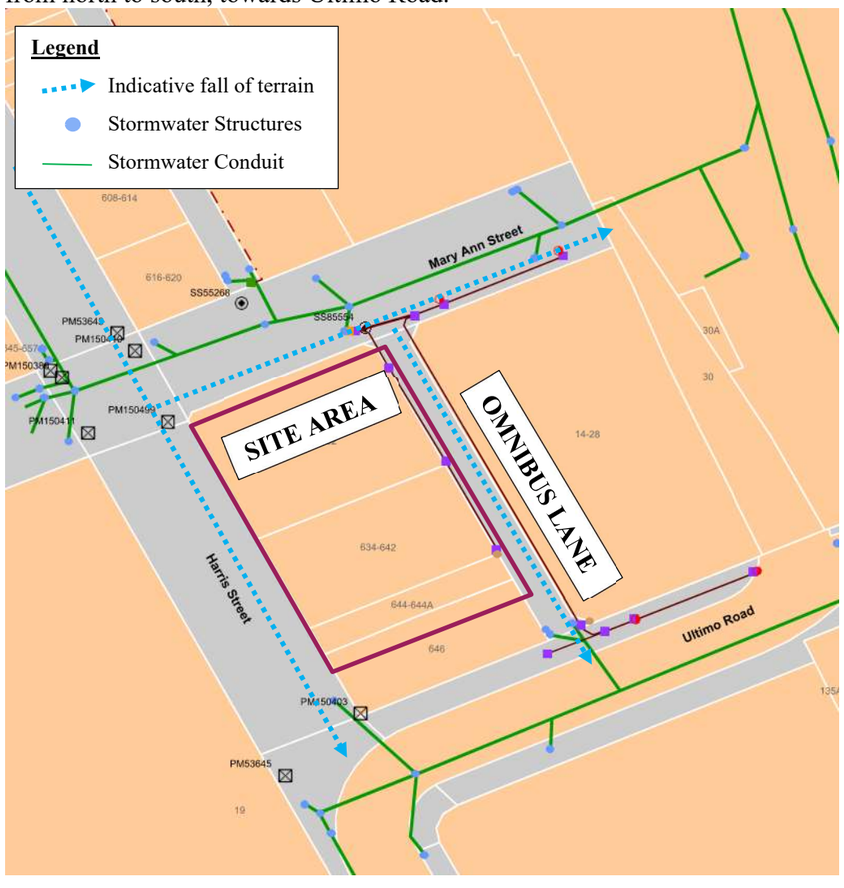


Figure 9 City of Sydney DBYD Plans *(Please note: the brown lines, purple squares and pink circles represent electrical underground conduits, electrical pits and smart poles which are not relevant to this flooding assessment)*

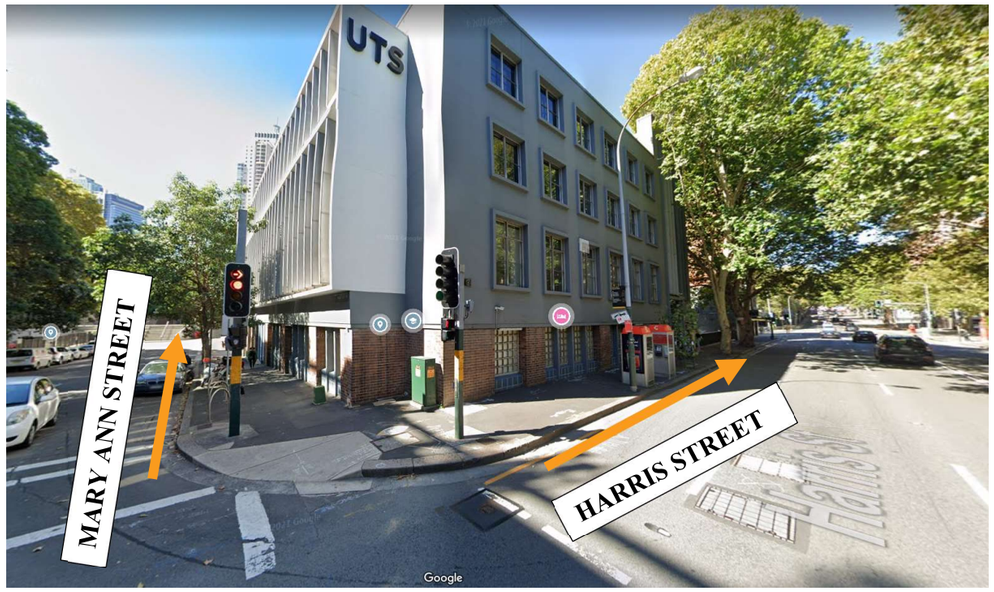


Figure 10 Google Street view of the proposed development site

The stormwater surface runoff which will flow south along Harris Street and east along Mary Ann Street will enter the existing stormwater network via numerous connection points and kerb inlet pits along both streets. Along Omnibus Lane, the surface runoff will be collected by the two kerb inlet pits on either side of Omnibus Lane at the Ultimo Road intersection. The overall Sydney Water/City of Sydney stormwater network at this location ultimately drains north towards Darling Harbour.

7.3.2 Previous Flood Studies

The proposed development site falls within the Darling Harbour catchment area and is covered by the City of Sydney Darling Harbour Catchment Floodplain Risk Management Plan (2016). A review of the City of Sydney flood study and associated digital flood model results has been undertaken to gain an understanding of the existing stormwater drainage and flooding behaviour at the proposed development site.

In order to conduct the flood study, a two-dimensional hydrologic and hydraulic TUFLOW flood model was developed of the entire Darling Harbour catchment area. A direct rainfall approach ("rainfall on the grid") was used to model the catchment hydrology. A pit and pipe network was incorporated into the study as shown in Figure 11. Within the immediate surrounding area of the proposed development site, the existing pit and pipe network within the flood study is composed of circular pipes along Mary Ann Street and Ultimo Road and rectangular pipes along Darling Drive.

Figure 11 Excerpt of Figure 1 Darling Harbour Catchment Area (BMT WBM, 2014)

The City of Sydney Darling Harbour catchment Floodplain risk Management study and flooding maps indicates that the proposed site experiences localised flooding with a maximum peak flood depth of 0.45m at the eastern end of Mary Ann Street during a 1% AEP flood event. The adjacent Goods Line blocks the overland flow, causing a ponding effect. However, as the section of Mary Ann Street immediately adjacent to the proposed development is higher, this area is not shown to be flooded. Flooding along Omnibus Lane appears to be shallow with a maximum peak flood depth of less than 0.25m. Digital flood model results show some shallow localised flooding within the existing car park with a depth less than 0.15m. An extract from the 1% AEP peak flood depth map presented in the flood study report is shown in Figure 12, which demonstrates the extent of predicted flooding identified in the study area.

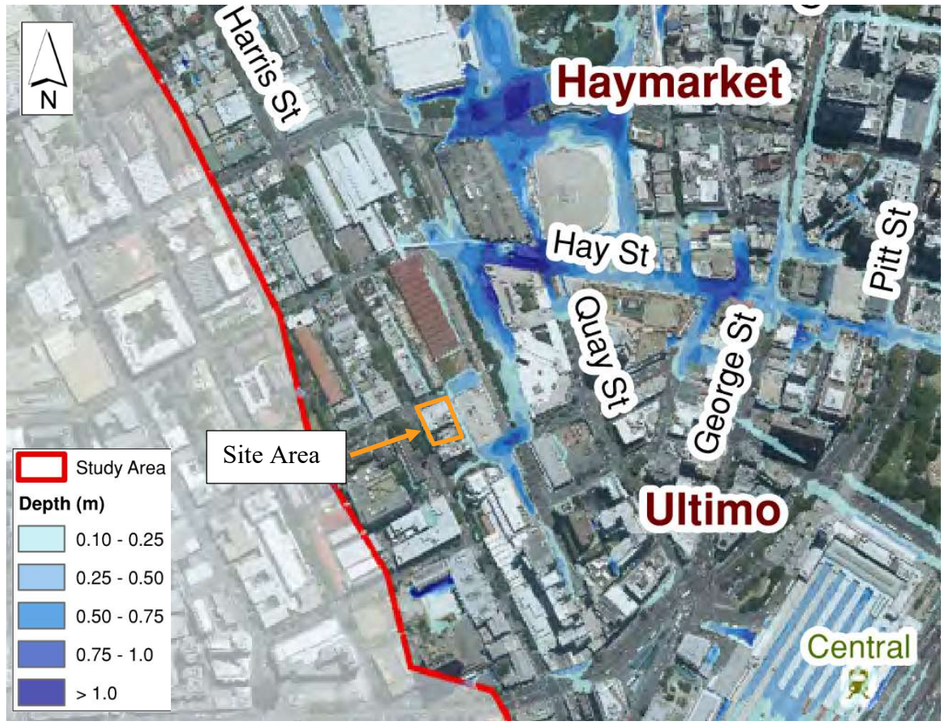


Figure 12 Excerpt of Figure 2 Peak Flood Depth 1% AEP Design Flood Event (BMT WBM, 2014)

In the Probable Maximum Flood (PMF) event, the localised flooding observed during the 1% AEP flood event at the eastern end of Mary Ann Street now extends towards the west where shallow flooding is indicated within the areas immediately adjacent to the proposed development site along Mary Ann Street and Harris Street. Peak flood depths along the northern and western proposed development frontages are indicated to be less than 0.30m. Along Omnibus Lane, the peak flood depths have increased slightly to a maximum of 0.70m, increasing to the south towards Ultimo Road. An excerpt of the PMF flood maps presented within the flood study is shown in Figure 13.

The flood study also indicates that the area immediately north of the proposed development site along Mary Ann Street is categorised as high hazard during a PMF flood event, however, this area is shown to be outside the extent of predicted flooding in the 1% AEP flood event. Along the western and eastern frontages of the development site, during a 1% AEP and PMF flood event, it has been categorised as a low hazard area.

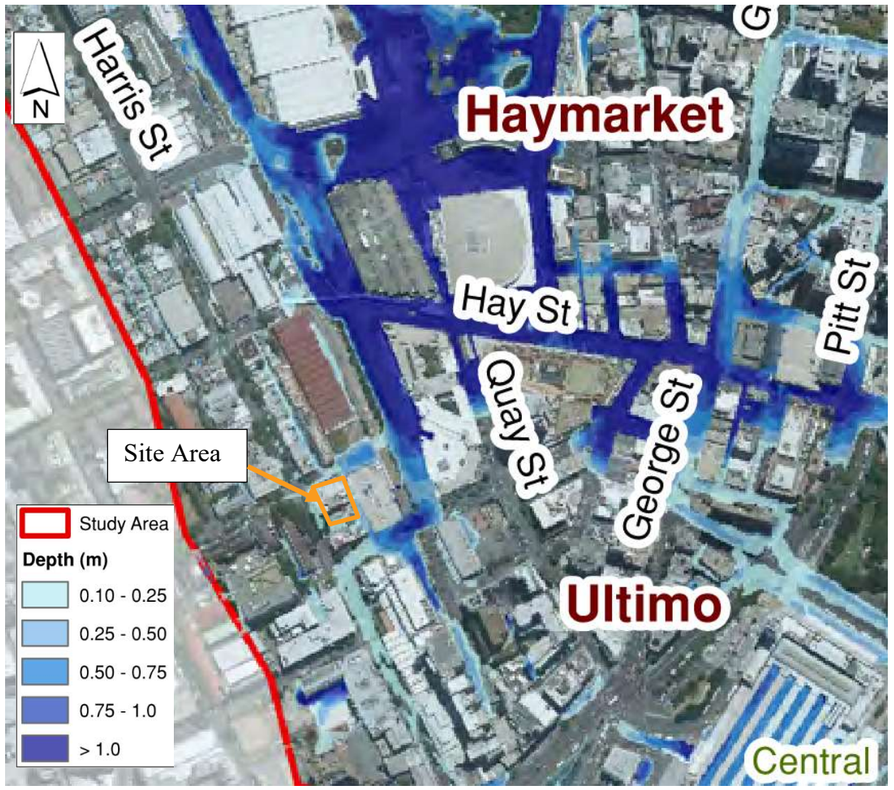


Figure 13 Excerpt of Figure 3 Peak Flood Depth PMF Design Flood Event (BMT WBM, 2014)

Based on a review of the City of Sydney Darling Harbour flood study, it can be concluded that the development site is affected by the 1% AEP flood event along Omnibus Lane and the eastern end of Mary Ann Street. Therefore, the site would be subject to specific flood related development controls.

7.4 Post-Development Concept Stormwater Management Plan

7.4.1 Flood Management

As discussed in Section 7.3.2, the proposed development site is subject to specific flood-related development controls such as the FPLs outlined in the City of Sydney Interim Floodplain Management Policy (2014).

There are seven pedestrian entrances/exits to the proposed development building according to the latest architectural plans (Refer to Figure 14). Given that the ground floor of the proposed development will be for commercial business use, the proposed flood planning levels are based on a merits approach with a minimum of the 1% AEP flood level.

The proposed development also features a basement loading dock area where vehicles can enter via Omnibus Lane. In accordance with the criteria outlined in Table 1, the FPLs for

below-ground basement must be designed to the 1% AEP flood level + 0.5m, or the PMF (whichever is higher).

Table 2 outlines the anticipated flood planning level for each pedestrian entrance/exit and basement shown in Figure 14. Based on a review of the architectural layout entrances 1, 2, 3, 4, 5 and 6 should all be able to comfortably meet the anticipated flood planning levels. The vehicular entrance to the basement will likely require a raised entrance on the ramp to protect from the risk of flooding. The stair entrance at door 7 would require protection consistent with a below-ground car park as it provides access to the lower level. The current design of door 7 appears to be non-compliant with this level and may require stairs up to the door to protect from flooding or relocation.

Table 2 Anticipated Flood Planning Levels

Entrance ID	Entrance/Exits	Flood Planning Level (FPL)
1	Entry Forecourt via Harris Street	N/A - not subject to 1% AEP flooding
2	Education Entry via Harris Street	N/A - not subject to 1% AEP flooding
3	Entry via Mary Ann Street	N/A - not subject to 1% AEP flooding
4	Foyer Entry via Precinct Heart (Omnibus Lane)	Minimum of 0.10m above adjacent kerb invert level (1% AEP peak flood depth)
5	Escalator/Stairway Entry via Precinct Heart (Omnibus Lane)	Minimum of 0.10m above adjacent kerb invert level (1% AEP peak flood depth)
6	IRC Indoor Space Entry via Precinct Heart (Omnibus Lane)	Minimum of 0.10m above adjacent kerb invert level (1% AEP peak flood depth)
7	Stairway Entry via Omnibus Lane	Minimum of 0.75m above adjacent kerb invert level (1% AEP Peak flood depth + 0.5m freeboard)
8	Basement Entrance for vehicles via Omnibus Lane	Minimum of 0.75m above adjacent kerb invert level (1% AEP Peak flood depth + 0.5m freeboard)

More certainty of anticipated flood planning levels for the site will be provided once Arup has reviewed digital flood model results for the site.

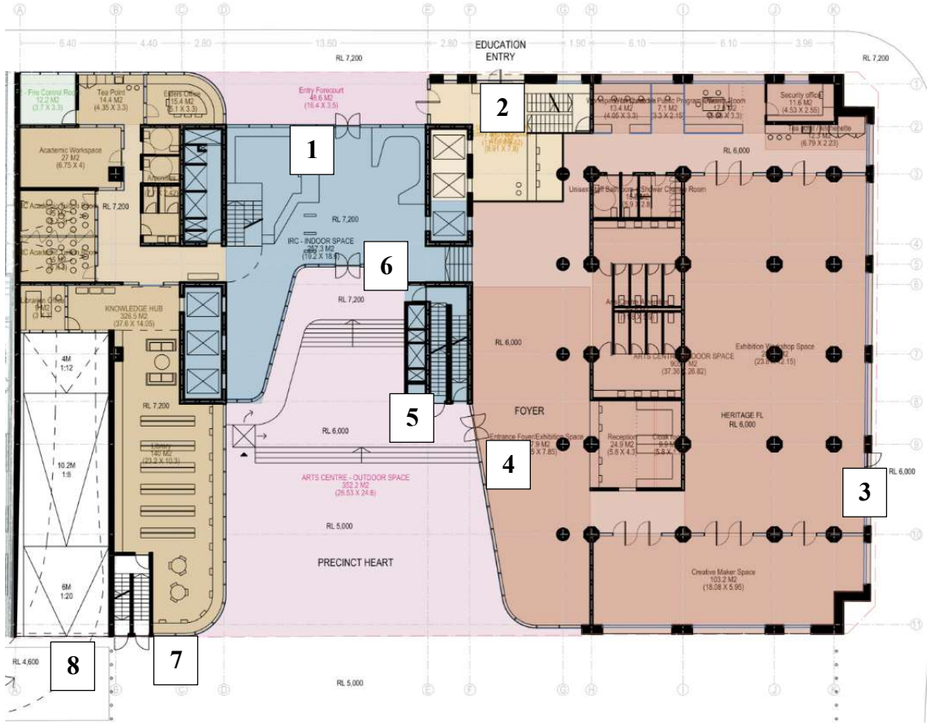


Figure 14 Excerpt from latest architectural plans with entrances/exits marked (BVN, 2021)

7.4.2 Flood Impacts

As the proposal will not result in an increase in site imperviousness and the existing site is predominantly occupied by existing buildings, it is not anticipated that the proposal will result in off-site flood impacts. However, it is recommended that as part of future design stages that a site-specific flood assessment is completed. This will assess whether the removal of the existing at-grade car park has any impact on flood levels in the surrounding area. Due to the small extent of shallow flooding at the car park it is anticipated any impacts would be minor and could be mitigated through the provision of flood storage within the development via an on-site detention tank.

7.4.3 Stormwater Quantity Management

As discussed in Section 7.2.5, the requirements for On-site detention within the City of Sydney LGA is dictated by the criteria outlined in the Sydney Water On-Site Stormwater Detention Policy (2014). Sydney Water was contacted directly on 7th July 2021 to advise whether the proposed development would require on-site detention. Sydney Water responded on the 8th July 2021 and advised that an On-Site Detention (OSD) is not required for the redevelopment of 622-644 Harris Street, Ultimo. This correspondence with Sydney Water is included in Appendix.

7.4.4 Stormwater Quality Management

In order to meet the City of Sydney water quality reduction targets outlined in Section 7.2.3, the following water quality treatment measures are recommended:

- Rainwater collection and reuse, Green roofs
- Light weight planting layer around solar panels
- Gross Pollutant Traps including
- Cartridge filtration systems

These strategies would be considered in more detail during the detailed design phase. A summary of these strategies and their associated benefits are included in Table 3.

Table 3 Summary of Best Practice WSUD devices

WSUD Technology	Description	Contribution to WSUD Strategies	Typical Images
Rainwater Collection and Reuse	Rainwater harvesting tanks provide the opportunity for water reuse by utilising water captured on the roof. These can be collected in above-ground or below-ground tanks.	The tanks provide water conservation by reducing the demand for potable water. It also reduces the volume of stormwater runoff.	 (Concept Design Guidelines for WSUD pg 63, Water by Design, 2009)
Green Roofs	Green roofs are multi-layered systems which cover the roof of a building with vegetation cover/landscaping over a drainage layer. The design intent is to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.	Directly reduces impervious areas from an urban development and mimics greenfield environments for high density development building footprints. Effectively removes pollutants.	 (Chicago City Hall, New York Times via Domain, http://www.domain.com.au/News/diy-rooftop-gardens-20120829-250aa/)
Light weight planting layer around solar panels	Utilising the space surrounding the solar panels to provide more landscaped, impervious area to the building footprint.	Directly reduces the impervious areas from an urban development. Reduces a fraction of stormwater runoff volume.	 (Architects presentation, 2021)
Gross Pollutant Traps (GPTs)	There are many types of GPT devices on the market which are installed at the point of entry to a subsurface network or on-line in a pit or at a discharge point.	The GPT device removes rubbish and debris. Depending on the type of device being used, some coarse sediment may also be removed. GPTs are most effective at locations that generate high levels of litter (i.e. commercial land uses)	 (Rocla, http://rocla.com.au/Cleans All.php)
Cartridge Filtration Systems	Stormwater filtration devices which can be installed in stormwater pits. These devices typically use cartridges to filter the nutrients from stormwater runoff.	Stormwater filtration devices are effective in removing litter, oil, suspended solids and particulate-bound pollutants such as phosphorus and nitrogen.	 (Stormwater360)

FIGURE 1
STUDY AREA
DARLING HARBOUR CATCHMENT

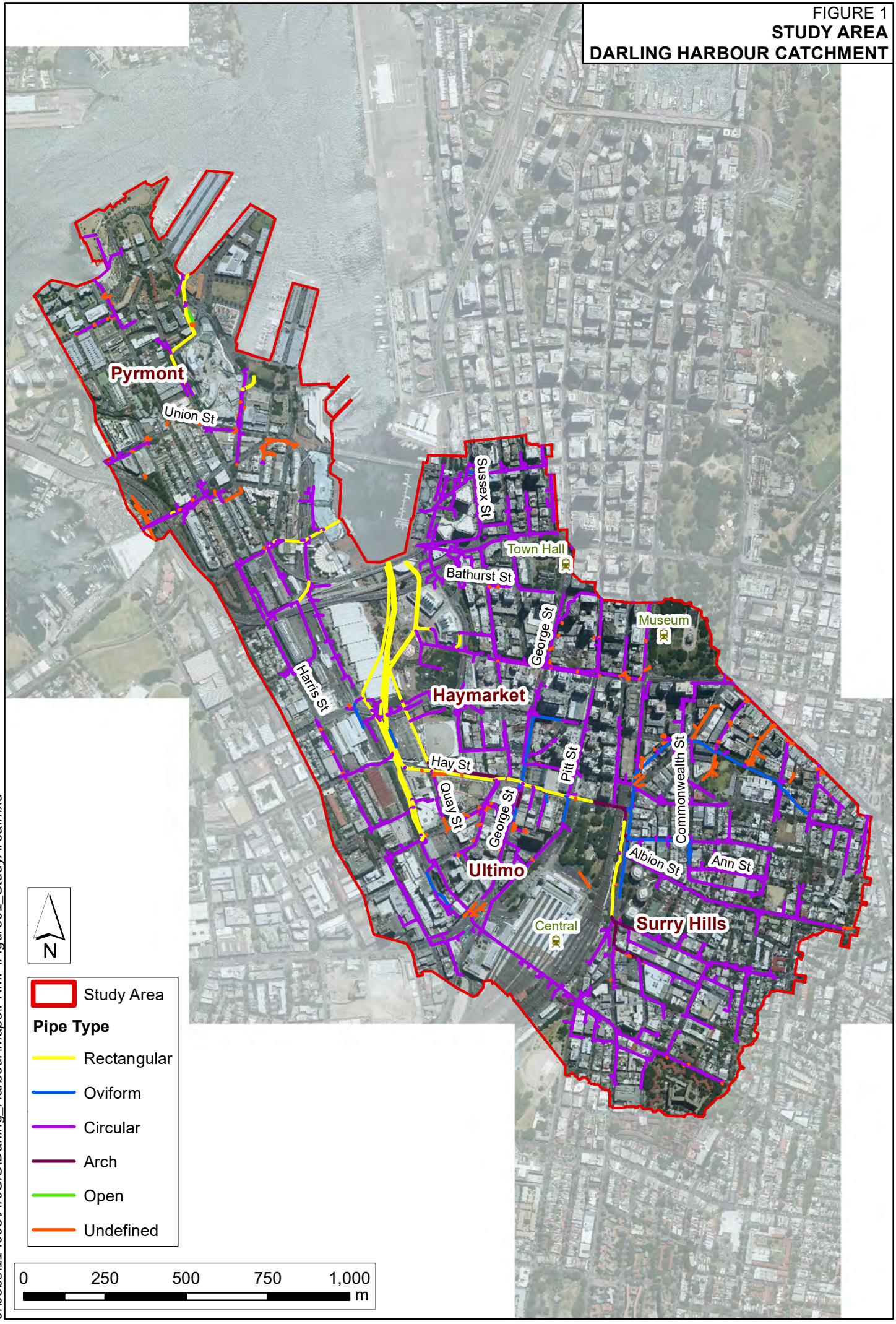


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FIGURE 2

PEAK FLOOD DEPTH
1% AEP DESIGN FLOOD EVENT

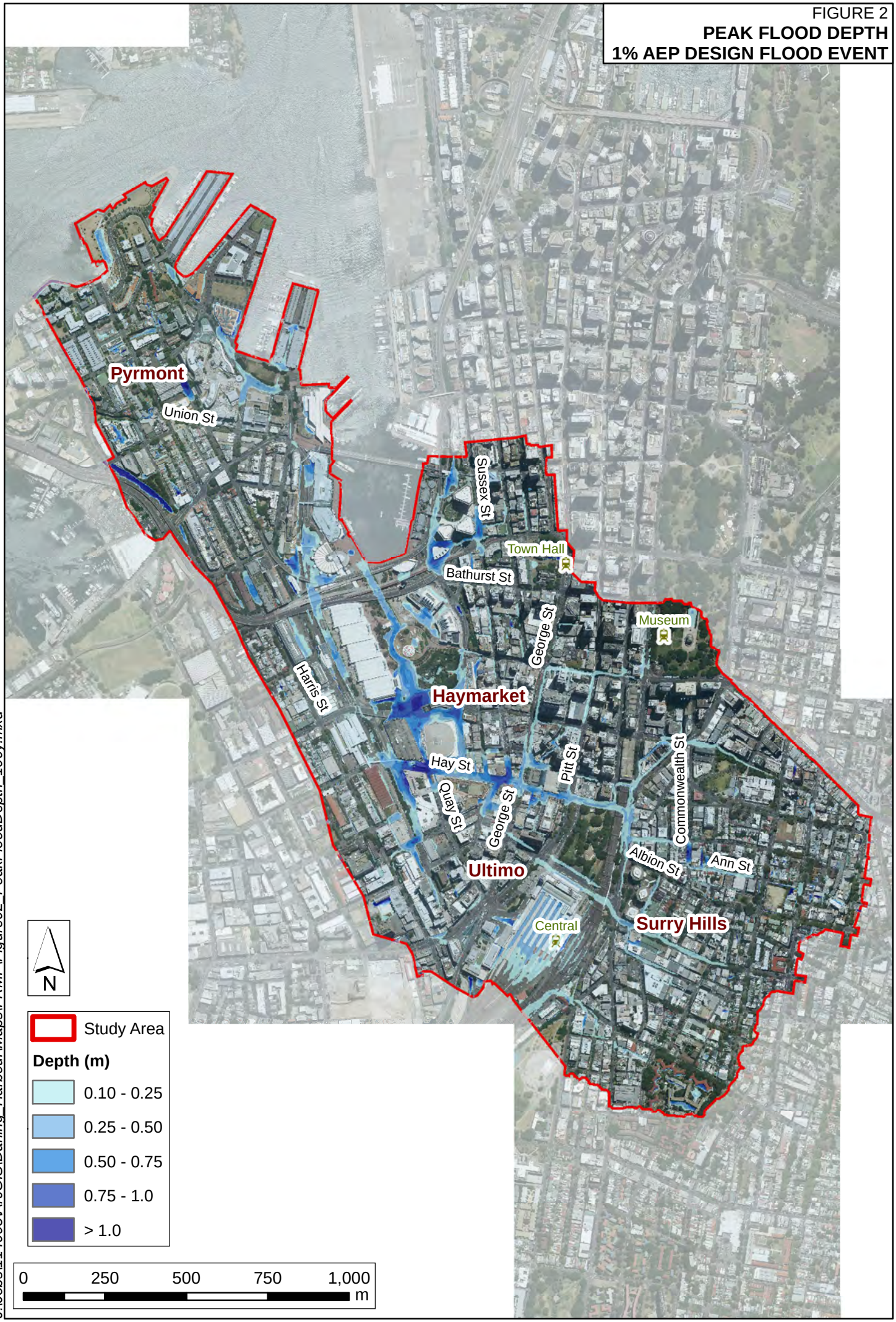

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FIGURE 3
PEAK FLOOD DEPTH
PMF DESIGN FLOOD EVENT

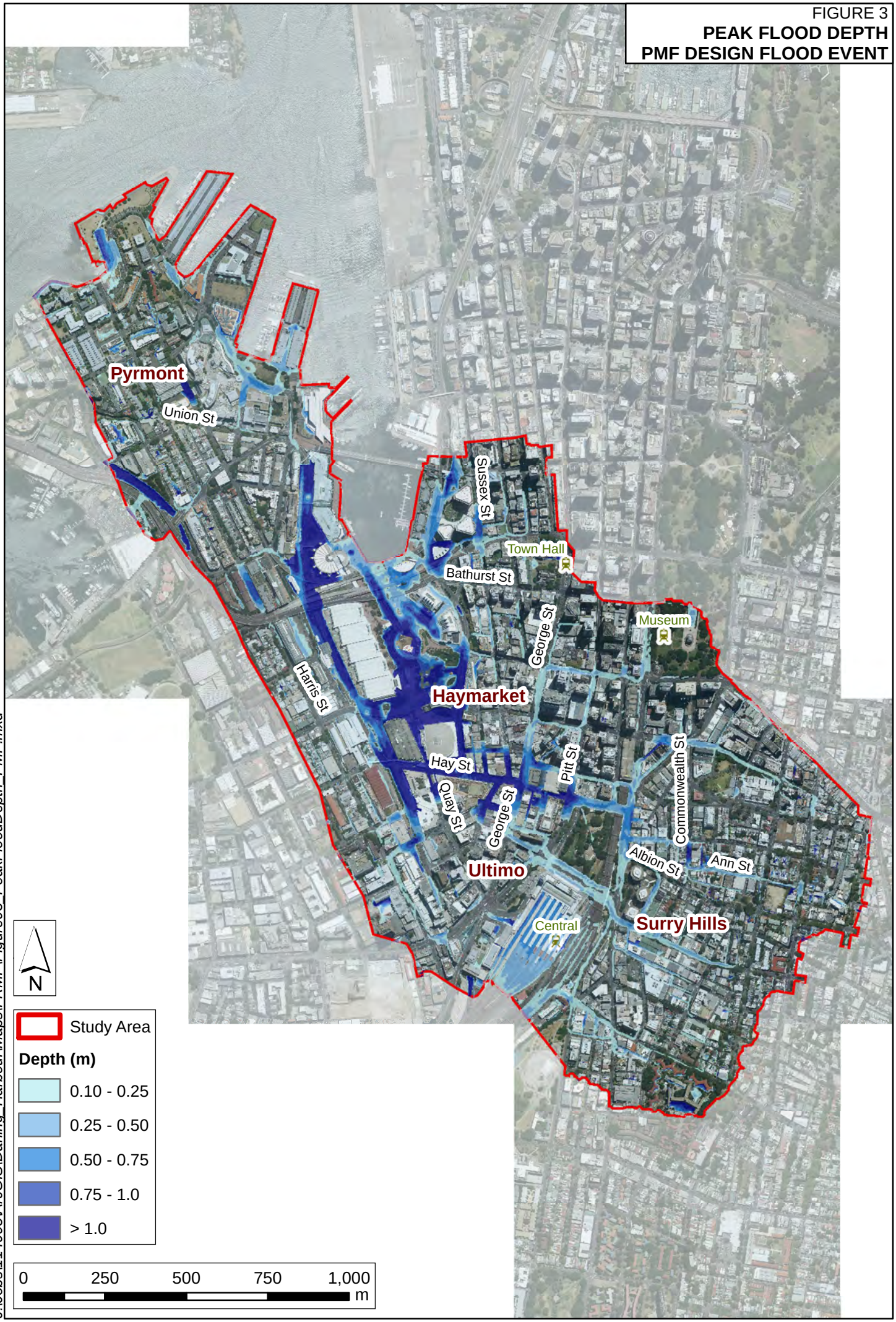

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FIGURE 4
HAZARD CATEGORIES
1% AEP DESIGN FLOOD EVENT

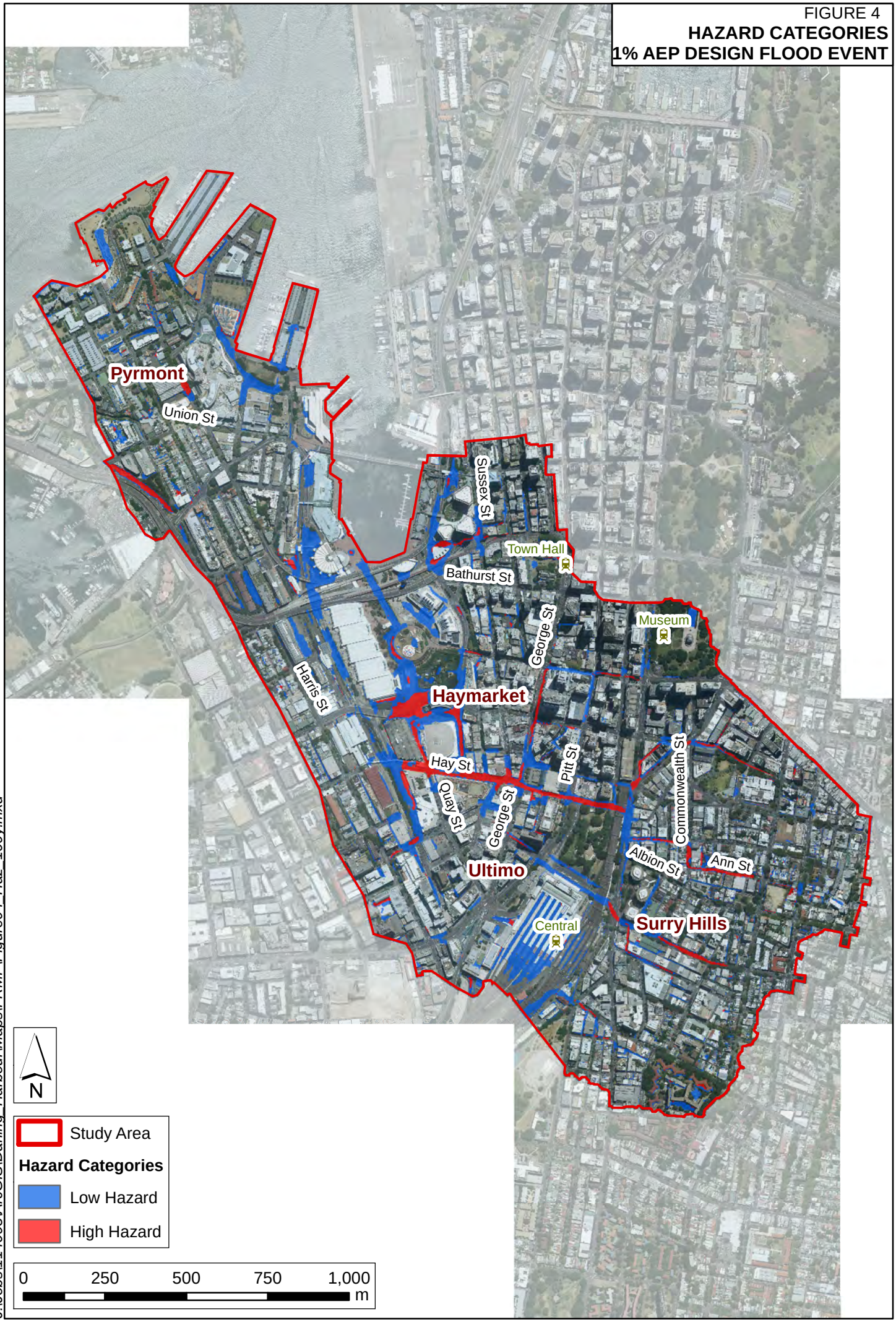

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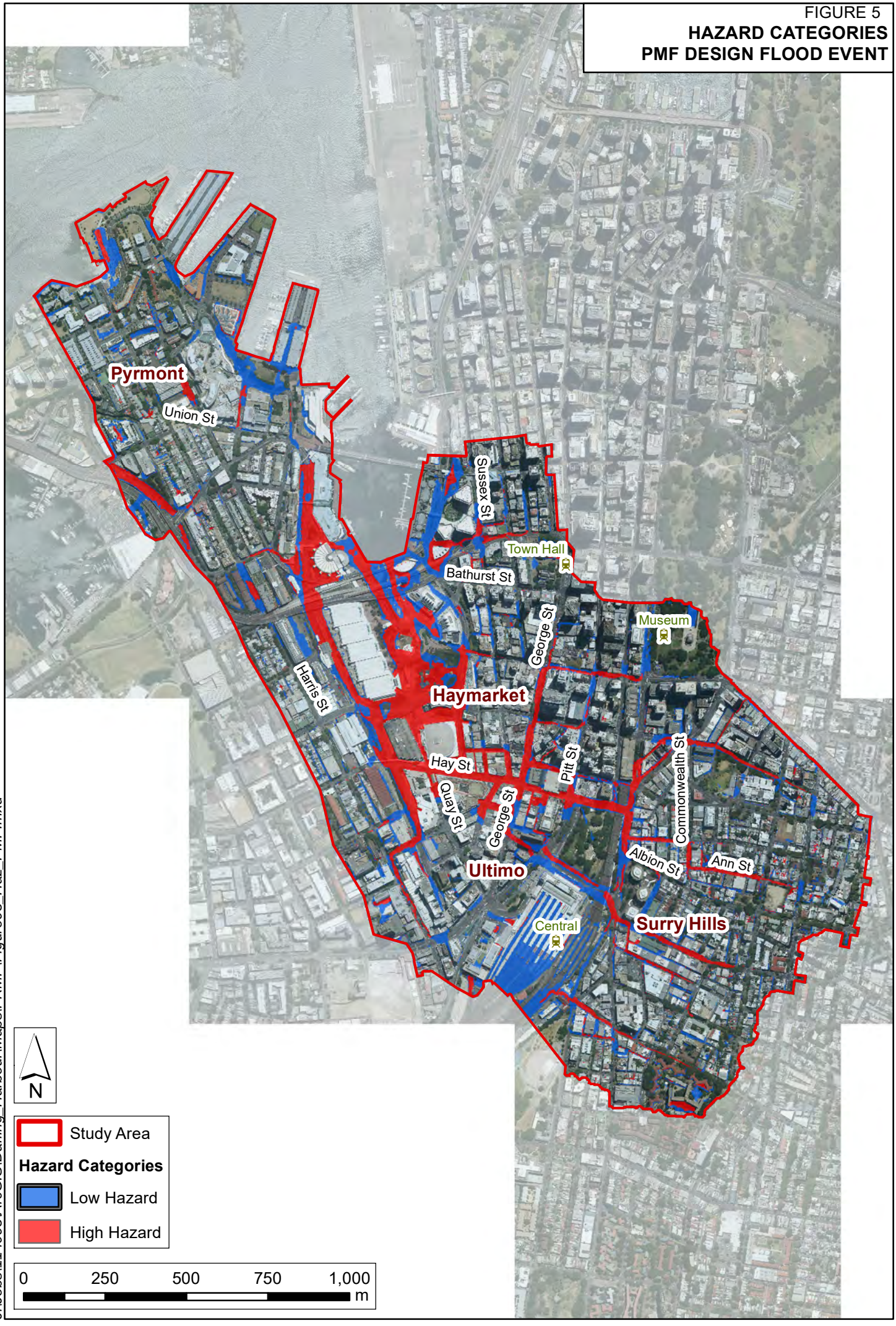
FIGURE 5

HAZARD CATEGORIES
PMF DESIGN FLOOD EVENT

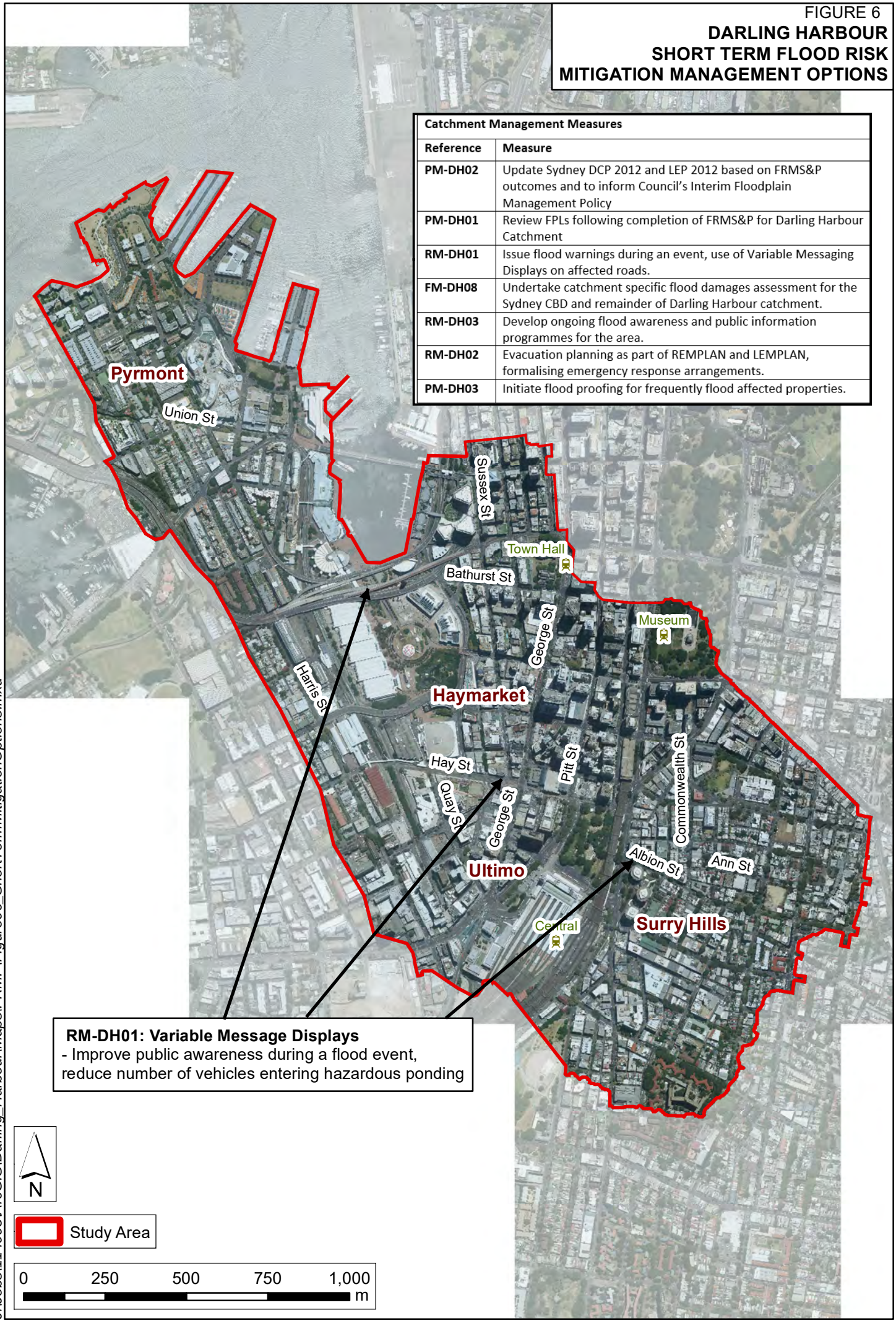


J:\Jobs\114095\ArcGIS\Darling_Harbour\Maps\FRMP\Figure05_Haz_PMF.mxd

FIGURE 6

DARLING HARBOUR SHORT TERM FLOOD RISK MITIGATION MANAGEMENT OPTIONS

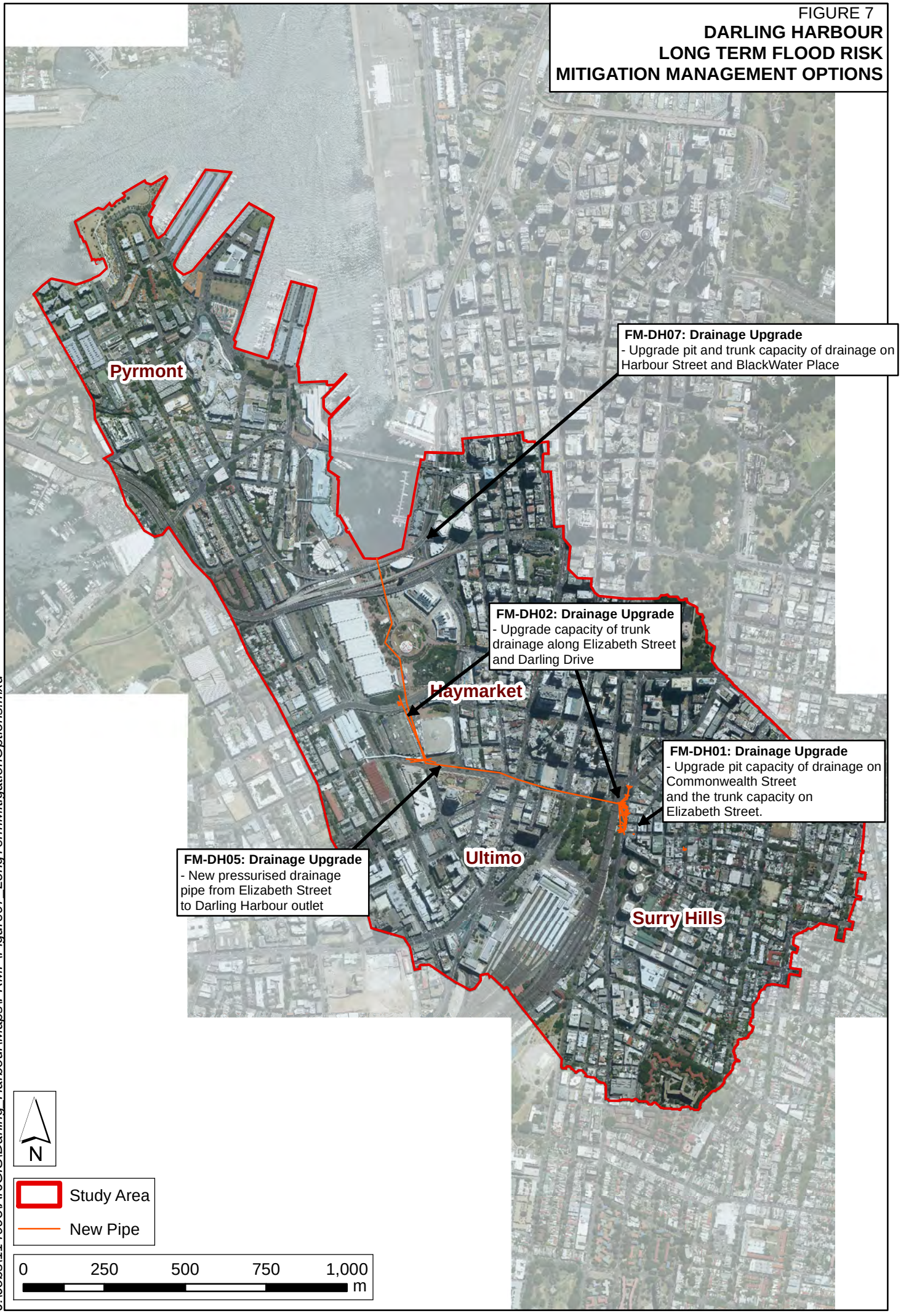
Catchment Management Measures	
Reference	**Measure**
PM-DH02	Update Sydney DCP 2012 and LEP 2012 based on FRMS&P outcomes and to inform Council's Interim Floodplain Management Policy
PM-DH01	Review FPLs following completion of FRMS&P for Darling Harbour Catchment
RM-DH01	Issue flood warnings during an event, use of Variable Messaging Displays on affected roads.
FM-DH08	Undertake catchment specific flood damages assessment for the Sydney CBD and remainder of Darling Harbour catchment.
RM-DH03	Develop ongoing flood awareness and public information programmes for the area.
RM-DH02	Evacuation planning as part of REMPLAN and LEMPLAN, formalising emergency response arrangements.
PM-DH03	Initiate flood proofing for frequently flood affected properties.



J:\Jobs\114095\ArcGIS\Darling_Harbour\Maps\FRMP\Figure06_ShortTermMitigationOptions.mxd

FIGURE 7

DARLING HARBOUR LONG TERM FLOOD RISK MITIGATION MANAGEMENT OPTIONS



J:\Jobs\114095\ArcGIS\Darling_HarbourMaps\FRMP\Figure07_LongTermMitigationOptions.mxd

Greg Kalisz

From: Stormwater <Stormwater@sydneywater.com.au>
Sent: Thursday, 8 July 2021 7:31 AM
To: Andrew Crouch
Cc: Greg Kalisz; Ashley Nguyen
Subject: OSD Enquiry - 622- 644 Harris Street, Ultimo

Andrew,

On Site Detention is not required for any development at 622- 644 Harris Street, Ultimo.

Best Regards

Jeya Jeyadevan
Senior Capability Assessor
Business Development
Sydney Water, Level 13, 1 Smith Street, Parramatta NSW 2150

Sydney WATER

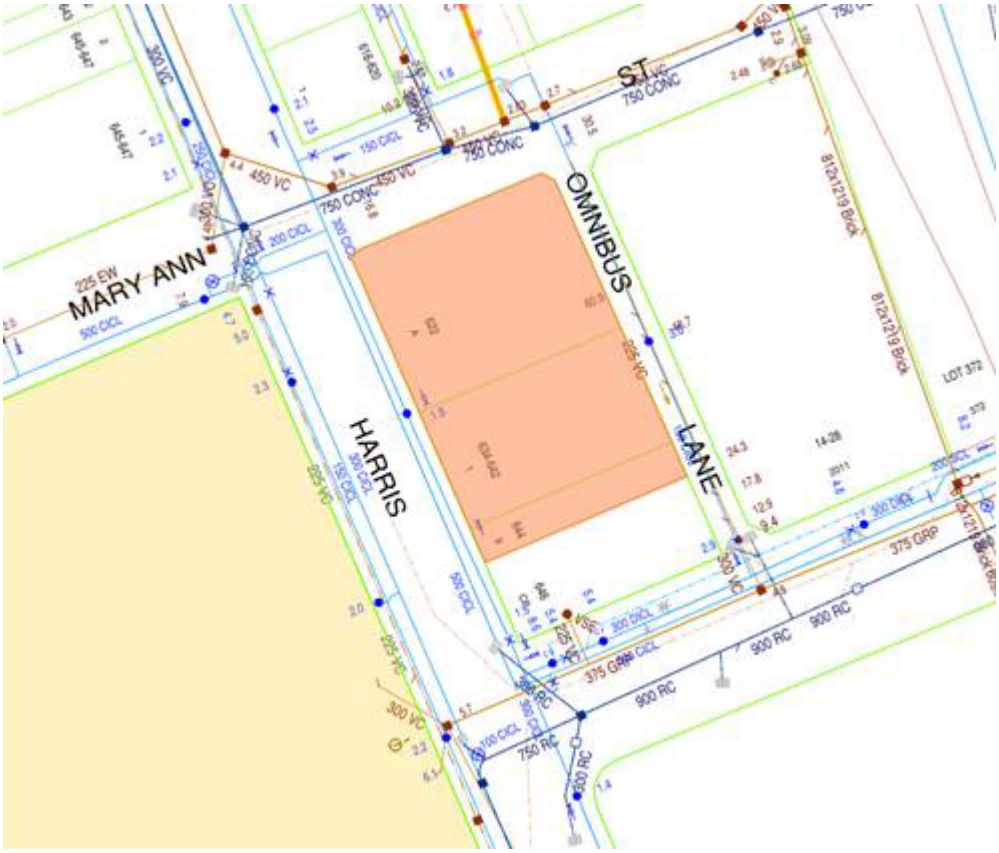
Phone: 8849 6118
Mobile: 0409 318 827
jeya.jeyadevan@sydneywater.com.au

From: Andrew Crouch <Andrew.Crouch@arup.com>
Sent: Wednesday, 7 July 2021 1:30 PM
To: Stormwater <Stormwater@sydneywater.com.au>
Cc: Greg Kalisz <Greg.Kalisz@arup.com>; Ashley Nguyen <Ashley.Nguyen@arup.com>
Subject: [External] OSD Enquiry - 622 Harris Street

Hi Jeya,

We are providing a high level advice and undertaking a feasibility study for the UTS Building 15 site at the corner of Harris Street and May-Ann Street at 622 – 644 Harris St, Ultimo within the Darling Harbour drainage catchment. The site boundary is shown below overlaid on the SydneyWater DBYD plan.

Are you able to advise on whether on-site detention would be required for redevelopment of this site?



Regards
Andrew

Andrew Crouch
Senior Civil Engineer | Infrastructure
BEng (Hons-1) CPEng NER MIEAust
Please note I do not work Thursdays

Arup
Level 5, 151 Clarence Street Sydney NSW 2000 Australia
t: +61 2 9320 9320 d: +61 2 9320 9151
www.arup.com

Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: A/87139

SEARCH DATE	TIME	EDITION NO	DATE
23/6/2021	1:54 PM	1	25/3/2013

LAND

LOT A IN DEPOSITED PLAN 87139
AT ULTIMO
LOCAL GOVERNMENT AREA SYDNEY
PARISH OF ST ANDREW COUNTY OF CUMBERLAND
TITLE DIAGRAM DP87139

FIRST SCHEDULE

UNIVERSITY OF TECHNOLOGY SYDNEY (T AH626590)

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

2210184 - A Heath PRINTED ON 23/6/2021

Received: 23/06/2021 13:54:16

Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 1/87261

SEARCH DATE	TIME	EDITION NO	DATE
23/6/2021	1:54 PM	2	21/6/2012

LAND

LOT 1 IN DEPOSITED PLAN 87261
LOCAL GOVERNMENT AREA SYDNEY
PARISH OF ST ANDREW COUNTY OF CUMBERLAND
TITLE DIAGRAM DP87261

FIRST SCHEDULE

UNIVERSITY OF TECHNOLOGY SYDNEY (T AH63162)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 AH35397 RESTRICTION(S) ON THE USE OF LAND

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

2210184 - A Heath PRINTED ON 23/6/2021

Received: 23/06/2021 13:54:17

Title Search

NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 9/86567

SEARCH DATE	TIME	EDITION NO	DATE
23/6/2021	1:54 PM	9	9/12/2011

LAND

LOT 9 IN DEPOSITED PLAN 86567
LOCAL GOVERNMENT AREA SYDNEY
PARISH OF ST ANDREW COUNTY OF CUMBERLAND
TITLE DIAGRAM DP86567

FIRST SCHEDULE

UNIVERSITY OF TECHNOLOGY SYDNEY (T AG677255)

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

2210184 - A Heath PRINTED ON 23/6/2021

Received: 23/06/2021 13:54:18

Ausgrid

Preliminary Enquiry

Reference Code : 0252486

Preliminary Enquiry

LOCATION

NMI
4103994154
Property Name
Uts Building Cb13-15
Property Type
Building
Land Title Type
Torrens
Street Number/RMB
622-644
Lot Number
Lot A
Nearest Cross Street
Mary Ann Street
Location Address
Harris Street, Ultimo, 2007
Land Zoning
Urban

APPLICANT

Applicant Type
Other On Behalf Of A Retail Customer Or Real Estate Developer
Full Name
Mr Eric Serret
Email Address
eric.serret@arup.com
ABN/ACN
36625911686
Company Name
Arup
Floor Number
5
Street Number/RMB
151
Applicant Address
Clarence Street Sydney 2000
Phone Number
0457851460

CUSTOMER

Customer Type
Retail Customer
Full Name
Mr Amir Vatandoust
Email Address
Amir.Vatandoust@uts.edu.au
Phone Number

0423320220

ENQUIRY

Type

I Have An Enquiry Related To A New Or Altered Residential Or Small Commercial/Industrial Load Connection (Up To 10mva) That I Cannot Answer After Reviewing Your Website.

Your Question

Due To A Possible Refurbishment Of The Building, Could You Please Advise On The Potential Of Increasing The Existing 800a Supply To 2,000a From Substation S6403, If Not, Please Confirm Options For 1mva Kiosk Substation Or Triplex Substation.

DECLARATION

Applicant Name

Mr Eric Serret

Application Date

24-Jun-2021

Price Description	Price Including GST
Preliminary Enquiry.	AUD $443.10
Total Price	AUD $443.10

Terms and Conditions:

In submitting this preliminary enquiry you are engaging Ausgrid to provide you with a written response. Once submitted the fee charged is consumed. Ausgrid will aim to provide you with a written response within 10 business days. If additional work and/or fees are required, we will contact you to advise prior to providing the response.

*I acknowledge the terms & conditions. ☑

Preliminary Enquiry – Response Letter

05/07/2021 Webform ref: 252486

ARUP AUSTRALIA SERVICES PTY LTD
Attention: ERIC SERRET
Via email: eric.serret@arup.com

Premises address: **UTS BUILDING CB13-15 622-644 HARRIS STREET, ULTIMO**

Ausgrid AE Reference: **700007307**

Dear Eric

I refer to your preliminary enquiry regarding the electricity connection at the above address and provide the following information.

- ❑ The Ausgrid network does not have the capacity to connect the proposed 2000-amps 3 phase low voltage electricity connection. An extension/augmentation of the Ausgrid network is required. Following is the likely work(s) required to provide the request capacity.
  - Installation of a chamber substation.
- ❑ An extension/augmentation of the Ausgrid network is Contestable and requires the customer to engage accredited service providers to undertake the design and construction of the required works. Information on how to connect to the Ausgrid network can be found on our website at the following link: https://www.ausgrid.com.au/Connections
- ❑ Ausgrid is unable to provide costs or timeframes for Contestable works. However, accredited service providers may be able to provide the information.
- ❑ The electrical connection will require Ausgrid to provide auxiliary services that only Ausgrid can provide. The auxiliary services and the associated fee are detailed in the Ausgrid document ***Alternative control services fee schedule.***. The document is available on our website at the following link: https://www.ausgrid.com.au/Connections/charges
- ❑ Substation S.6043 basement CBD substation with a non-firm rating of 5400 amps. The substation can only supply an 800 amp 3 phase connection for the above side address
- ❑ Information regarding the private installation such as service fuse size, private protection settings, cable size(s) and so forth requires you to arrange suitably trained electrical persons to obtain the desired information about the private installation. Gathering this information may also require you to make arrangements for an interruption of electricity to the customer(s) connected to the private installation.
- ❑ To proceed further in obtaining a new or altered electrical connection to the property a Connection Application will need to be submitted. The various application forms are available on our website at the following link: https://www.ausgrid.com.au/Connections

It should be noted that the above advise is based on Ausgrid's polices and network status as of today and are subject to change.

Connections to the Ausgrid network are governed by a set of laws and rules referred to as the National Energy Customer Framework (NECF). Included in the NECF is the National Electricity Rules (NER). Under these rules, a binding contract may only be formed after a connection application is lodged and Ausgrid has made a connection offer in response to that application. Accordingly, to make arrangements for the electricity connection of the development to the Ausgrid network you should lodge a completed connection application.

Should you require any further information please contact me.

Yours sincerely,

Tyson Geer

Ausgrid

Direct Telephone Number: 0295855723
Email: tgeer@ausgrid.com.au

Greg Kalisz

To: Eric Serret
Subject: RE: 700007307 - 622-644 Harris Street, Ultimo (UTS) - Preliminary Enquiry Response

From: Tyson Geer <tgeer@ausgrid.com.au>
Sent: Monday, 5 July 2021 2:28 PM
To: Eric Serret <Eric.Serret@arup.com>
Cc: David Tomlin <dtomlin@ausgrid.com.au>
Subject: 700007307 - 622-644 Harris Street, Ultimo (UTS) - Preliminary Enquiry Response

Dear Eric,

Thank you for your preliminary enquiry submitted through Ausgrid's online SmartForms.

Please find enclosed the response for the above application address.

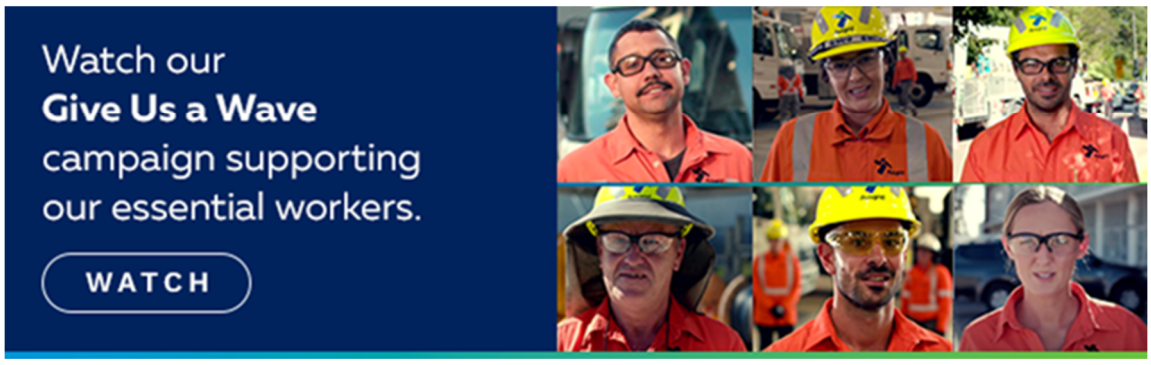
The preliminary enquiry letter is attached to your web portal in private installation section for additional convenience.

If you have any questions or queries, please don't hesitate to call on the undersigned.

Regards,

Tyson Geer | Engineering Officer | Contestability | Ausgrid
☎: 02 9585 5723 (Extn 35723) | 🖷: 02 9585 5797 (Extn 35797) | : 0408 968 807 | ✉: tgeer@ausgrid.com.au

Ausgrid Connecting communities, empowering lives



Greg Kalisz

To: Zachary Kennett
Subject: RE: UTS CB13-15 622-644 Harris Street Ultimo

From: Zachary Kennett <Zachary.Kennett@jemena.com.au>
Sent: Friday, 9 July 2021 7:35 AM
To: Greg Kalisz <Greg.Kalisz@arup.com>
Subject: RE: UTS CB13-15 622-644 Harris Street Ultimo

Hi Greg,

Apologises on the delay getting back to you I wanted to reconfirm something with our engineers.

Based on current modelling Jemena can confirm that there is existing capacity within the 210kPa mains to support the proposed indicative loads. Please note that while we do not reserve capacity in the network should the 210kPa network at the time of application have insufficient capacity or the gas load increases dramatically the high pressure 1050kPa steel mains also have available capacity.

Please let me know if you need any additional information to help support this proposal.

Thanks,

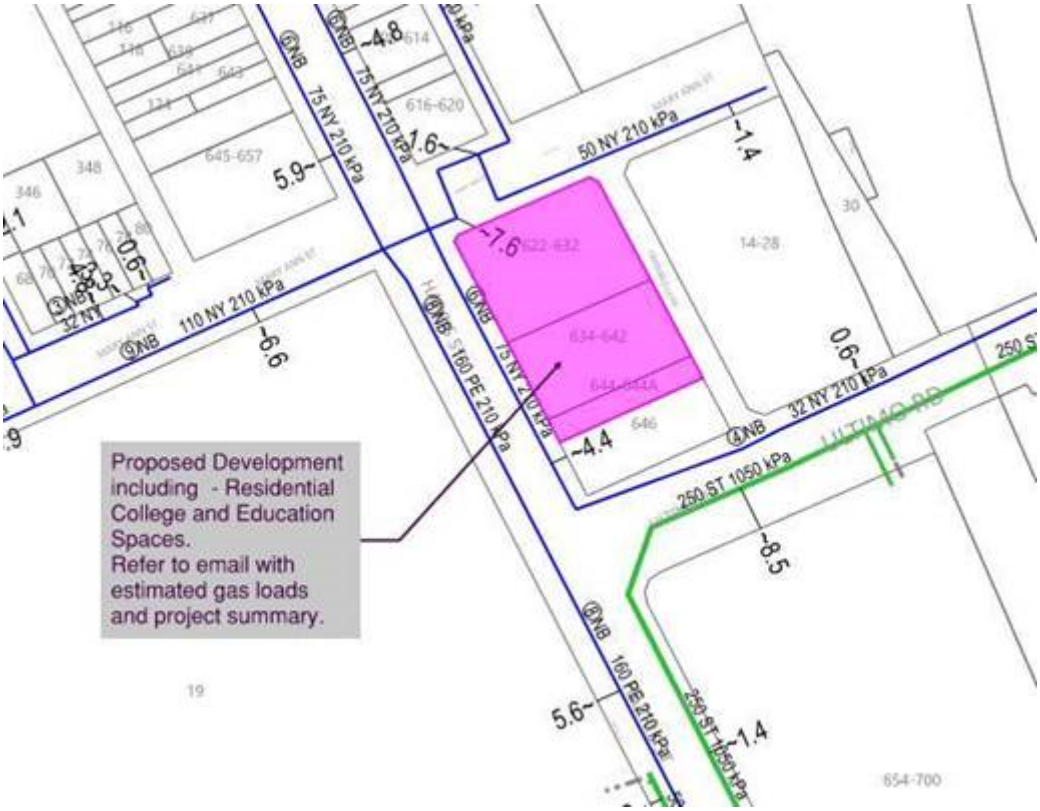
Regards,
Zachary Kennett
Network Development Specialist – I&C
Jemena
99 Walker Street, North Sydney NSW 2060
PO Box 1220, North Sydney NSW 2059
Tel: 02 9867 7182 | 0409 608 399
www.jemena.com.au

From: Greg Kalisz
Sent: Monday, 28 June 2021 7:13 PM
To: Zachary Kennett <Zachary.Kennett@jemena.com.au>
Subject: UTS CB13-15 622-644 Harris Street Ultimo

Good Afternoon Zachary

We are prepring Masterplan Services input for UTS CB13-15 at 622-644 Harris Street, Ultimo, Sydney 2007. The new proposed uses for building include approximatelly 80+ student / residential apartmets, Arts Centre, Teaching spaces, Library and courtyard Gardens.

We are looking for an early advice on the exisitng Jemena gas infrastrucure surrounding site. We have reviewed DBYD (atatched) and summarised the exisitng infrastructure on image below:



The current site is connected to 75NY medium pressure gas main 210kPa. Review of the capacity against future demand will be required to inform any system upgrades. Based on our initial review the existing gas meter would need to be upgraded to cater for the future loads. Application to Jemena would need to be lodged to verify the future demand during design stage.

Based on our review of the current infrastructure we believe that there is no issue with the gas supply with options for connection to the following:

- 75NY@210kPa in Harris Street or
- 32NY@210kPa in Ultimo Road or
- High pressure main 250ST @1050kPa in Ultimo Road.

Could you please review above and provide your comments as well as our assumptions on the current loads and approval process.

Below are the estimated very high level gas loads

Services	Peak demand [GJ/hr]	Operating capacity	Max daily demand [GJ/day] 8 hours	Max monthly demand [GJ/day] 31 days	Max annual demand [TJ/day] 365 days
Mechanical hot water boilers	3	50%	12	360	4.3
Hydraulic Hot water system	2	80%	12	82	1.2
Retails space 1 x 400Mj/hr	0.4	90%	1.4	30	0.5
EOT Facilities	1	90%	3	60	0.65

Please let me know if you have any questions. Would you be able provide your comments by end of the week please.

Regards

Greg Kalisz
Associate Principal | Buildings NSW
MSc MIEAust CPEng NER

Arup
Barrack Place, 151 Clarence Street, Sydney 2000
t: +61 2 9320 9320 m: +61 422 167 167
www.arup.com

Connect with Arup on LinkedIn

Greg Kalisz

To: RAMLIE, WILLY
Subject: RE: [External] RE: UTS CB13-15 622-644 Harris Street Ultimo - Preliminary enquiry

From: RAMLIE, WILLY <WILLY.RAMLIE@sydneywater.com.au>
Sent: Monday, 12 July 2021 9:53 AM
To: Greg Kalisz <Greg.Kalisz@arup.com>
Cc: GREENWOOD, VIRGINIA <VIRGINIA.GREENWOOD@sydneywater.com.au>
Subject: RE: [External] RE: UTS CB13-15 622-644 Harris Street Ultimo - Preliminary enquiry

Morning Greg,

Apologies for not sending this last week.

As discussed, the information you have provided below is pretty much what is out there at the current state. There are a number of assets surrounding the site and to determine which asset to connect will depend on future reviews of the relevant applications submitted to Sydney Water for approval.

I also like to point out that Virginia has responded very well on 29 June 2021, regarding the next steps you should take in getting approval for the proposed development. In addition, we understand that it may be a while before a WSC is appointed and there will be continuous discussions between UTS and Sydney Water. All future correspondences/meetings/discussions will incur a Sydney Water contract administration charge of $169.17 per hour (incl GST), as per the IPART determination. Any additional charges due to other 3rd party consultants will also be passed onto UTS, should they be required to undertake specialist reviews/assessments.

Hope this helps.

Note: I have sent an email to Jim Young in UTS on 28 June 2021, seeking an introductory meeting but have not heard back. Perhaps you can get in touch with UTS and they can meet with us so that I can relay the commercial aspects to them directly.

Thank you.

Kind Regards,

Willy Ramlie
Account Manager | Infrastructure Development
Business Development
Sydney Water, Level 13, 1 Smith Street, Parramatta NSW 2150

Sydney WATER

Mobile: 0418 697 873
Willy Ramlie@sydneywater.com.au

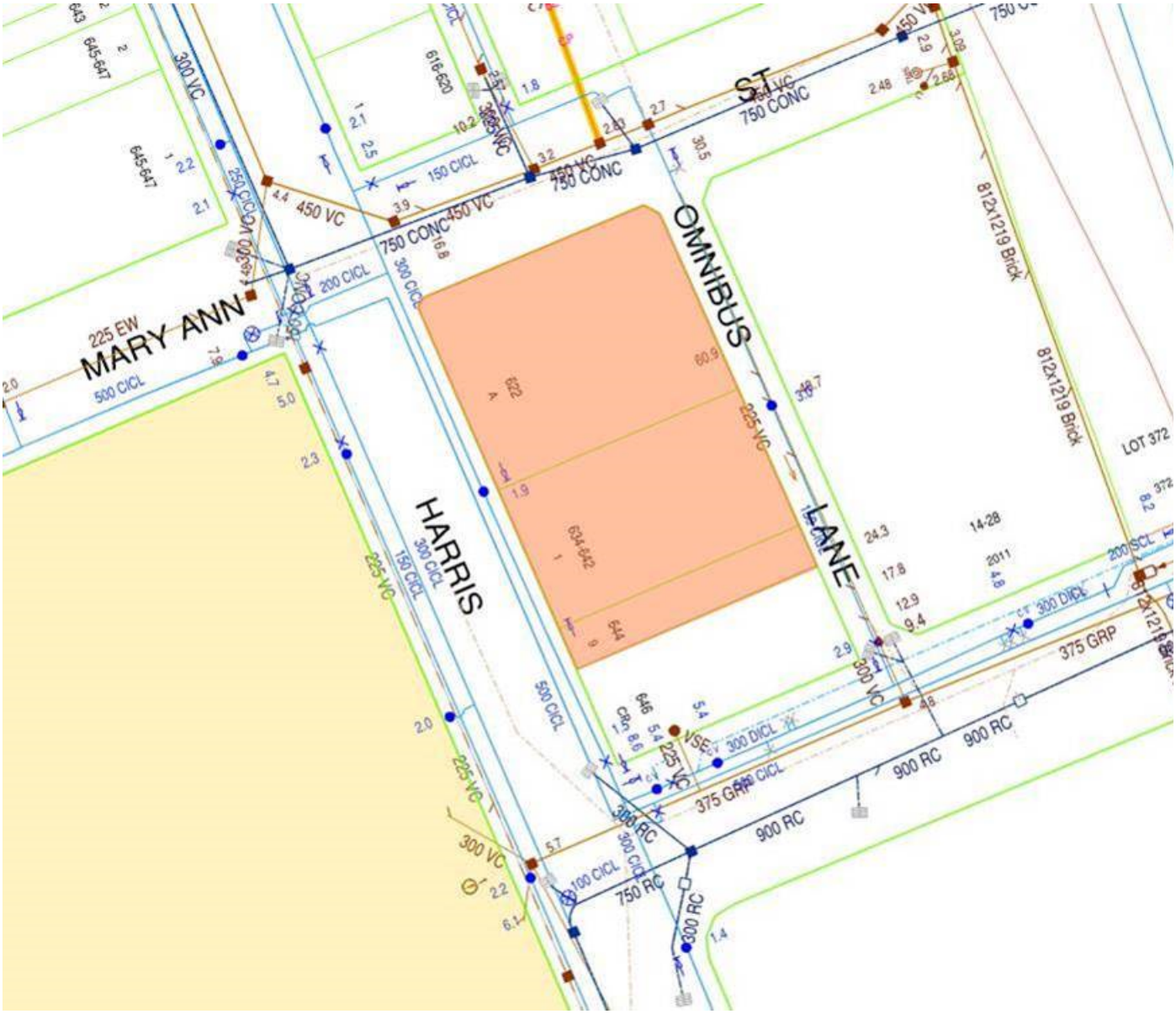
Sydney Water acknowledges the traditional custodians of the waters and land on which we work, live and learn.

From: Greg Kalisz
Sent: Monday, 28 June 2021 7:46 PM
To: Willy.Ramlie@sydneywater.com.au
Cc: VIRGINIA.GREENWOOD@sydneywater.com.au
Subject: UTS CB13-15 622-644 Harris Street Ultimo - Preliminary enquiry

Good Evening Willy

We are prepring Masterplan Services input for UTS CB13-15 at 622-644 Harris Street, Ultimo, Sydney 2007. The new proposed uses for building include approximatelly 80+ student / residential apartmets, Arts Centre, Teaching spaces, Library and courtyard Gardens.

We are looking for an early advice on the exisitng Sydney Water infrastructure surrounding the site. We have reviewed DBYD (atatched) and summarised the exisitng infrastructure on image below (shown in orange):



Review of the capacity against future demand will be required to inform any system upgrades. Based on our initial review the existing water meter would need to be upgraded to cater for the future loads. Application via TAPS for Pressure and Flow and Feasibility Application would need to be lodged to verify the future demand during the design stage.

The existing site is (image above) is well serviced by Sydney Water network including:

- Domestic Cold Water – DN300 CW located in Harris Street and DN300 CW in Ultimo Road suitable to provide supply for any future development options.
- The 225mm Sewer line is available on Omnibus Lane (300 at Ultimo Rd). Multiple Junctions as available for connections.
- The 450mm VC sewer line Is available in Marry Ann
- The 375mm GRP line is available in Ultimo Road picking up 225mm sewer line from Omnibus Lane
- No Sydney Water Easements have been indicated on any available drawings
- Application to Sydney Water as part of the Feasibility Study could be lodged to verify system capacity. Based on our review the infrastructure is suitable to service any future development located on this site.

Could you please review above and provide your comments including future approval process.

Please let me know if you have any questions. Would you be able provide your comments by end of the week please.

Regards

Greg Kalisz
Associate Principal | Buildings NSW
MSc MIEAust CPEng NER

Arup
Barrack Place, 151 Clarence Street, Sydney 2000
t: +61 2 9320 9320 m: +61 422 167 167
www.arup.com

Connect with Arup on LinkedIn

Greg Kalisz

From: donotreply@sydneywater.com.au
Sent: Wednesday, 30 June 2021 3:26 PM
To: Greg Kalisz
Subject: Application Received

Sydney WATER

✔ **Your applications have been successfully submitted**

Dear Greg Kalisz,

The applications on order number **SW-28845512** for

622 Harris St, Ultimo 2007

has been successfully submitted. You can access information regarding this order at any time from your dashboard.

- Sydney Water Tap in™

Statement of available pressure and flow for drinking water

Status **Submitted**

Statement of Available Pressure and Flow

Greg Kalisz
151 Clarence Street
Sydney, 2000

Attention: Greg Kalisz Date: 21/07/2021

Pressure & Flow Application Number: 1179824
Your Pressure Inquiry Dated: 2021-06-30
Property Address: 622 Harris Street, Ultimo 2007

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Omnibus Lane	Side of Street: Middle
Distance & Direction from Nearest Cross Street	30 metres South from Mary Ann Street
Approximate Ground Level (AHD):	8 metres
Nominal Size of Water Main (DN):	150 mm (Nominated Asset ID: 2571897)

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	67 metre head
Minimum Pressure	35 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	35
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20 26 30 40 50	37 37 37 37 36 36 36 35
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main) Maximum Permissible Flow	5 10 15 20 26 30 40 50 67	35 35 34 34 34 34 33 32 31

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

General Notes

This report is provided on the understanding that (i) the applicant has fully and correctly supplied the information necessary to produce and deliver the report and (ii) the following information is to be read and understood in conjunction with the results provided.

1. Under its Act and Operating Licence, Sydney Water is not required to design the water supply specifically for fire fighting. The applicant is therefore required to ensure that the actual performance of a fire fighting system, drawing water from the supply, satisfies the fire fighting requirements.

2. Due to short-term unavoidable operational incidents, such as main breaks, the regular supply and pressure may not be available all of the time.

3. To improve supply and/or water quality in the water supply system, limited areas are occasionally removed from the primary water supply zone and put onto another zone for short periods or even indefinitely. This could affect the supply pressures and flows given in this letter. This ongoing possibility of supply zone changes etc, means that the validity of this report is limited to one (1) year from the date of issue. It is the property owner's responsibility to periodically reassess the capability of the hydraulic systems of the building to determine whether they continue to meet their original design requirements.

4. Sydney Water will provide a pressure report to applicants regardless of whether there is or will be an approved connection. Apparent suitable pressures are not in any way an indication that a connection would be approved without developer funded improvements to the water supply system. These improvements are implemented under the Sydney Water 'Urban Development Process'.

5. Pumps that are to be directly connected to the water supply require approval of both the pump and the connection. Applications are to be lodged online via Sydney Water Tap in™ system -
Sydney Water Website – www.sydneywater.com.au/tapin/index.htm. Where possible, on-site recycling tanks are recommended for pump testing to reduce water waste and allow higher pump test rates.

6. Periodic testing of boosted fire fighting installations is a requirement of the Australian Standards. To avoid the risk of a possible 'breach' of the Operating Licence, flows generated during testing of fire fighting installations are to be limited so that the pressure in Sydney Water's System is not reduced below 15 metres. Pumps that can cause a breach of the Operating Licence anywhere in the supply zone during testing will not be approved. This requirement should be carefully considered for installed pumps that can be tested to 150% of rated flow.

Notes on Models

1. Calibrated computer models are used to simulate maximum demand conditions experienced in each supply zone. Results have not been determined by customised field measurement and testing at the particular location of the application.

2. Regular updates of the models are conducted to account for issues such a urban consolidation, demand management or zone change.

3. Demand factors are selected to suit the type of fire-fighting installation. Factor 1 indicates pressures due to system demands as required under Australian Standards for fire hydrant installations. Factor 2 indicates pressures due to peak system demands.

4. When fire-fighting flows are included in the report, they are added to the applicable demand factor at the nominated location during a customised model run for a single fire. If adjacent properties become involved with a coincident fire, the pressures quoted may be substantially reduced.

5. Modelling of the requested fire fighting flows may indicate that local system capacity is exceeded and that negative pressures may occur in the supply system. Due to the risk of water contamination and the endangering of public health, Sydney Water reserves the right to refuse or limit the amount of flow requested in the report and, as a consequence, limit the size of connection and/or pump.

6. The pressures indicated by the modelling, at the specified location, are provided without consideration of pressure losses due to the connection method to Sydney Water's mains.