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SERVICES



## **75 Mary Street, St Peters 2044**

# **Engineering Services Due Diligence Report + Indicative Spatial Requirements**

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Rev 3.0

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## CONTENTS

1. INTRODUCTION .....	1
2. THE PRECINCT .....	2
3. FLOOD RISK ASSESSMENT .....	3
3.1 General .....	3
3.2 Recommendations.....	3
3.3 Summary & Conclusions .....	3
4. BUILDING ENGINEERING SERVICES INFRASTRUCTURE DUE DILIGENCE .....	4
4.1 Utilities Services Review / Analysis .....	4
4.2 Electrical.....	5
4.2.1 Existing Services .....	5
4.2.2 Ausgrid Infrastructure in the Vicinity of the Site.....	7
4.2.3 New Substation Options for the Development .....	8
4.2.4 Summary & Conclusions .....	14
4.3 Natural Gas .....	15
4.4 Telecommunications.....	16
4.5 Stormwater .....	19
4.5.1 General .....	19
4.5.2 Pre Development Load.....	19
4.5.3 Post Development Load .....	19
4.5.4 Special Requirements .....	19
4.5.5 Water Sensitive Urban Design.....	19
4.5.6 Proposed Servicing Strategy .....	20
4.5.7 Risks/Issues .....	20
4.6 Water.....	22
4.7 Sewer .....	24
4.8 Summary & Conclusions .....	25
5. BUDGETS .....	26
5.1 Services Infrastructure.....	26
5.2 Building Services.....	27
APPENDICES .....	28
Appendix A .....	29
Flow & Pressure Enquiry.....	29
Appendix B .....	30
Spatial Requirements.....	30
B1 - Communications/Electrical/Security.....	31
B2 - Hydraulics .....	34
B3 - Fire.....	37
B4 - Mechanical .....	38
B5 - Lifts .....	41
LIFT LAYOUTS .....	42
Option 1 - 17 Passenger.....	42
Option 2 – 13/15 Passenger .....	43

## 1. INTRODUCTION

Tonkin Zulaikha Greer has commissioned IGS to carry out an engineering services due diligence report of the new mixed use planning application proposed for 75 Mary Street, St Peters NSW on behalf of JVMC Pty Ltd. This report has been prepared solely for JVMC Pty Ltd. No warranty is provided to third parties who rely on this report for any other purpose.

The planning application will predominantly consist of:

- Adaptive reuse of some of the existing buildings (Buildings 1, 2, 6, 7 and 8) predominantly for commercial, retail and residential uses;
- Approximately 180 apartments in new buildings (Buildings A, B and C) and adaptive reuse of Building 8; and
- Basement carparking for approximately 339 cars (residential, retail, commercial);
- Community centre and other amenities to cater for the occupants of the precinct and neighbours in the direct vicinity of the precinct (eg. open air cinema, through site links and open landscaped spaces).

We have assumed that the effective building heights will be less than 25m in height, therefore will not require stair pressurisation, smoke management systems, EWIS, sprinklers, sprinkler/hydrant tanks, and emergency lifts to comply with the BCA.

This report presents an initial peer review with respect to:

- Flood Risk Assessment;
- Building Engineering Services Infrastructure Due Diligence;
- Indicative Budget costs for Engineering Services Infrastructure upgrades;
- Indicative Budget costs for Building Engineering Services;
- Indicative spatial requirements for building engineering services required for the new and adaptively reused buildings.

## 2. THE PRECINCT

The precinct is located to the northern side of Mary Street, and extends all the way to Edith Street (refer to Figure 1).



**Figure 1 – Site Photograph (Source: TZG Report)**

The precinct exhibits generally above road level, sloping topography (from Edith Street - north to Mary Street – south). The level difference from Edith Street to Mary Street is 4 – 5 metres.

The precinct is located in a mixed use area with commercial/industrial buildings at the western end of Mary Street and all along Unwins Bridge Road and residential uses to Edith Street and down the eastern end of Mary Street.

The precinct is located within 5kms of the Sydney CBD and Sydney International and Domestic Airports. It is also in very close proximity to Sydney's major arterial road networks (Princes Hwy and M5 Motorway). In addition to this it is also within 5 minutes of St Peters and Sydenham railway stations.

### **3. FLOOD RISK ASSESSMENT**

#### **3.1 General**

We have been advised by council that this site/precinct is not subject to flooding.

#### **3.2 Recommendations**

Although the site/precinct is not affected, it is possible that the site/precinct could be flood affected in the future. It could be impacted by localised flooding in extreme events. This can be caused by short term overloading of local stormwater drains caused by extreme rainfall.

It is therefore recommended that the proposed floor level(s) at Edith Street is designed to be above the water level on neighbouring properties for the 100 year ARI flood event.

Any new development must comply with the Council Development Control Plans, (in particular Stormwater Management).

Consequently, it is likely that the proposed development will require on-site detention of stormwater and this has been conceptually shown on the planning application plans.

#### **3.3 Summary & Conclusions**

There appears to be no major issues with flooding associated with this proposed development.

## 4. BUILDING ENGINEERING SERVICES INFRASTRUCTURE DUE DILIGENCE

### 4.1 Utilities Services Review / Analysis

A utilities review has been carried out in consultation with the relevant local authorities to identify the existing utilities at the site.

The following assumptions have been made in carrying out this assessment:

- Basement carparking for approximately 340 cars;
- Approximately 16,734m<sup>2</sup> Gross Building Area (GBA) of commercial/industrial/retail space;
- Approximately 180 apartments;
- 265m<sup>2</sup> GBA Community benefit space - open landscaped areas, through site links, open air cinema;
- Site area of approximately 15,299m<sup>2</sup>;
- Peak water consumption for the site/precinct is 100 kL/day;
- Population Equivalent (PE) is of 1,650 people (peak);

Dial Before You Dig (DBYD) requests were submitted on the 24 October 2014 to investigate the presence of existing utilities such as natural gas, water, stormwater, sewer and telecommunications.

The below utilities were notified:

Seq. No.	Authority Name	Phone	Status
42211006	AAPT / PowerTel, NSW	1800786306	NOTIFIED
42211013	AARNet Pty Ltd, Nsw	1300275662	NOTIFIED
42211008	Ausgrid	0249510899	NOTIFIED
42211011	Jemena Gas South	1300880906	NOTIFIED
42211002	Marrickville Council	0293352000	NOTIFIED
42211010	Optus and/or Uecomm, Nsw	1800505777	NOTIFIED
42211007	PIPE Networks, Nsw	1800201100	NOTIFIED
42211004	RailCorp Central	0297528682	NOTIFIED
42211003	Roads and Maritime Services	0288370285	NOTIFIED
42211012	Sydney Water	132092	NOTIFIED
42211009	Telstra NSW, Central	1800653935	NOTIFIED
42211005	Transgrid	0296200777	NOTIFIED

## 4.2 Electrical

It is estimated that the electrical loading of the proposed new development will be in the order of 2,211.8Amps/Phase as per maximum demand calculations below:

Electrical Maximum Demand Calculation						
Precinct75 - 75 Mary Street, St Peters NSW 2044 ~180 Unit Residential Development 13,673m <sup>2</sup> of Commercial/Retail/Industrial NLA Underground Basement Carparking (340 spaces) 9 Lifts  Job No: EN - N14_100						
Basements	Area (m <sup>2</sup> )	Quantities	VA/m <sup>2</sup>	VA	I (A)	Subdivided I (A)
Carpark (Mechanically Ventilated)	12624	20		252480	350.7	
Common Space				0	0.0	
Carpark Lighting	12624	10		126240	175.3	
						526.0
General	Area (m <sup>2</sup> )	Quantities	VA/m <sup>2</sup>	VA	I (A)	Subdivided I (A)
Common Space	500	1	20	10000	13.9	
Lifts		9			360.0	
Escalators		0			0.0	
						373.9
Apartments	Area (m <sup>2</sup> )	Quantities	VA/Bed	VA	I (A)	Subdivided I (A)
Studios		2	2000	4000	5.6	
1 bed		61	2500	152500	211.8	
1 bed + study		0	2750	0	0.0	
2 bed		100	3000	300000	416.7	
2 bed + study		0	3250	0	0.0	
3 bed		17	3500	59500	82.6	
Terraces		0	4000	0	0.0	
						716.7
Commercial	Area (m <sup>2</sup> )		VA/m <sup>2</sup>	VA	I (A)	
Retail/Commercial Space	13673		80	1093840	1519.2	
Community Benefit Space	215		80	17200	23.9	
						1543.1
<b>Total (without ADMD)</b>						<b>3159.7</b>
<b>Total (with ADMD of 70% applied)</b>						<b>2211.8</b>

The redevelopment of the site/precinct will necessitate new onsite substations that is considerate of the future site layout. Locations have been shown indicatively on the planning application plans.

To accommodate the new development load it is highly likely that two (2) 1,000kVA substation(s) will be required.

This will be confirmed when a formal application for connection is carried out.

### 4.2.1 Existing Services

There is an existing substation (S.723) servicing the site/precinct that will need to be decommissioned and removed when the new substation(s) are installed. The existing substation is

an open type and does not currently comply with latest network standards with respect to safety and maintenance in particular (refer to Figure 2 below).



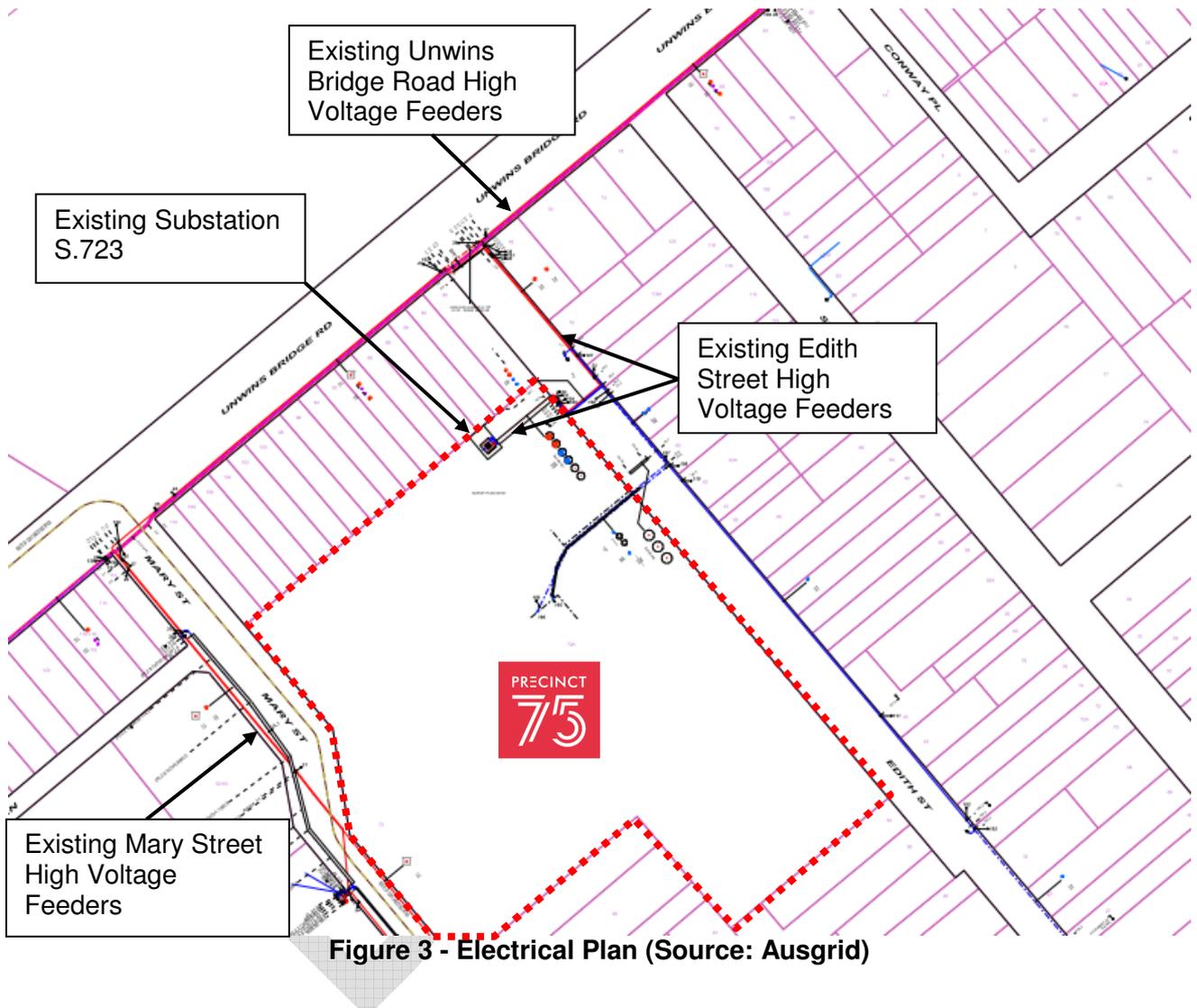
**Figure 2 – Existing Substation S.723 Photograph**

The new substations proposed for the redevelopment of the site/precinct would provide a much safer and compliant substation arrangement for Ausgrid.

Based on Ausgrid GIS information, there are three (3) low voltage distributors originating from this substation. One distributor services the site/precinct and the other two service Ausgrid's own network in Edith Street. Therefore there will be minimal disruption to other customers other than those currently located within the 75 Mary Street precinct when the old substation is changed over to the proposed new ones.

### 4.2.2 Ausgrid Infrastructure in the Vicinity of the Site

There are a high voltage feeders reticulating into the site/precinct off Edith Street servicing substation S.723. There is also high voltage feeders off Mary Street which can be utilised in the future. Refer to Figure 3 below for locations of existing high voltage feeders and substation S.723.



## 4.2.3 New Substation Options for the Development

### 4.2.3.1 Option 1 – Kiosk Substation

The kiosk type of substation would be applicable to this development. The kiosks can either be located on the Mary Street or Edith Street frontages because high voltage feeders are available on both the streets respectively.

#### Quantity Required

If a kiosk substation is considered, then two (2) would be required of 1,000kVA capacity each.

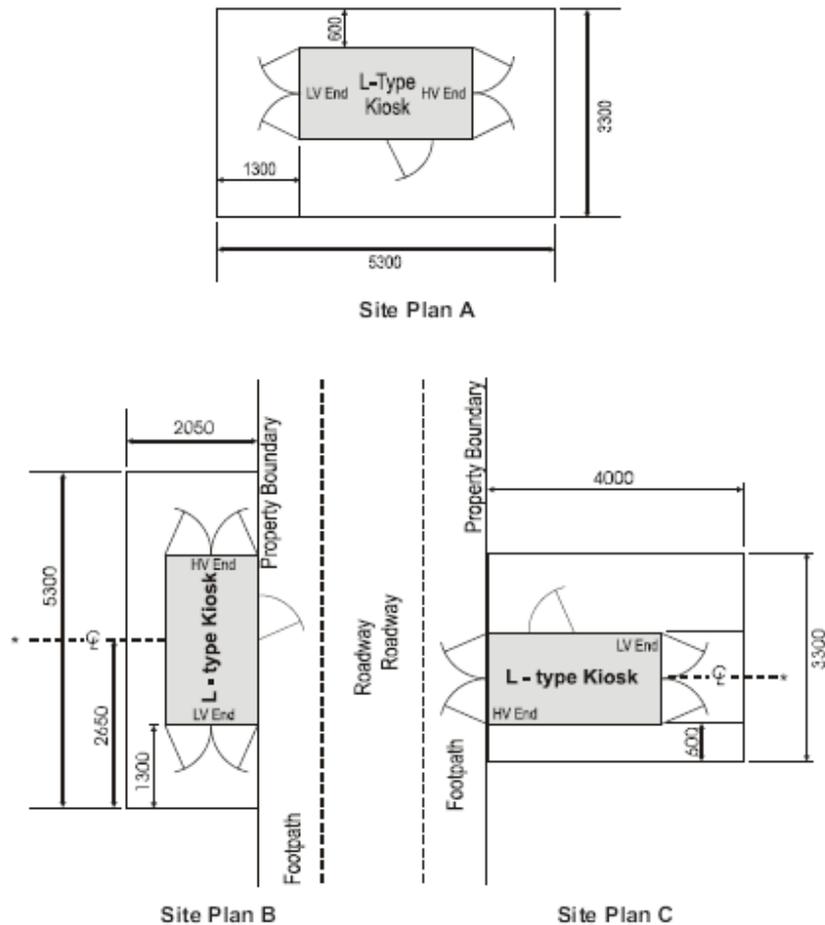
#### Spatial Requirements

Below are some spatial options for kiosk substations (refer below to Figure 4):

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## L Type Kiosk

L type kiosk minimum site requirements are indicated in the following site plans and notes:



(\* Property boundary between lots, if kiosk site is located across adjacent residential lots.)

### L Type Kiosk - Notes.

- Note 1. The L kiosk site plans shown with one edge of the kiosk structure on the street frontage property boundary (Site Plans B and C) are restricted options generally only available for underground residential distribution (URD) sites. Approval for these options in areas other than URD will be at the discretion of Ausgrid, after consideration of all relevant factors.
- Note 2. Where the 5300 mm x 3300 mm L kiosk site is set back from the street frontage property boundary (ie Site Plan A with additional set back), it will be necessary for an associated cable easement and a right-of-way for access to be established. (Refer to Clause 3.8.)

**Figure 4 – Kiosk Substation Options (Source: Ausgrid)**

### Special Requirements

Kiosk substations have the following special requirements:

- Must be located off vehicular road for direct street access by Ausgrid trucks.
- Preferably sited on grade (can be on suspended slabs with dispensation);
- Must be 6m (stringline) from supply air intakes or exhaust points;
- Must be 6m (stringline) blast zone from apartments and/or balconies;

- Any walls within 3m of the easement must be 3hr fire rated; and
- Free to air (ie. no encroachments above).

### Advantages

The following are advantages associated with kiosk substations:

- More flexible with respect to splitting up and locating closer to the respective loads rather than one main substation;
- Cost effective;
- Space efficient;
- No construction costs associated for special purpose rooms.

### Disadvantages

The following are disadvantages associated with kiosk substations:

- Not aesthetically pleasing;
- Segregation constraints;
- Free to air requirements.

### Budget Estimates

It is estimated that a kiosk substation will be worth \$150,000 each.

### 4.2.3.1 Option 2 – Mini Sub (Surface Chamber Substation)

The Mini Sub type of substation would also be applicable to this development. The Mini Subs can either be located on the Mary Street or Edith Street frontages because high voltage feeders are available on both the streets respectively.

#### Quantity Required

If a mini sub is considered, then two (2) would be required of 1,000kVA capacity each.

#### Spatial Requirements

A room of approximately 20m<sup>2</sup> is required for each mini sub.

Below is an example of this installation (refer below to Figure 5):

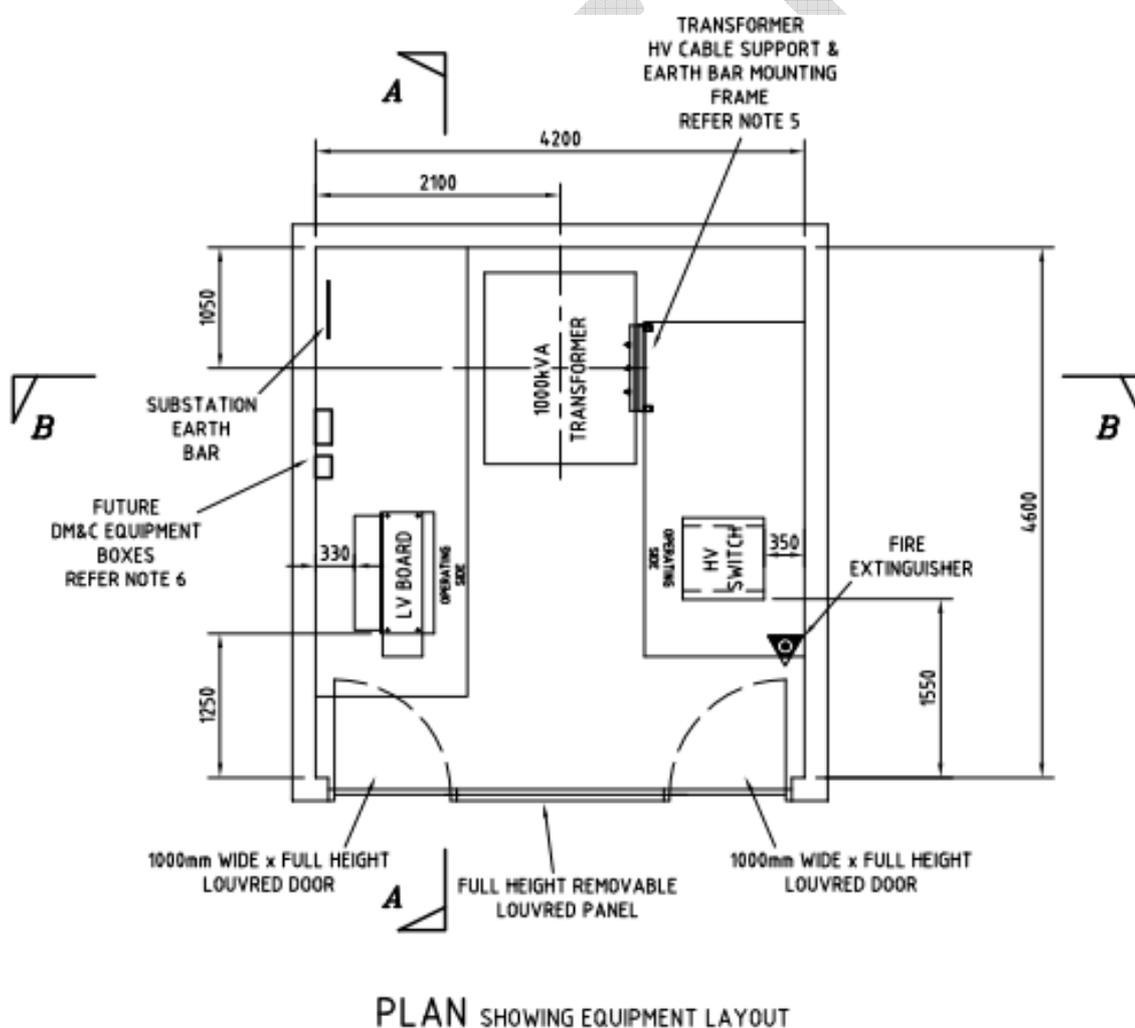
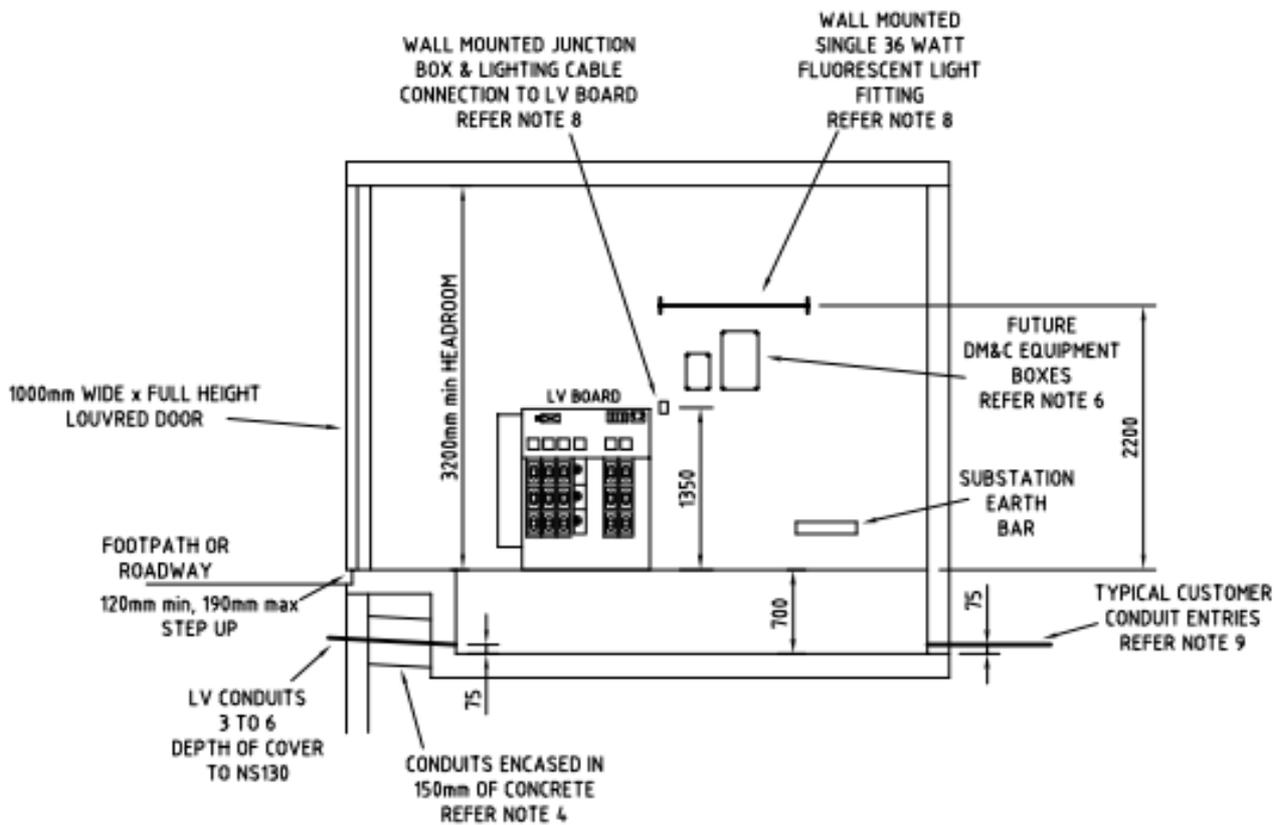
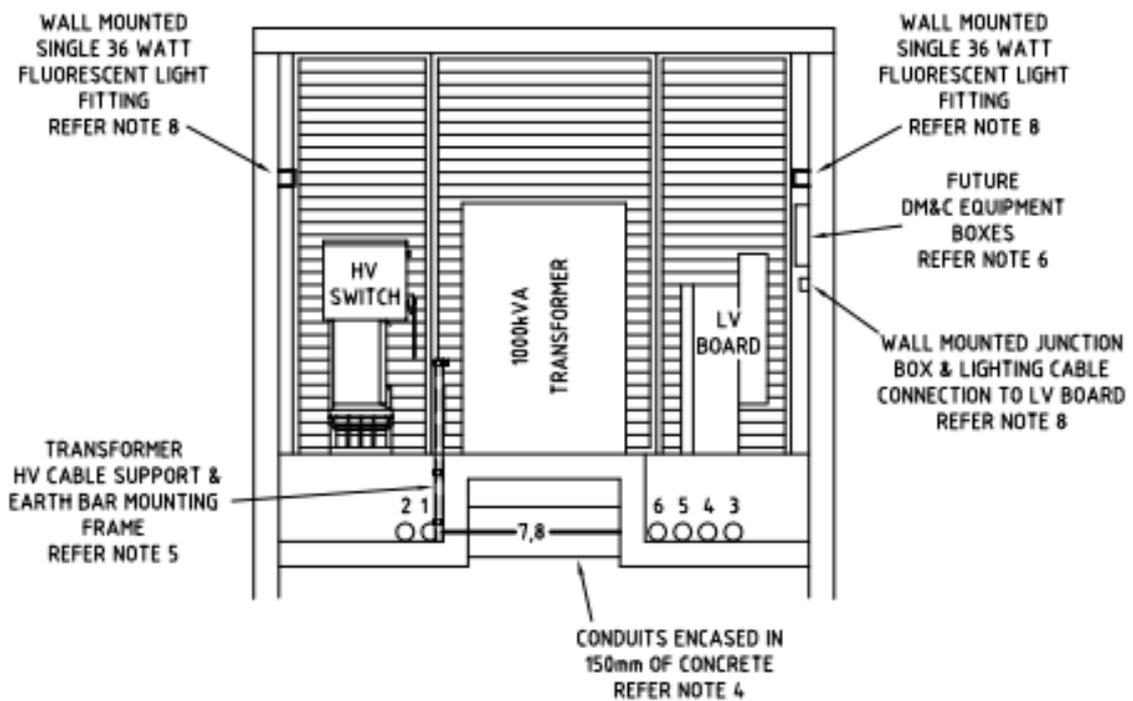


Figure 5a – Mini Chamber Substation Option | Plan View (Source: Ausgrid)





**SECTION A-A**



**SECTION B-B**

**Figure 5b – Mini Chamber Substation Option | Section Views (Source: Ausgrid)**

## Special Requirements

Mini subs have the following special requirements:

- Must be located off vehicular road for direct street access by Ausgrid trucks.
- Can be sited on suspended slabs;
- Must be 6m (stringline) from any exhaust intakes, outside air intakes, stair pressurisation;
- Front door louvres be 6m (stringline) blast zone from apartments and/or balconies;
- Any walls must be 3hr fire rated; and
- Minimum 3.2m floor to ceiling space.

## Advantages

The following are advantages associated with mini subs:

- Aesthetically pleasing;
- Reduced blast zones;
- Space efficient;
- Can be built over.

## Disadvantages

The following are disadvantages associated with mini subs:

- Construction costs associated with building the special purpose space;
- More expensive than kiosks because rooms will be required and individual equipment (ie. switchgear, transformers, boards, etc.) will require onsite installation.

## Budget Estimates

It is estimated that mini subs will be worth \$200,000 (excluding building works).

### **4.2.4 Summary & Conclusions**

The following items will need to be further considered with respect to the electrical services associated with the site:

- **Decommissioning of existing Substation S.723;**
- **Establishment of two (2) new 1,000kVA substations for the proposed development that works in with the new building/development layout.**

Based on preliminary investigations with Ausgrid, the high voltage electrical infrastructure in the vicinity of the site/precinct has the capacity to service the proposed development. This will be subject to formal application.

### 4.3 Natural Gas

Response from Jemena shows there are 32mm, 210kPa gas mains reticulating along Mary Street, Edith Street and Roberts Street (Refer to Figure 6 below). There is also a bigger 50mm, 210kPa gas main reticulating along Unwins Bridge Road. This capacity is adequate for the proposed new development.

This is based on the Heating Ventilation and Air Conditioning (HVAC) System being a reverse cycle, split, air cooled, type system. It has also been assumed that hot water and cooking appliance will predominantly be gas.

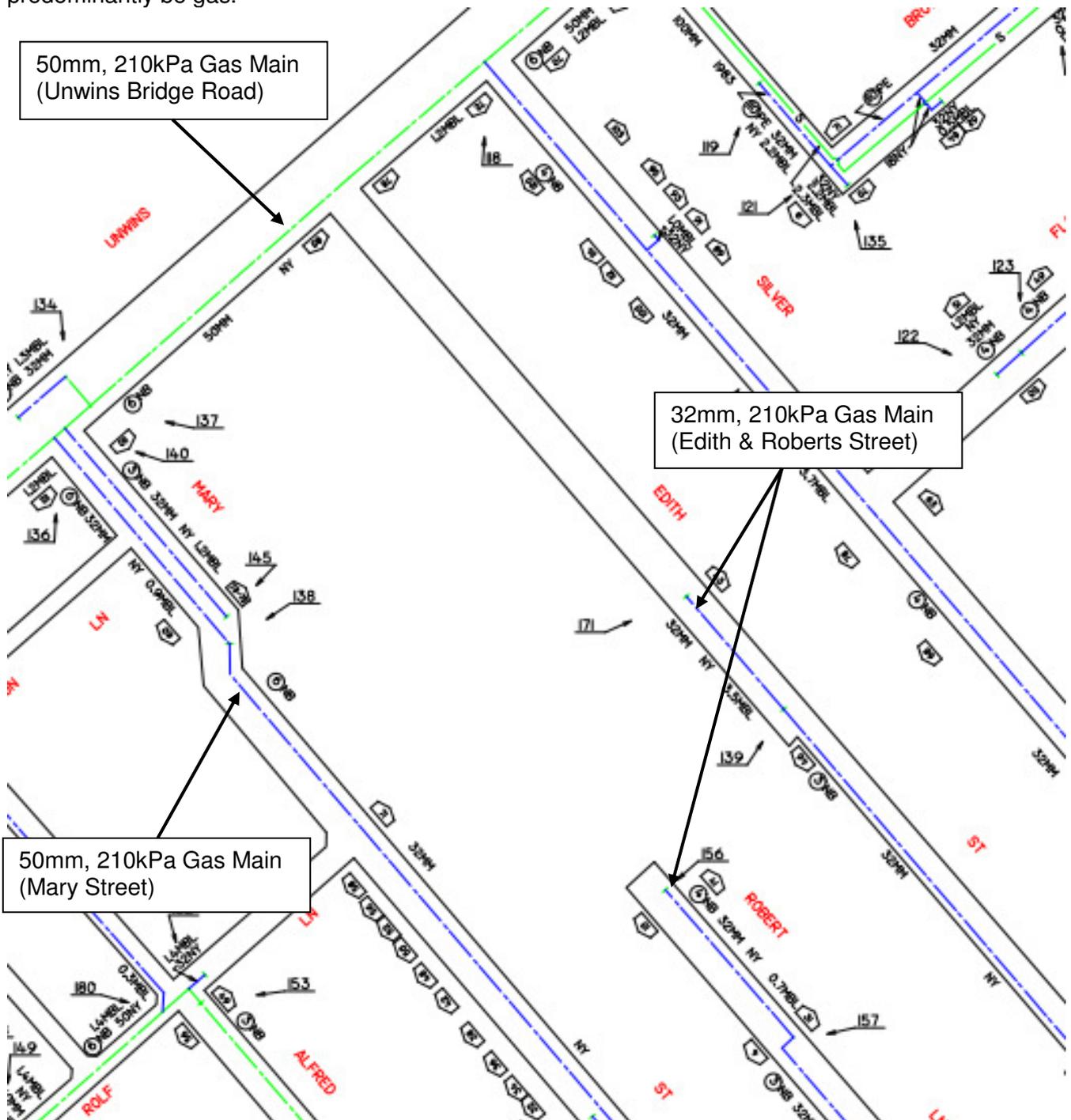


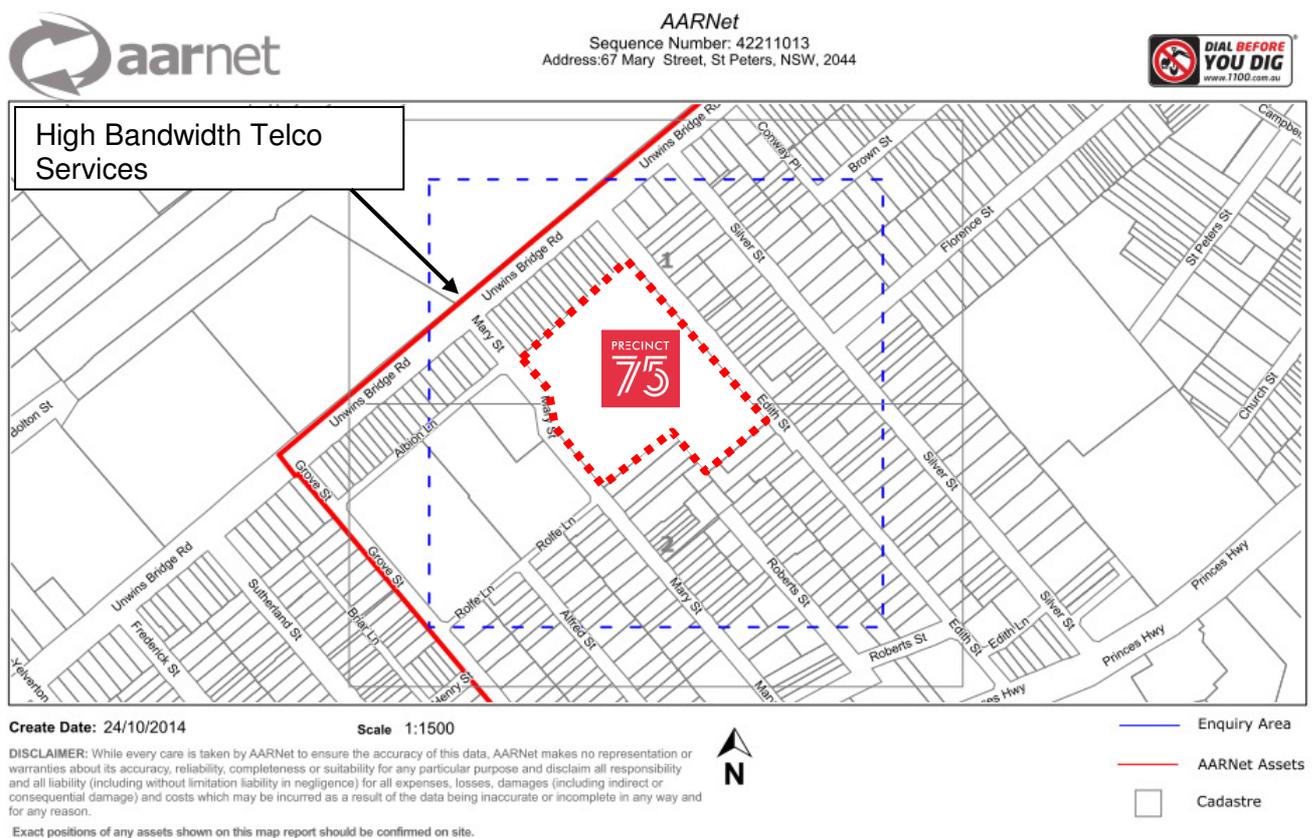
Figure 6 - Natural Gas Plan (Source: Jemena)

#### 4.4 Telecommunications

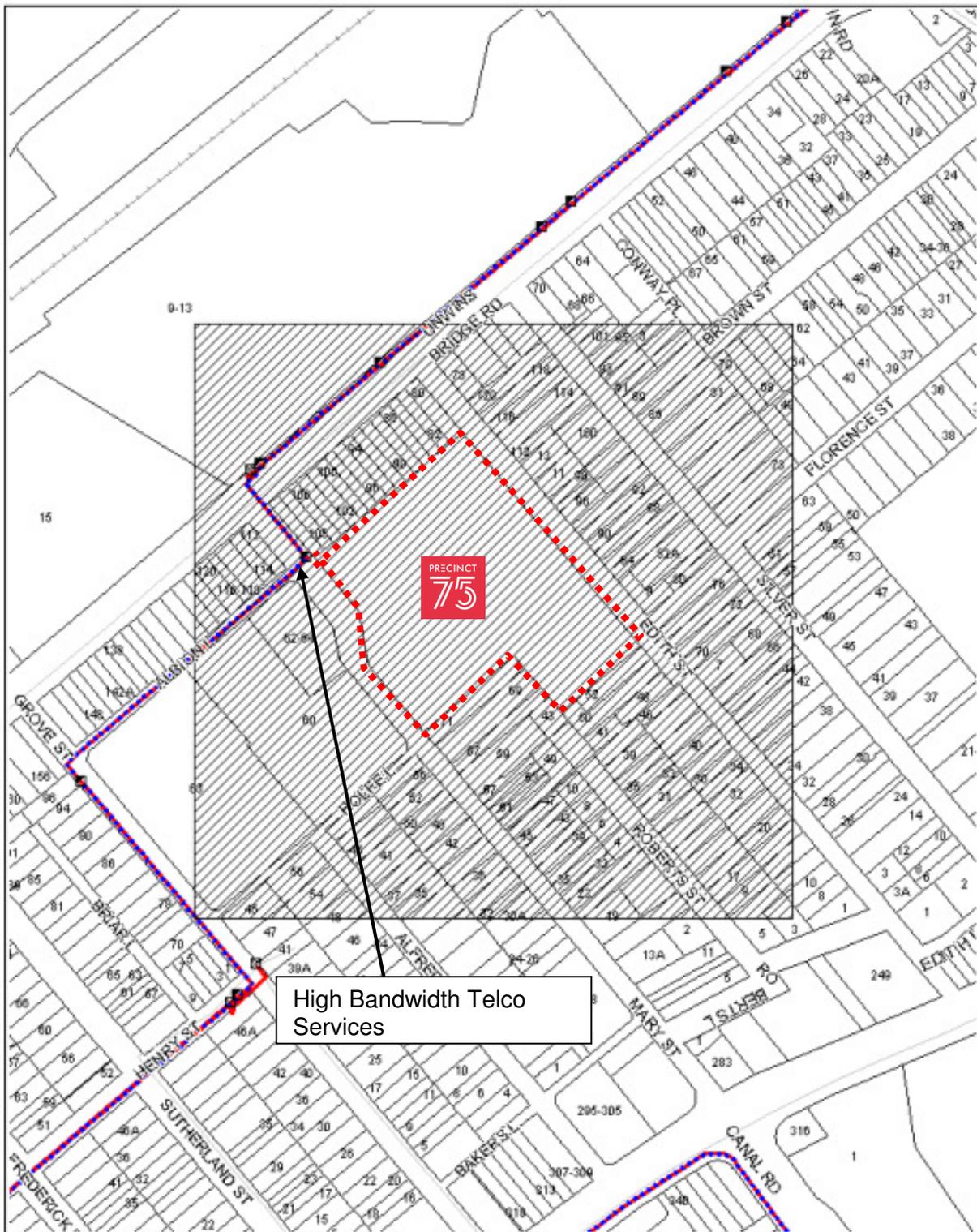
Response from the respective Telco's shows multiple conduits located along Unwins Bridge Road, Edith and Mary Street.

High bandwidth services are available in the direct vicinity of the site/precinct. Refer to Figure 7a and 7b below.

The telecommunications services identified in the vicinity of the site/precinct are expected to have the carrying capacity to suit the needs of the proposed mixed use development.



**Figure 7a – Telco Services Infrastructure (Source: Aarnet)**



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**Figure 7b – Telco Services Infrastructure (Source: Optus)**

**NBN is also available in St Peters and can be discussed with them during design development to ascertain viability of reticulating NBN infrastructure to the site/precinct. The limit is 100 units before NBN consider the development. Based on the proposed development of 180 apartments, the project would be applicable for NBN.**

**We have liaised with NBNCo regarding this proposed development and they are interested in entering into further negotiations upon the project progressing to DA stage.**

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## 4.5 Stormwater

### 4.5.1 General

The responsibility for the control of stormwater runoff in the vicinity of the site is with Marrickville Council.

Review of service drawings obtained from the Council show there are pipe network drains in the vicinity of the site.

All future stormwater works at the site must comply with Council's DCP.

### 4.5.2 Pre Development Load

As the site is currently fully developed, the site discharge is expected to be quite large.

### 4.5.3 Post Development Load

Council's requirement for post-development site discharge is to be limited to the existing site conditions. This means that the maximum discharge from the development should be limited to the existing site conditions discharge for all storms ranging from 5-yr to 100-yr ARI event. This will determine the size of the OSD required for the proposed development. This has been carried out using "DRAINS" software, which uses a Time-Area hydrograph method.

### 4.5.4 Special Requirements

The residential part of the development will be subject to BASIX requirements and it will be more than likely that rainwater tanks will be required. This requirement, if applicable, will determine the capacity of the rainwater tank and the roof area to be drained via the tank.

### 4.5.5 Water Sensitive Urban Design

The proposed development is also subject to the WSUD requirements under Section 2.17 of the DCP.

The site involves new residential gross floor area greater than 2000m<sup>2</sup>, water conservation and stormwater quality targets are required under parts C1, C4, C5 & C7 of Section 2.17 of the DCP.

Part C1 refers to the BASIX requirements.

Part C4 refers to the stormwater quality load reduction controls as below:-

- 90% reduction in Gross pollutants;
- 85% reduction in Total Suspended Solids;
- 60% reduction in Total Phosphorus; and
- 45% reduction in Total Nitrogen.

Part C5 requires the modelling to be undertaken in “MUSIC” and in accordance with Marrickville Council WSUD Reference Guidelines.

#### 4.5.6 Proposed Servicing Strategy

It is proposed to provide a stormwater reticulation system to convey the internal site runoff in a 20-year ARI storm event where failsafe overland flow is available. Where no emergency overflow can be achieved, the internal stormwater reticulation will be sized to cater for 100-year ARI event (i.e. box gutters, OSD systems, etc...).

It has been confirmed that the stormwater infrastructure in the street system surrounding the site will have enough capacity to collect the site discharge. This is based on the assumption that the discharge is reduced much greater than what is currently discharging. It is not anticipated that upgrade of the existing infrastructure will be required. To that effect, it will be more than likely necessary to discharge in more than one location into the public infrastructure.

The OSD will be designed in accordance with the results of the “DRAINS” modelling which will determine the SSR and the PSD.

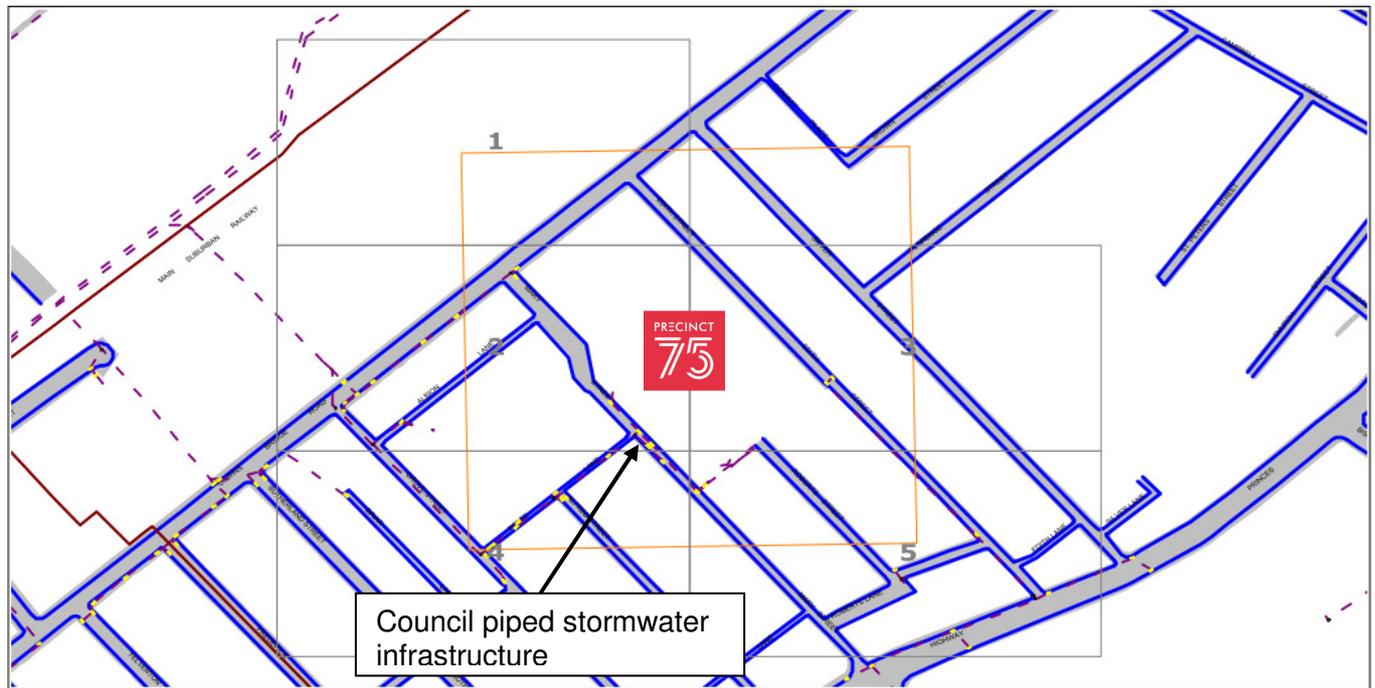
A stormwater concept plan has been prepared to accompany this planning application to demonstrate compliance can be achieved with council stormwater requirements.

#### 4.5.7 Risks/Issues

Upgrade of the public infrastructure is always a possibility subject to confirmation by Council.

The responsibility for the control of stormwater runoff in the vicinity of the site is with Marrickville Council.

Review of service drawings obtained from the Council show there are pipe network drains in the vicinity of the site (refer to Figure 8 below).



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**Figure 8 – Council Stormwater Infrastructure (Source: Marrickville Council)**

All future stormwater works at the site must comply with Council Development Control Plans.

**On-site detention systems will need to be allowed for in the DA plans and invert levels will need to be checked for falls to the Council infrastructure.**

The maintenance obligations and costs will need to be integrated into the development of the property.

The existing stormwater in the vicinity of the site should be adequate to accommodate the proposed new mixed use development.

#### 4.6 Water

Sydney Water is the responsible authority for the provision of potable water to the site.

There are 150mm diameter water mains running along Mary and Edith Streets. There is a 315mm diameter water main running along Unwins Bridge Road.

**The 150mm water main will most likely be insufficient to cater for cold water and fire services requirements of the proposed new development. This will most likely need to be upgraded to a 200mm water main from the corner of Unwins Bridge Road and Edith Street. Sydney Water will generally fund the majority of this amplification cost. This will be confirmed by the Section 73 that will be lodged with Sydney Water.**

**Further to this, it is likely that the water flow and pressure will need to internally “boosted” to achieve the AS2419 fire services (hydrants/sprinkler) flow and pressure requirements. This will need to be allowed for in the DA plans.**

Refer to Figure 9 below for locations of water and sewer services in the vicinity of the site/precinct.



Figure 9 - Water & Sewer Plan (Source: Sydney Water)

#### 4.7 Sewer

Sydney Water is also the responsible authority for the provision of sewer services to and from the site. Information provided by Sydney Water shows 225mm gravity sewer services reticulating down Mary Street and within the site/precinct to Roberts Street. Refer to Figure 9 above for locations of sewer mains.

The 225mm sewer mains will be sufficient to cater for sewer/drainage requirements of the proposed new development. **The 225mm sewer main within the site/precinct will need to be diverted. However, since the sewer main within the site only services 75 Mary Street, there will be no disruption to anyone else and any disruption will be contained within the site/precinct.**

This will be confirmed by the Section 73 that will be lodged with Sydney Water after a Development Application (DA) is obtained.

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#### 4.8 Summary & Conclusions

Consultations have been carried out with Railcorp, RMS, Ausgrid, Sydney Water, Jemena, Telstra/Optus/Uecomm and Marrickville Council.

Based on information received from these supply authorities sufficient supply is available for sewer, gas, telco and stormwater services.

**The following services will require negotiation with the relevant authorities:**

- **Ausgrid regarding new substations and decommissioning the existing one (S.723);**
- **Sydney Water for water main upgrade from the corner of Unwins Bridge Road and Edith Street;**
- **Sydney Water for sewer diversion within the site/precinct;**
- **Marrickville Council for OSD;**
- **NBN endorsement.**

## 5. BUDGETS

### 5.1 Services Infrastructure

The following indicative budget costs are applicable to the respective Infrastructure Services requiring upgrade/diversion/decommissioning/relocation:

INFRASTRUCTURE SERVICE	INDICATIVE BUDGET COSTS	COMMENTS
<b>New Mini Sub(s)</b>	\$400,000.00 (2 x \$200,000.00)	This will be subject to Ausgrid approval
<b>Water Main Amplification</b>	\$50,000.00	Sydney Water will pay for most of this but allow \$50,000.00 for design, coordination, fees, etc.
<b>Sewer Main Diversion</b>	\$50,000.00	Subject to Sydney Water Notice of Requirements

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## 5.2 Building Services

SERVICE	INDICATIVE UPGRADE BUDGET COSTS	COMMENTS
<b>Electrical</b>	\$4,000,000.00	Includes Power, Lighting, Comms, Security, and MATV. Excludes Substation costs.
<b>Mechanical</b>	\$4,500,000.00	Includes either Daikin/Mitsubishi Split VRV/VRF HVAC Systems, Central Kitchen Exhaust, Central Toilet Exhaust, and simple BMS.
<b>Fire</b>	\$2,000,000.00	Includes “dry” fire services (Automatic Smoke Detection and Building Occupant Warning System)
<b>Hydraulic</b>	\$5,000,000.00	Includes internal Cold Water, Hot Water, Gas, Drainage, Stormwater, Fire Services (Hydrants, Hose Reels). Includes fire tanks.
<b>Lifts</b>	\$1,000,000.00	Allows for eight (8), 13/15 passenger, 1.5m/s, MachineRoomLess type lifts with standard finishes and stretcher facilities (no building works allowed)

# APPENDICES

# Appendix A

## Flow & Pressure Enquiry

\*To be attached when received from Sydney Water

# Appendix B

## Spatial Requirements

(Indicative only at this stage)

The buildings will be under 25m in height, therefore will **not** require stair pressurisation, smoke management systems, EWIS, sprinklers, fire tanks (for hydrant and sprinkler redundancy) or emergency lifts.

This document presents spatial requirements for the following building services:

- Electrical;
- Mechanical;
- Fire;
- Hydraulics;
- Lifts.

### B1 - Communications/Electrical/Security

Plantroom	Size (L x D)	Height (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>COMMUNICATIONS</b>						
1.1 Main Campus Distributor (BD) Security/Access Control Room	N/A	N/A	N/A	N/A	N/A	N/A
1.2 Building Distributor (BD)/ Cross Connect (With Fibre RIMS)	3000 x 2500	2500	Corridor Key Lockable (MDF Key)	Ground or Basement	Doors smoke sealed, fire resistant.	Main Data and Voice Cross Connects. Allows for two (2) major Telco's (telecommunications RIMS). <b>Subject to the status and future of NBNC.</b>
1.3 Low Rise Building Distributor (BD)/ Cross Connect (With Fibre RIMS)	N/A	N/A	N/A	N/A	N/A	N/A
2.1.4 Floor Distributors/ Intermediate Cross Connect Closets	900 x 600	2500	Common area. Key lockable.	One (1) on each floor for each building	Doors smoke sealed, fire resistant. Aligned with riser above and below	Includes MATV and security provision. To reticulate cabling from BD/MDF to FD's/IDF's located in the riser itself. One (1) FD per level
1.5 Local Distributors	N/A	N/A	N/A	Within each apartments (concealed within joinery above fridges)	N/A	Refer Apartment Section (Section 3)
1.6 MATV Headend + Masthead Amplifier	2000 x 1000	2000	Common area. Key lockable.	One level below Roof Level or Roof Level if there is any plant room allowance on this level	N/A	Nil

Plantroom	Size (L x D)	Height (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>POWER SYSTEMS</b>						
1.7a Kiosk Type Substation	As per Section 4.2	As per Section 4.2	As per Section 4.2	As per Section 4.2	As per Section 4.2	As per Section 4.2. One on Mary Street and the other on Edith Street.
1.7b Mini Sub (alternative to 1.7a above)	As per Section 4.2	As per Section 4.2	As per Section 4.2	As per Section 4.2	As per Section 4.2	As per Section 4.2. One on Mary Street and the other on Edith Street.
2.1.8 Main Switch Room(s)	2 off 6000 x 3000	3000	Building Common Area. (Door to open outwards. Energy Australia/Ausgrid key lockable.)	Ground or Basement Level (one of Mary Street & the other of Edith Street)	2 hr fire rated. Mechanical exhaust required. 2 forms of egress from opposing sides of the switch room. One required for each new kiosk substation. Must be located within 30m of substation.	To accommodate Main Switchboard, Power Factor Correction Units and Meters. Locate as centrally as possible.
1.9 Low Rise Main Switch Room	N/A	N/A	N/A	N/A	N/A	N/A
1.10 Building Main Distribution Room	3000 x 1000	2500	Building Common Area. (Door to open outwards. Energy Australia/Ausgrid key lockable.)	Ground or Basement Level	2 hr fire rated. Mechanical exhaust required. 2 forms of egress from opposing sides of the switch room. One required for each new kiosk substation. Must be located within 30m of substation.	To accommodate Main Distribution Board per building.
1.11 Meter Panel	N/A	N/A	N/A	Integrated in Main Switch Room	N/A	N/A
1.12 Electrical Cupboard Risers	1000 x 800 (commercial/ industrial/ retail) 1500 x 800 (residential)	2500	Corridor Key Lockable	One (1) on each floor	Doors smoke sealed, non-combustible.	To accommodate electrical submains, tee-offs, apartment meters and floor distribution board. Front Connected Boards.

Plantroom	Size (L x D) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>APARTMENTS</b>						
1.13 Electrical Distribution Board	N/A	N/A	Access required for future maintenance.	Built into joinery above fridges	Key lockable door	Reticulated directly to floor electrical distribution boards.
1.14 Local Distributor	N/A	N/A	Access required for future maintenance.	Built into joinery above fridges	Key lockable door	Reticulated directly to communications floor distributors.
<b>SECURITY SYSTEMS</b>						
1.15 Main Security Control Room for CCTV / Security / Door Intercom / Access Control Systems	3000 x 3000	2400	Corridor Key Lockable	Building C	Key lockable door	Basement of Building C
1.16 Security / Building Intercom / Access Control Cables Riser	N/A	N/A	N/A	N/A	N/A	Reticulate directly back down to Main Security Control Room via Electrical / Comms Risers

## B2 - Hydraulics

Plantroom	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>HYDRAULIC SERVICES</b>						
2.1a Mains Riser	600x250	Floor to floor	300x 300 at floor level	All levels	At building core	Proposed plumbing stack and central riser
2.2b Typical Apartment Riser	400x250	Floor to floor	300x 300 at floor level	All levels	At each wet area	
2.3 Solar Panels (Hot Water)	TBC	TBC	TBC	TBC	TBC	<i>Optional</i>
2.4 Water Meter (Master) & RPZD	3000x500	1000	From street for reading	External wall		
2.5 Water meter ,gas meter, hot water meter and reuse water meter (all apartments)	900 x 600	Floor to floor	Off common area corridors	All levels All levels	At building core At each wet area	Proposed plumbing stack and central riser
2.6 Pressure Pump (domestic)	3000 x 3000	Floor to Floor	TBC	TBC	TBC	TBC
2.7 Fire Hydrant Pump						<b>Refer to fire section of this document</b>

Plantroom	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
2.8 Fire Hydrant Landing Valves	500 x 350	750 above FFL	Access / Egress path within fire stair to clear landing valves.	Landings of all fire stairs at all levels.	Ring main isolation valves to be located within fire stairs also.	1m clear space in front and 300mm clearance around each valve required.
2.9 Fire Hydrant and sprinkler Booster Assembly	3000 x 2000	1600	Accessible under fire conditions.	Near main building entry.	10m from building or against fire rated wall extending 2m either side & 3m above booster assembly.	
2.10 Onsite Detention Tank	500m3 – TBC	TBC	Common area	Above street level	Clear access from above, in common area.	Included in planning application plans
2.11 Pressure Pump (Re-use)	N/A	N/A	N/A	N/A	N/A	N/A
2.12 Stormwater Re-use Tank	As per BASIX		For service and cleaning	As shown		Subject to negotiations with local Council and client requirements for landscape irrigation.
2.13 Sub-soil Pumping Station	2000 x 2000	N/A	N/A	N/A	N/A	Allow in lowest basement level
2.14 Pool Plant	N/A	N/A	N/A	N/A	N/A	N/A
2.15 Greywater / Black water plant	N/A	N/A	N/A	N/A	N/A	N/A
2.16 Gas Meter/Regulator Assembly(Master)	3000 x 2000	800	Access to meter / regulator to allow removal / maintenance + meter reading	Well ventilated area. Above ground. Protected from rain.	Positioned to minimise exposure to physical damage and possibility of ignition of discharge from breather vent.	Only master required. No other meters required.

Plantroom	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
2.17 Fire Hose Reels	N/A	N/A	N/A	N/A	N/A	N/A – Subject to confirmation from BCA consultant
2.18 Centralised Gas HWU	40m2 in basement or ground floor – TBC	N/A	TBC	Roof	TBC	Must be vented to roof
2.19 Rainwater down pipe	200 x 200	N/A	N/A	All levels		Located within central core risers
2.20 Combined Fire hydrant / Sprinkler tank	N/A	N/A	N/A	N/A	N/A	N/A
2.21 Pressure reduction station and booster hot water units	N/A	N/A	N/A	N/A	N/A	N/A
2.22 Instantaneous Gas HWU	N/A	N/A	N/A	N/A	N/A	N/A
2.23 Solar Panels (Hot Water)	N/A	N/A	N/A	N/A	N/A	N/A
2.24 car wash bay-coalating plate seperator	2000 x 500	1000 above ground	Accessible for cleaning	Basement	Adjacent to car wash bay(TBC)	
2.25 Grease arrestor chamber vent	3000 x 2000	N/A – buried	Truck access required and 3 clear above for checking	Ground Level	TBC	N/A
2.26 Sewer pump well Camber vent	N/A	N/A	N/A	N/A	N/A	N/A

**B3 - Fire**

Plantroom	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>FIRE SERVICES</b>						
3.1 Fire Indicator Panel	1000 x 500	2000	N/A	Ground	Main Building entry	Located in Ground Floor Main Entry Lobby
3.2 Building Occupant Warning System (BOWS) Panel	1000 x 500	2000	N/A	Ground	Main Building entry and mimic panels(sub fire indicator panels) in all other intermediary buildings	Located in Ground Floor Main Entry Lobbies
3.3 Fire Control Room/Centre	12m2	2400	Direct from street	Ground	Direct street access	Main entry
3.4 Sub Fire Indicator Panels	N/A	N/A	N/A	N/A	N/A	N/A
3.5 Combined Fire Sprinkler/ Hydrant tank	N/A	N/A	N/A	N/A	N/A	N/A
3.6 Fire Hydrant Pump & Valve Room	5000 x 4000	2400	N/A	Ground or Basement with direct street access	N/A	Direct street access required. <b>Subject to Sydney Water Pressure Enquiry.</b>
3.7 Fire hydrant / Sprinkler relay pump room	N/A	N/A	N/A	N/A	N/A	N/A

## B4 - Mechanical

Service Space	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>MECHANICAL SERVICES</b>						
4.1 Natural Ventilation openings, to all rooms except toilets and laundries.	N/A	N/A	N/A	Doors	Total door and operable window area to be not less than 5% of total floor area	Note excludes any Basix breeze ways – by architect.
4.2 Kitchens Exhaust	150 clear diameter	N/A	N/A	In ceilings discharging horizontally to balconies.	Allow 200 x 200 louvre at balconies for discharging horizontally.	Airflow to be confirmed when hoods are selected
4.3 Toilet Exhaust	150 clear diameter	N/A	N/A	In ceilings discharging horizontally to balconies.	Allow 200 x 200 louvre at balconies for discharging horizontally.	
4.4 AC - Fan coil units	350mm clear in ceilings, 900x1345x320 outdoor unit (one apartment) Outdoor unit(s) located on balconies or roof	350 H – indoor unit	Yes, to all indoor units for access to filters (from underneath via access panels)	Indoor units within ceiling bulkheads over wet areas.	N/A	Condensate control. AC units – on balconies or roof
4.5 Refrigerant pipework riser. One riser from roof level to ground floor, located centrally in the building	N/A	N/A	N/A	N/A	N/A	Outdoor units located on balconies or roof
4.6 Roof for outdoor condensers	N/A	N/A	N/A	N/A	N/A	Outdoor units located on balconies or roof. Allow 2m <sup>2</sup> per condenser unit. <b>Alternatively these may be incorporated into outdoor light wells on a floor by floor basis with access.</b>

Service Space	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
4.7 Car Park Exhaust	2 off 1500 x 1500 risers at opposing ends of the carpark	N/A	N/A	Opposing ends of the carpark	Allow for 2 off shafts rising in the buildings	Shafts to be offset at roof level to be 6m from the boundary
4.8 Car Park Make Up Air	2 off 1500 x 1500 risers at opposing ends of the carpark	N/A	N/A	Opposing ends of the carpark	Low level intakes required	
4.9 Carpark Supply Fan Room	2 off 3500 x 3500	2000	Openable door	Close to supply air riser shafts	The fan rooms should be as close as possible to the riser shafts.	Preferably around where the central garbage rooms are located
4.10 Carpark Exhaust Fan Room	2 off 3500 x 3500	2000	Openable door	Close to exhaust air riser shafts.	The fan rooms should be as close as possible to the riser shafts.	Preferably around where the central garbage rooms are located
4.11 Garbage room exhaust (6m from boundary or windows/nat. vent. openings)	500 x 500 (2 off – one for hotel and the other for residential)	From Ground to Roof	N/A	N/A	N/A	From Ground to Roof
4.12 Hot water plant room exhaust	500 x 500	N/A	N/A	From basement to roof	N/A	N/A
4.13 Hot water plant room supply Grille to be min 6m away from any exhaust point	N/A	N/A	N/A	N/A	N/A	N/A – on roof
4.14 Main Switch Room exhaust	250mm x 250mm to outside	N/A	N/A	N/A	N/A	N/A
4.15 Comms Room exhaust	N/A	N/A	N/A	N/A	N/A	N/A
4.16 Stair pressurisation system for the fire escape stairs (assumed two fire escape exits)	N/A	N/A	N/A	N/A	N/A	Buildings are under 25m

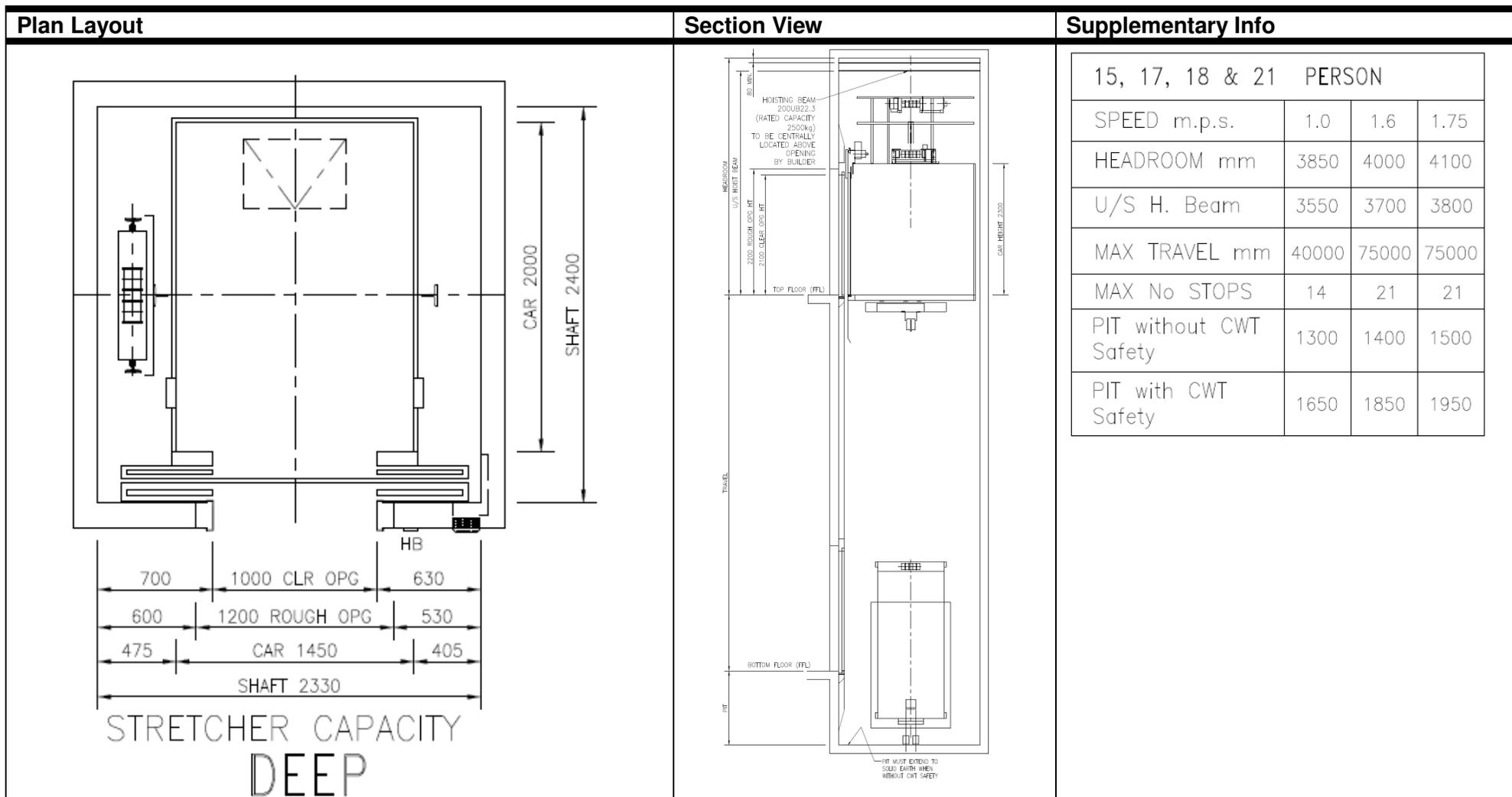
Service Space	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
4.17 Relief system for the lobby	N/A	N/A	N/A	N/A	N/A	N/A
4.18 Stair pressurisation for the basement	1m2 – TBA	N/A	N/A	Ground	TBA	N/A
4.19 Fire Control Room Naturally ventilated if control centre has outside wall. Alternatively ducted fresh air system to room	250mm x 250mm to outside	N/A	N/A	N/A	N/A	N/A
4.20 Laundry exhaust	150 clear diameter	N/A	N/A	In ceilings discharging horizontally to balconies.	Allow 200 x 200 louvre at balconies for discharging horizontally.	
4.21 Smoke Exhaust	1.5m2 – TBA	N/A	N/A	To roof	TBA	Only required to basement carpark levels
4.22 Gas Cupboard Exhausts	200 x 200 – TBA	N/A	N/A	To roof	TBA	N/A
4.23 Retail Kitchen Exhaust	1m2 – TBA	N/A	N/A	To roof	TBA	N/A
4.24 Loading Dock Exhaust	1m2 – TBA	N/A	N/A	To roof	TBA	N/A

**B5 - Lifts**

Service Space	Size (L x W) mm Clear Internal	Height (mm) (Clear Inside)	Access/ Egress	Location	Special Requirements	Comment
<b>LIFT SERVICES</b>	2330 x 2400 (clear shaft requirements) for 17 passenger lifts.	4100 @ 1.5m/s (from last level served)	Only to access panel at last level served. It is a control panel built into the wall adjacent the lift at the highest level.	As shown on architectural plans.	Compliance with DDA and stretcher requirements.	Refer below for typical lift layouts.

# LIFT LAYOUTS

## Option 1 - 17 Passenger



## Option 2 - 13/15 Passenger

Alternative Schindler Lift Shaft (more compact)

