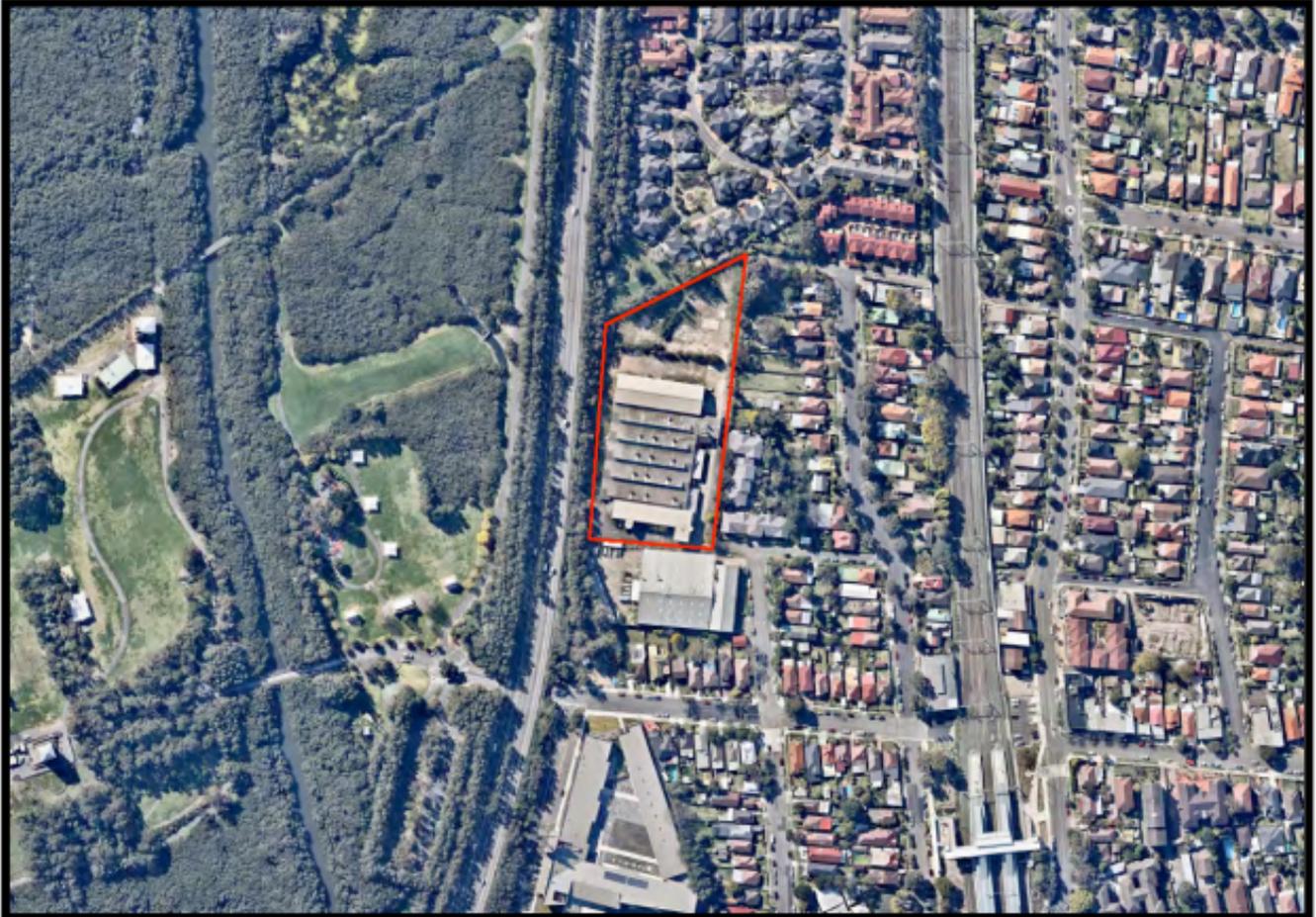




IGS INTEGRATED
GROUP
SERVICES



Lot 1 DP 219742, Concord West

Engineering Services Due Diligence Report

Job Number: EN_N15 - 65
December 2015
Rev 0.2



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1. EXECUTIVE SUMMARY

Based on this due diligence report which covers the following utility services:

- Electrical;
- Gas;
- Telecommunications;
- Stormwater;
- Mains Water; and
- Sewer.

It was ascertained that all utility services in the vicinity of the site have the required capacity to service the future development.

The National Broadband Network (NBN) will need to be brought to the site however with the amount of apartments proposed in this development, NBN will have no issues in providing new telecommunications to the site.

2. INTRODUCTION

2.1 General

Integrated Group Services (IGS) has been commissioned to carry out an engineering services due diligence report of a site located at 7 Concord Ave, Concord West (Lot 1 in DP 219742). This report has been prepared solely for Bradfield Pty Ltd. No warranty is provided to third parties who rely on this report for any other purpose.

It is understood that the site will be redeveloped for residential uses.

The redevelopment will predominantly consist of:

- 1 basement level with 330 underground carparking spaces;
- Approximately 300 apartments on Ground, Level 1 – Level 7.

This report presents the findings of a desk study review with respect to the utility infrastructure (electrical, mains water, natural gas, sewer, telecommunications) assessment.

Whilst we are still waiting to include the findings of the Pressure and Flow Enquiry, we are confident of the infrastructure upgrade requirements stated in this report based on previous experience with the respective authorities. When the formal notifications finally do come through, they will be appended accordingly and confirm our initial findings.

2.2 Assumptions

Given that the carpark will be located underground, it will require carpark ventilation. We have assumed that the effective building height(s) will be under 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.

2.3 The Site

The site is currently occupied by an existing industrial warehouse and associated office space of double storey construction.

The proposed redevelopment of the site comprises a new road and several multi-storey residential buildings with basement carparking. It is part of the Concord West Precinct development area bounded by Powells Creek and Homebush Bay Drive to the west, the Northern Railway line to the east, Pomeroy Street to the south, and the suburb of Liberty Grove to the north (refer to Figure 1 below).

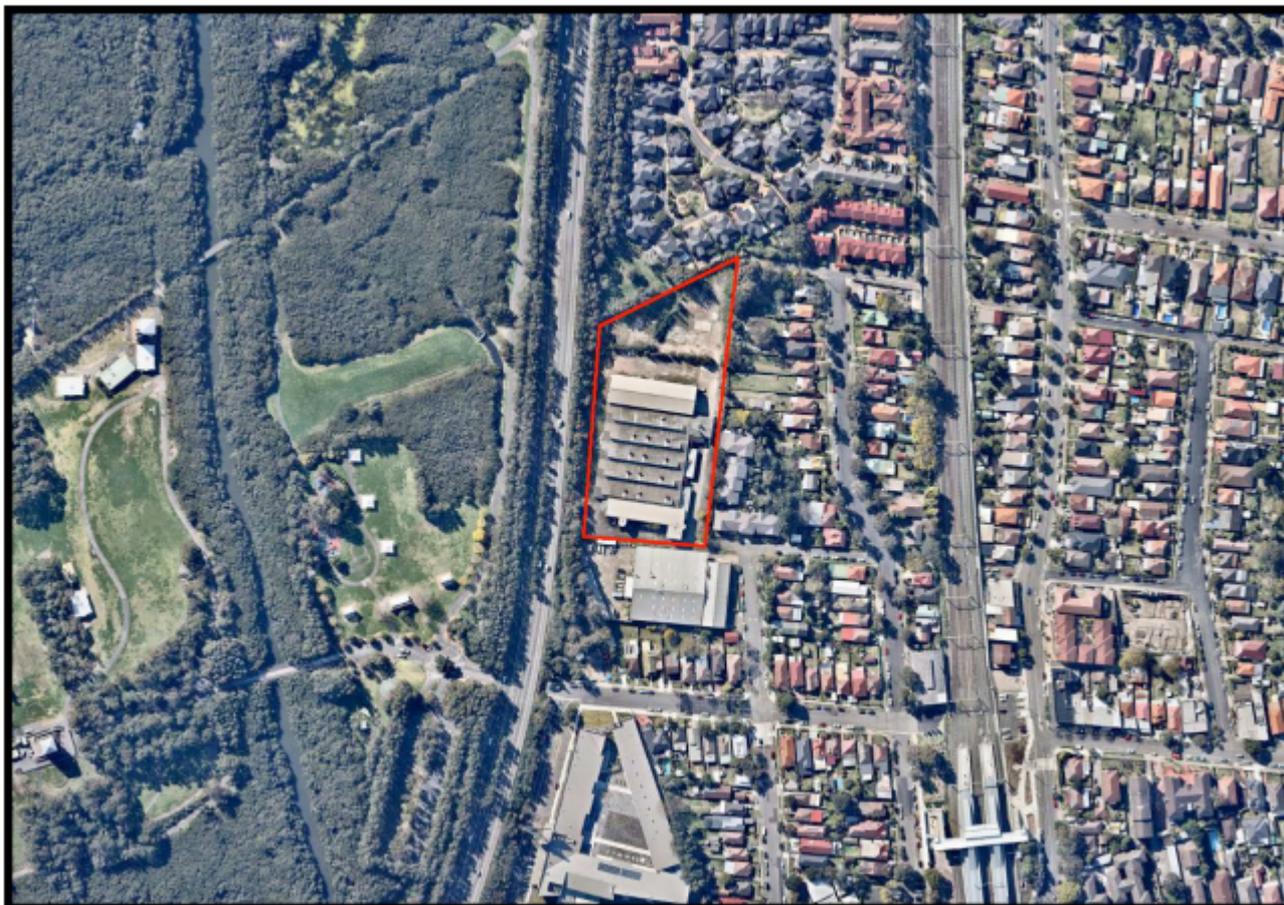


Figure 1 – Site Photograph (Source: Nearmap)

The site area is approximately 15,000m² (based on RPDATA information).

2.4 Building Code of Australia (BCA) Classification

BCA classification(s) of the development are as follows:

BCA Classification	Class 2 Residential/Apartments Class 7a Carpark
Rise in Storeys	8
Type of Construction	Type A Construction
Floor Area (approx)	Carpark: ~12,000m ² Apartments: ~26,353m ²

2.5 Mandatory BCA Energy Efficiency Requirements

Mandatory BCA Energy Efficiency requirements are as follows:

- Part J1 – Building Fabric;
- Part J2 – External Glazing;
- Part J3 – Building Sealing;
- Part J5 – Air Conditioning and Ventilation;
- Part J6 – Lighting and Power;
- Part J7 – Hot Water Supply.

Additional Requirements:

- BASIX (residential);
- NaTHERS (residential);
- SEPP65 (residential).

3. UTILITY ENGINEERING SERVICES

3.1 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.

Dial Before You Dig (DBYD) requests were submitted on the 3 December 2015 to investigate the presence of existing utilities such as natural gas, water, stormwater, sewer and telecommunications.

The following utilities with interests/assets in the vicinity of the site were notified in this process:

Seq. No.	Authority Name	Phone	Status
49556512	Ausgrid	0249510899	NOTIFIED
49556511	Canada Bay (c)	0299116555	NOTIFIED
49556515	Jemena Gas South	1300880906	NOTIFIED
49556514	Optus and/or Uecomm, Nsw	1800505777	NOTIFIED
49556516	Sydney Water	132092	NOTIFIED
49556513	Telstra NSW, Central	1800653935	NOTIFIED

END OF UTILITIES LIST

3.2 Capacity Calculation Assumptions

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

- Site area approximately 15,000m²;
- Approximately 300 apartments;
- Approximately 330 carspaces;
- Average population of 2.5 persons per apartment;
- Cold Water 125,000l/day;
- Sanitary / Sewer Discharge 115,000 l/day;
- Gas 5,000 mj/hr diversified load;
- Fire Hydrant System 20 l/sec; and
- Hot Water 15,000 Litres over peak hour.

4. ELECTRICAL

4.1 Electrical Maximum Demand

Based on our preliminary electrical maximum demand calculations, the new development will require 1,306.3 Amps/Phase when After Diversity Maximum Demand (ADMD) has been applied.

This equates to approximately 940kVA.

The redevelopment of the site will most likely necessitate a new onsite substation in a more appropriate location that is considerate of the future site layout.

To accommodate the new development load 1 x 1,000kVA substation will be required.

The detailed maximum demand calculation is presented in the figure below:

Electrical Maximum Demand Calculation 7 Concord Ave, Concord West ~300 Unit Residential Development 1 Levels of Underground Basement Carparking 7 Lifts Job No: EN - N15_65						
						
Basements	Area (m2)	Quantities	VA/m2	VA	I (A)	Subdivided I (A)
Carpark (Mechanically Ventilated)	12000		10	120000	166.7	
Common Space				0	0.0	
Carpark Lighting	12000		10	120000	166.7	
						333.3
General	Area (m2)	Quantities	VA/m2	VA	I (A)	Subdivided I (A)
Common Space	1000	1	10	10000	13.9	
Lifts		7			280.0	
					0.0	
						293.9
Apartments	Area (m2)	Quantities	VA/Bed	VA	I (A)	Subdivided I (A)
Studios		6	2000	12000	16.7	
1 bed		19	2500	47500	66.0	
1 bed + study		46	2750	126500	175.7	
2 bed		187	3000	561000	779.2	
2 bed + study		8	3250	26000	36.1	
3 bed		34	3500	119000	165.3	
						1238.9
Commercial	Area (m2)		VA/m2	VA	I (A)	
Retail/Commercial Space	0		120	0	0.0	
						0.0
Total (without ADMD)						1866.1
Total (with ADMD of 70% applied)						1306.3

4.2 Existing Services

There is an existing substation on site that will need to be decommissioned. It is a kiosk type substation (refer to Figure 5 below). The substation is designated S.007189. This is shown in Figure 4 on the Ausgrid plans and Figure 5 – Nearmap Photo below:

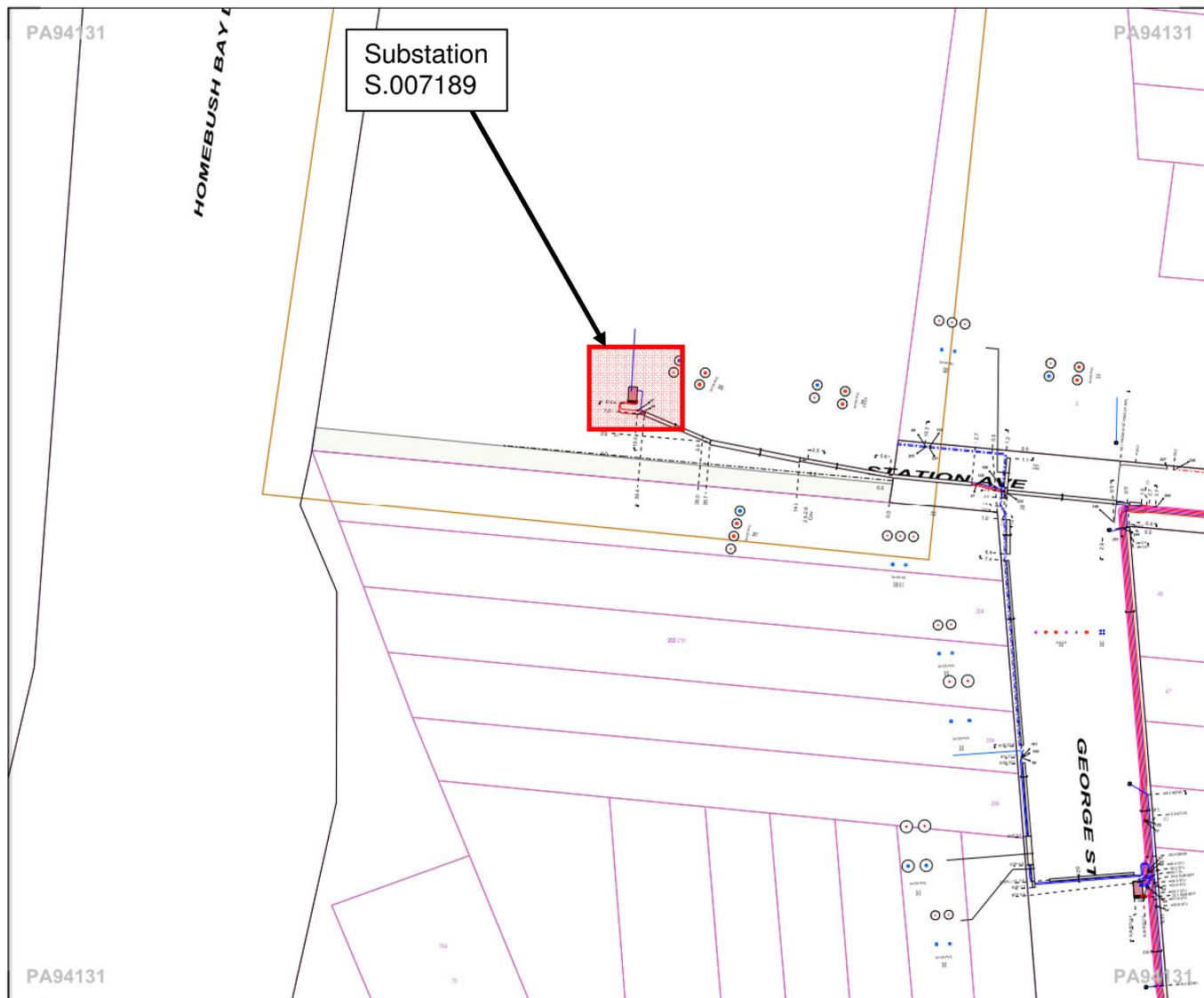


Figure 4 – Substation Location on the Site



Figure 5 – Substation S.007189 located onsite

Substation S.007189 appears to service 7 Concord Ave but also has interconnects to other substations. Before decommissioning substation S.007189, further liaison will be required with Ausgrid to ensure there is no disruption to their network. Furthermore the status of existing substation easement will need to be reviewed. Negotiations with Ausgrid will be necessary to extinguish this easement. New easements will then need to be created for the new substation(s) proposed for the development.

Temporary Builders Service (TBS) for construction will also need to be factored into negotiations with Ausgrid because if S.007189 is decommissioned a new TBS will be necessary from an alternate source.

4.3 Ausgrid Infrastructure in the Vicinity of the Site

There are high voltage feeders reticulating along George Street and into Station Ave for the development to connect in to. The feeder is shown below in Figure 6 which is an extract from the Ausgrid planning maps for the area:

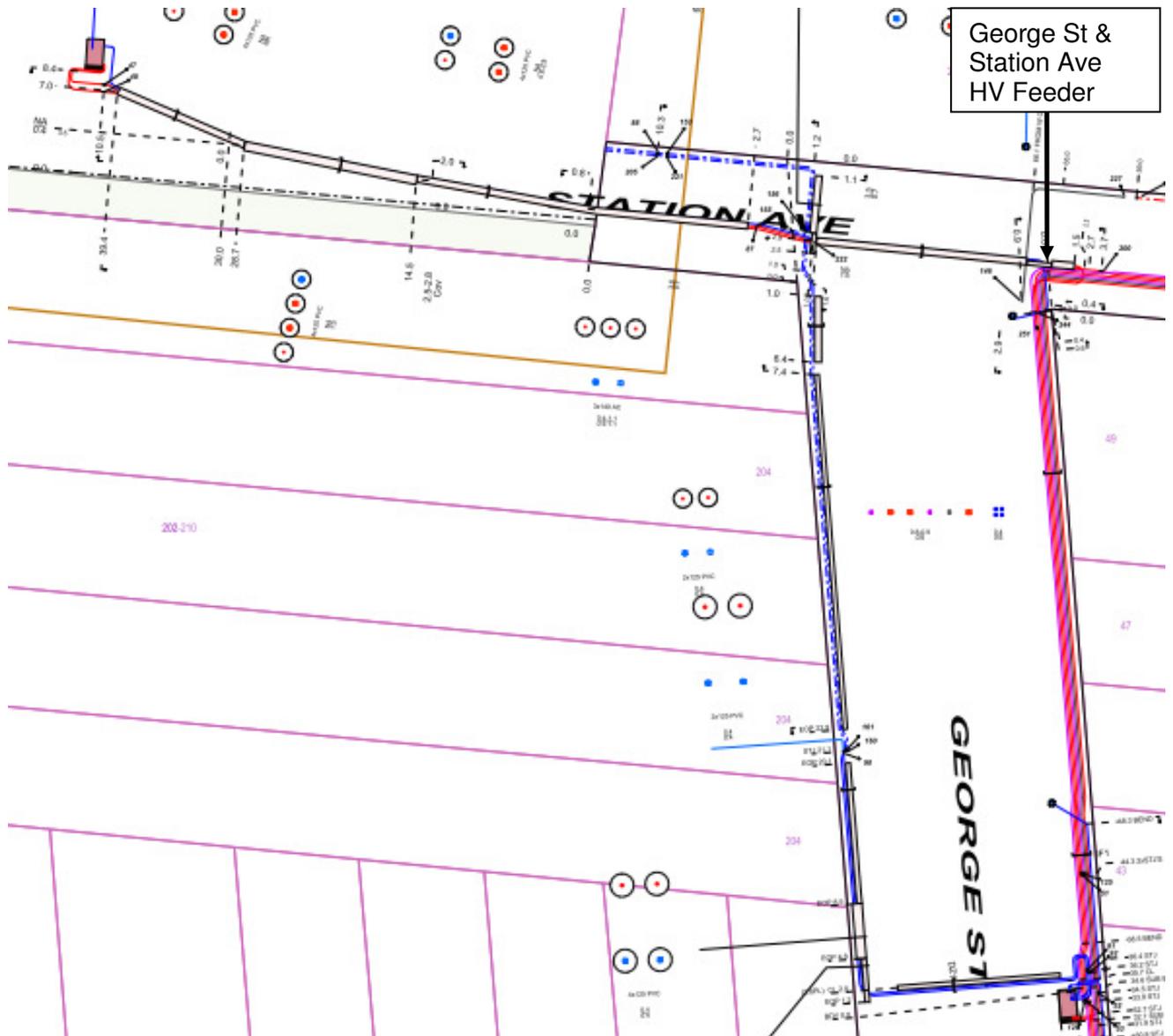


Figure 6 – Mitchell Street HV Feeders

4.4 New Substation Options for the Development

4.4.1 Option 1 – Kiosk Substation

Quantity Required

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

Spatial Requirements

Below are some spatial options for kiosk substations:

L Type Kiosk

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

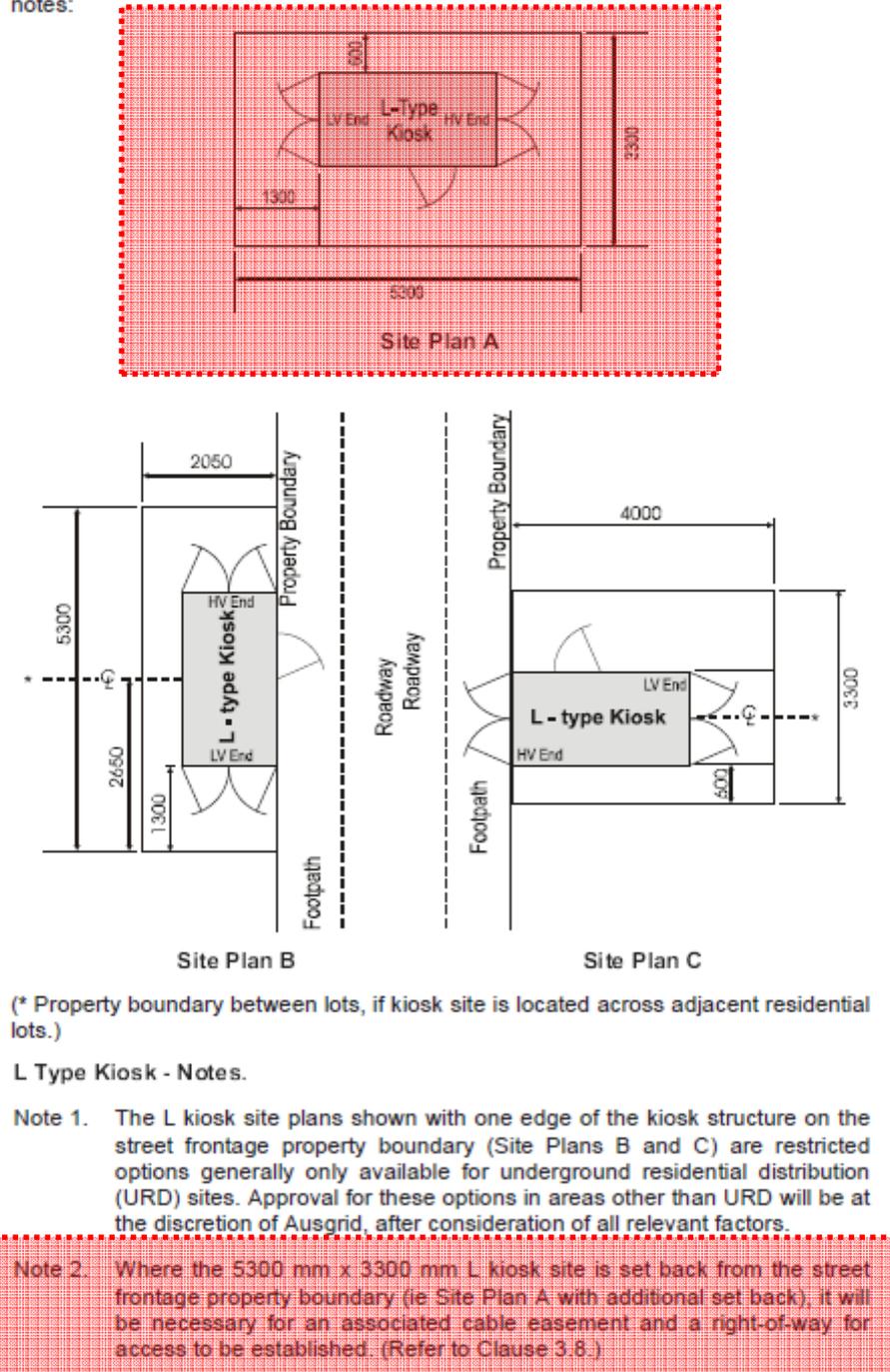


Figure 7 – Kiosk Substation Typical Layouts

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 any openable windows;
- 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.

4.4.2 Option 2 - Mini Sub

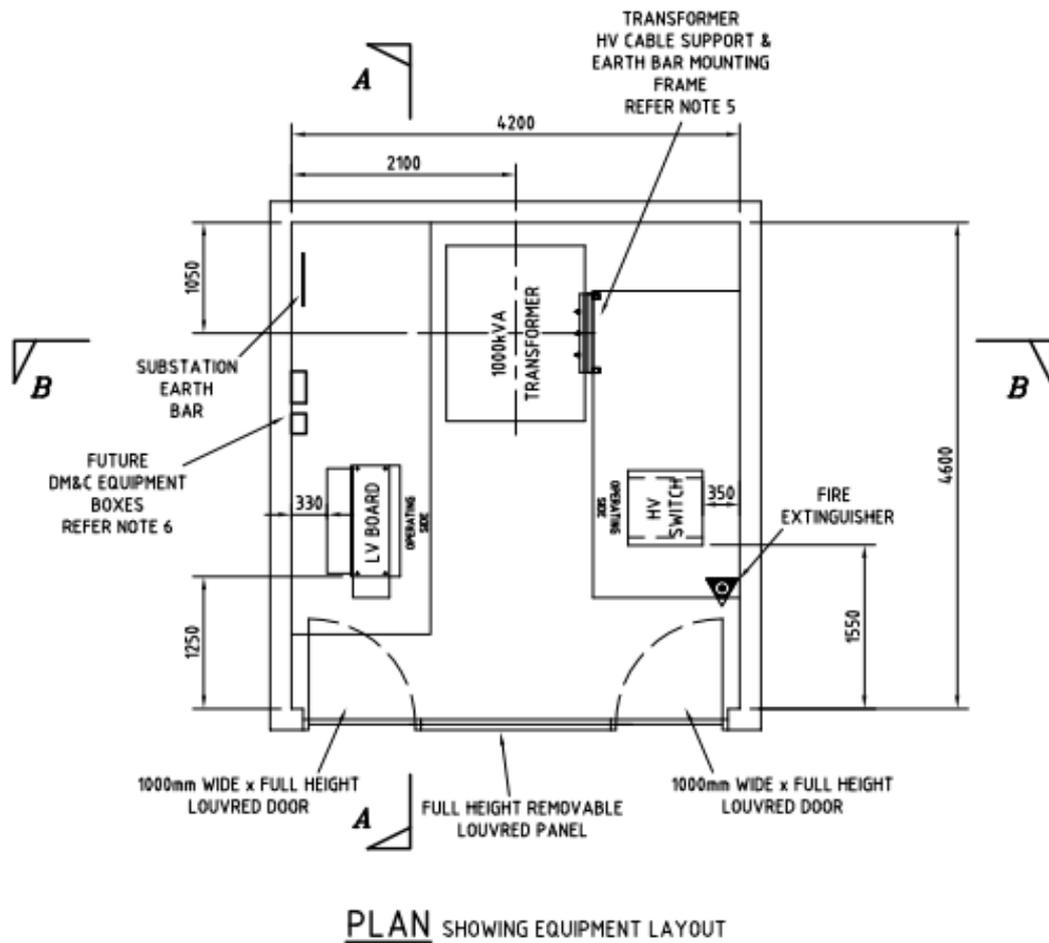
Quantity Required

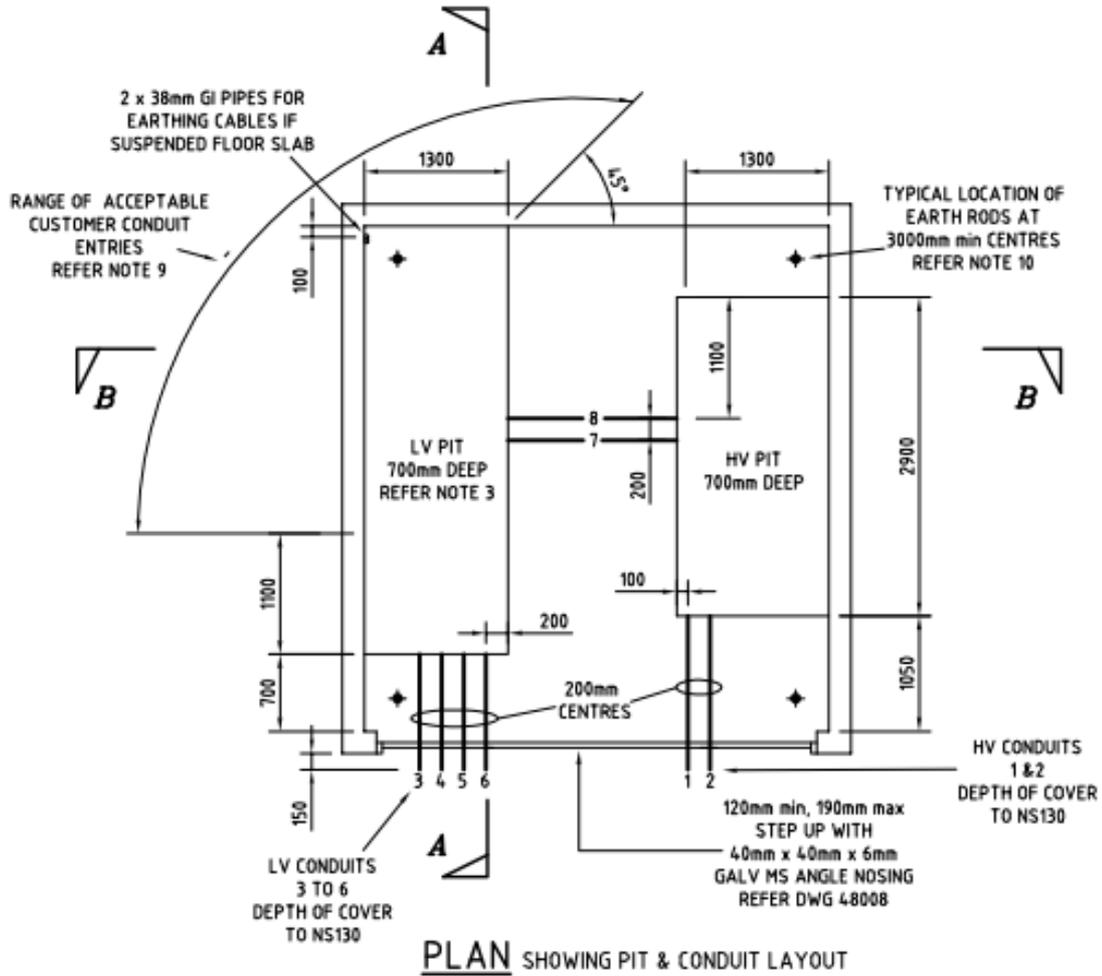
If a mini sub is considered, then one (1) would be required of 1,000kVA capacity each.

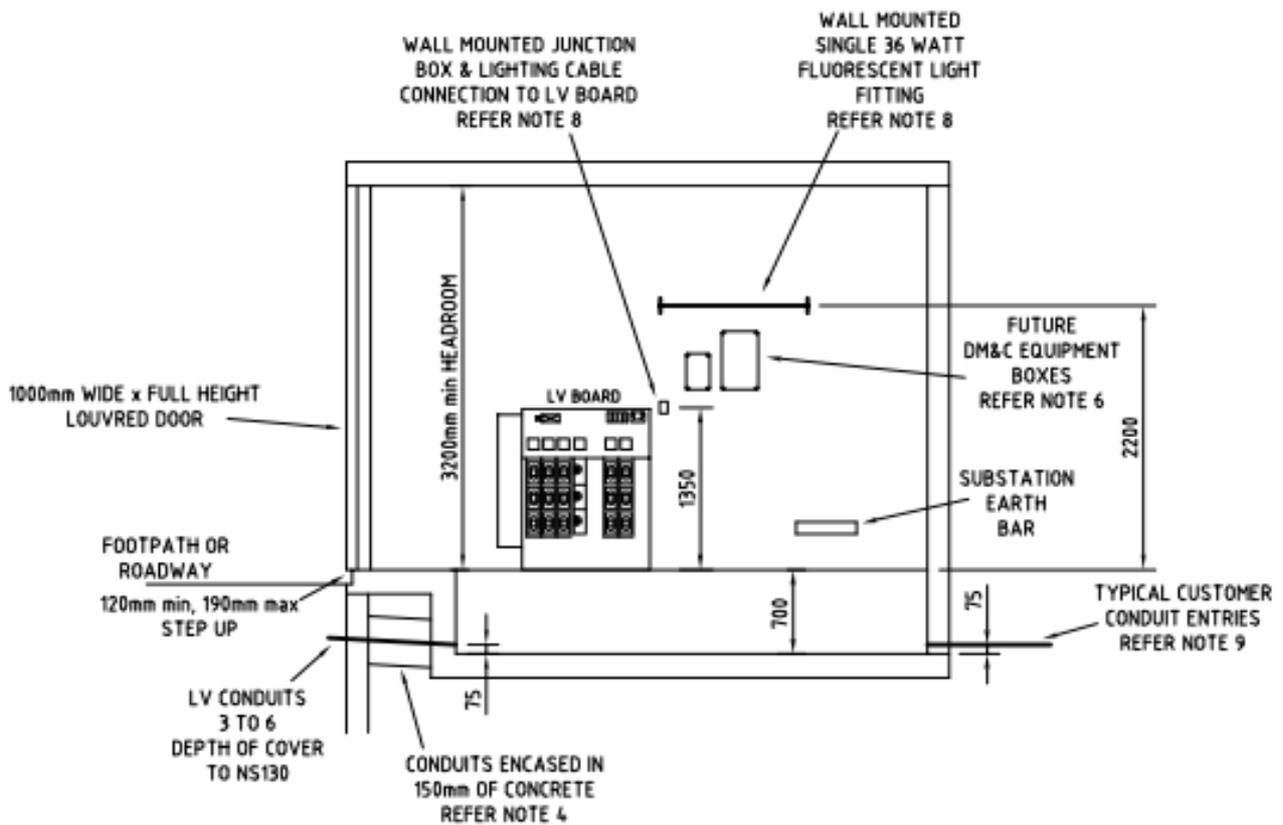
Spatial Requirements

A room of approximately 16m² is required for each mini sub.

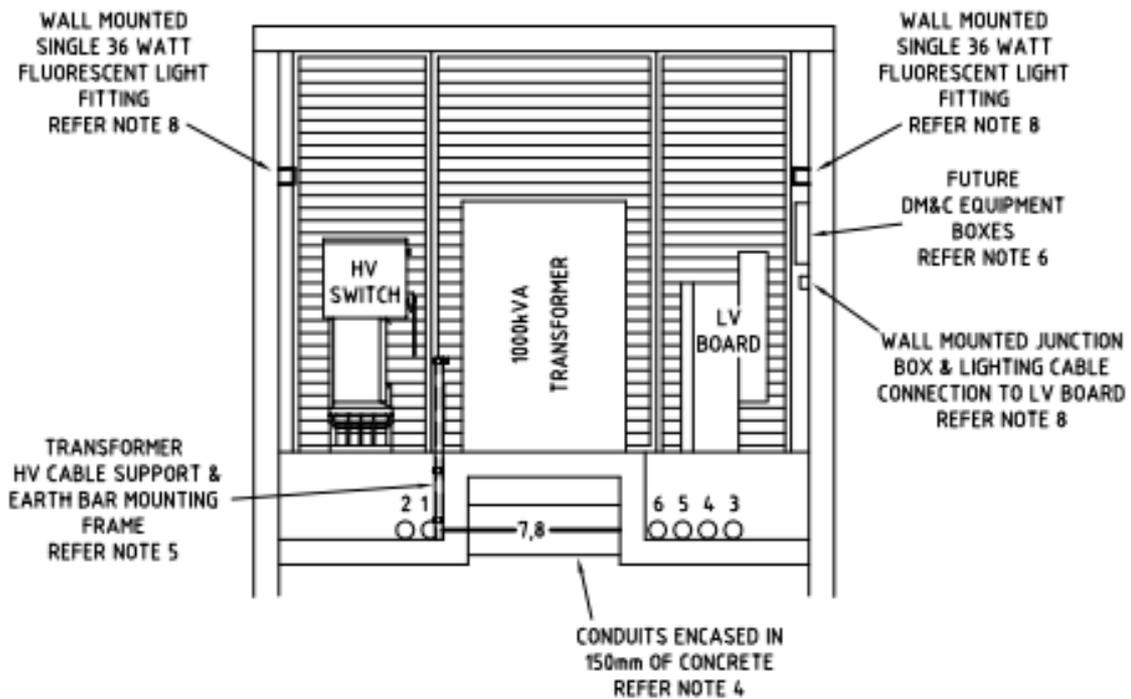
Below is an example of this installation:







SECTION A-A



SECTION B-B

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;
- Front door louvres must be 6m (stringline) from any openable windows;
- Front door louvres be 6m (stringline) blast zone from apartments and/or balconies;
- Any walls must be 3hr fire rated; and
- Minimum 3m floor to ceiling space.

Advantages

The following are advantages associated with mini subs:

- Aesthetically pleasing;
- Reduced blast zones;
- Space efficient.

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.

4.5 Summary & Conclusions

A detailed servicing strategy can be developed post-Gateway however this investigation indicates there is sufficient electrical services infrastructure in the vicinity of the site that accommodate the development.

5. NATURAL GAS

5.1 Gas Maximum Demand

The gas maximum demand has been estimated at:

- 5,000 mj/hr diversified load.

This is based on the Heating Ventilation and Air Conditioning (HVAC) System being a reverse cycle, split, air cooled, type of installation. It has been assumed that hot water and cooking appliances in the residential and food retail portions of the development will predominantly be gas.

5.2 Existing Services

There appears to be existing major gas services (primary and secondary gas mains) within the site that will need to be decommissioned and/or diverted.

Any minor supplies servicing the existing buildings can be readily decommissioned during demolition.

5.3 Jemena Infrastructure in the Vicinity of the Site

Response from Jemena shows there is a 50mm, 210kPa gas main in George Street. This capacity is adequate for the proposed new residential development. This is shown below in Figure 7.

The 50mm, 210kPa gas main gas main can adequately service the site.

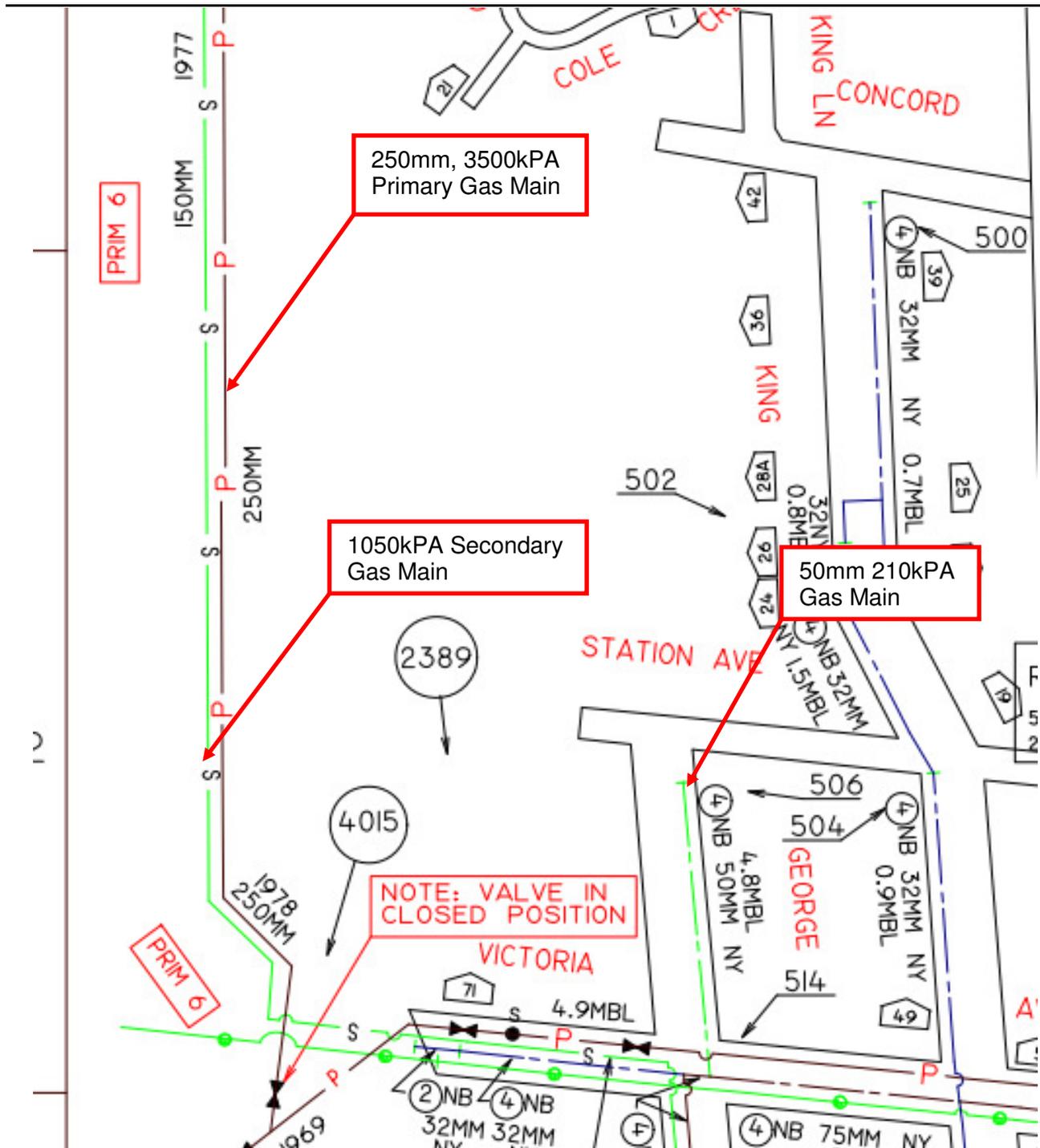


Figure 7 – Jemena Natural Gas Infrastructure (George St & Station Ave Gas Mains)

5.4 Summary and Conclusions

Jemena have extensive infrastructure in the vicinity of the site and can easily cater for the proposed new development.

The George Street 210kPa gas mains will be the most likely point of connection.

6. TELECOMMUNICATIONS

6.1 Telecommunications Maximum Demand

Based on current estimate of apartments proposed for the development at least 500 pairs will be required to the site main distribution frame (MDF/BD).

6.2 Existing Services

There appears to be broadband telco services reticulating along George Street and Station Ave.

This is shown below in Figure 8.

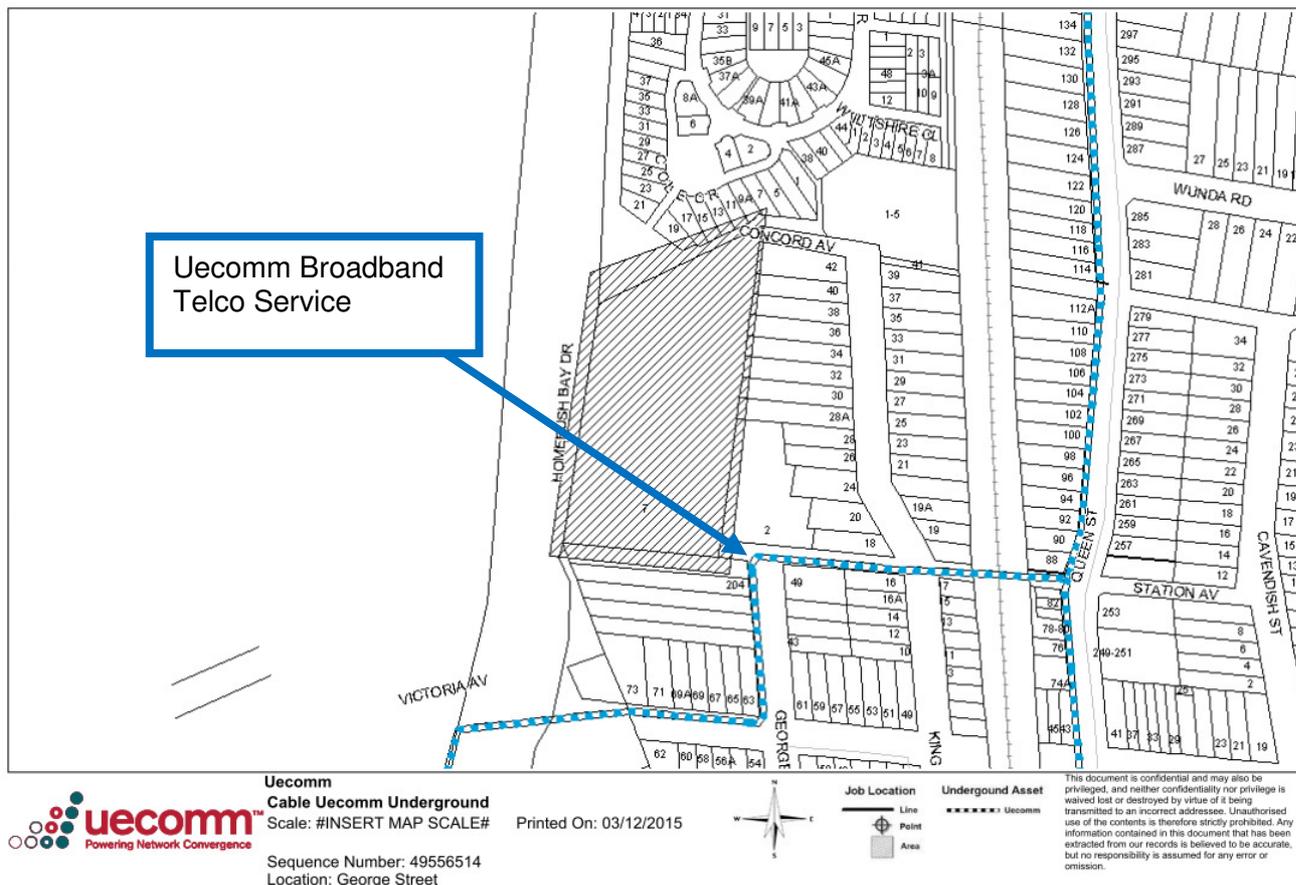


Figure 8 – Uecomm Infrastructure (within George Street & Station Ave)

6.3 Telecommunications Infrastructure in the Vicinity of the Site

Response from Uecomm shows conduits located along George Street and Station Ave.

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

The National Broadband Network (NBN) is not available yet in Concord West. With a site of this number of dwellings, it would be highly likely that NBN will be interested in entering into further negotiations.

6.4 Summary and Conclusions

Uecomm infrastructure in the vicinity of the site and can easily cater for the proposed new development.

NBN would also be brought into the site to service the future development.

7. STORMWATER

7.1 Stormwater Maximum Demand

Due to the site area, the estimated Onsite Detention System (OSD) required will be in the order of 300 - 400m³.

7.2 Existing Services

There are no major existing stormwater services within the site that will need to be decommissioned and/or diverted.

Any minor stormwater services within the site servicing the respective buildings can be readily decommissioned during demolition.

7.3 Stormwater Infrastructure in the Vicinity of the Site

The site is located within Sydney Water's catchment consequently the site's peak flow discharges are required to be regulated to meet Sydney Water's Permissible Site Discharge (PSD) rates.

This shall be achieved by providing an OSD system located in the lowest portion of the site. The entire site shall pass through the OSD system prior to its discharge to Sydney Water's receiving stormwater main.

Specifications for the OSD system can be determined through the development of a site specific hydraulic and water quality model.

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 residential development, however with this extent of development, a new OSD and Water Sensitive Urban Design (WSUD) will be necessary.

7.4 Summary and Conclusions

There is adequate stormwater infrastructure in the vicinity of the site and can easily cater for the proposed new development.

8. MAINS WATER

8.1 Water Maximum Demand

Water maximum demand has been estimated as follows:

- Cold Water 125,000l/day;
- Fire Hydrant System 20 l/sec; and
- Hot Water 15,000 Litres over peak hour.

8.2 Existing Services

There are no major water services within the site that will need to be decommissioned and/or diverted.

Any minor water services within the site servicing the respective buildings can be readily decommissioned during demolition.

8.3 Mains Water Infrastructure in the Vicinity of the Site

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

There is a 100mm water main reticulating along George Street and 150mm diameter water main reticulating along Station Ave.

It is likely that the 150mm water main will be sufficient to cater for cold water and fire services requirements of the proposed new development. This will be confirmed by the Section 73 that will be lodged with Sydney Water after a Development Application (DA) is obtained.

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 be confirmed by the Pressure/Flow Enquiry.

Figure 9 below indicates the Sydney Water mains water and sewer services infrastructure in the vicinity of the site.

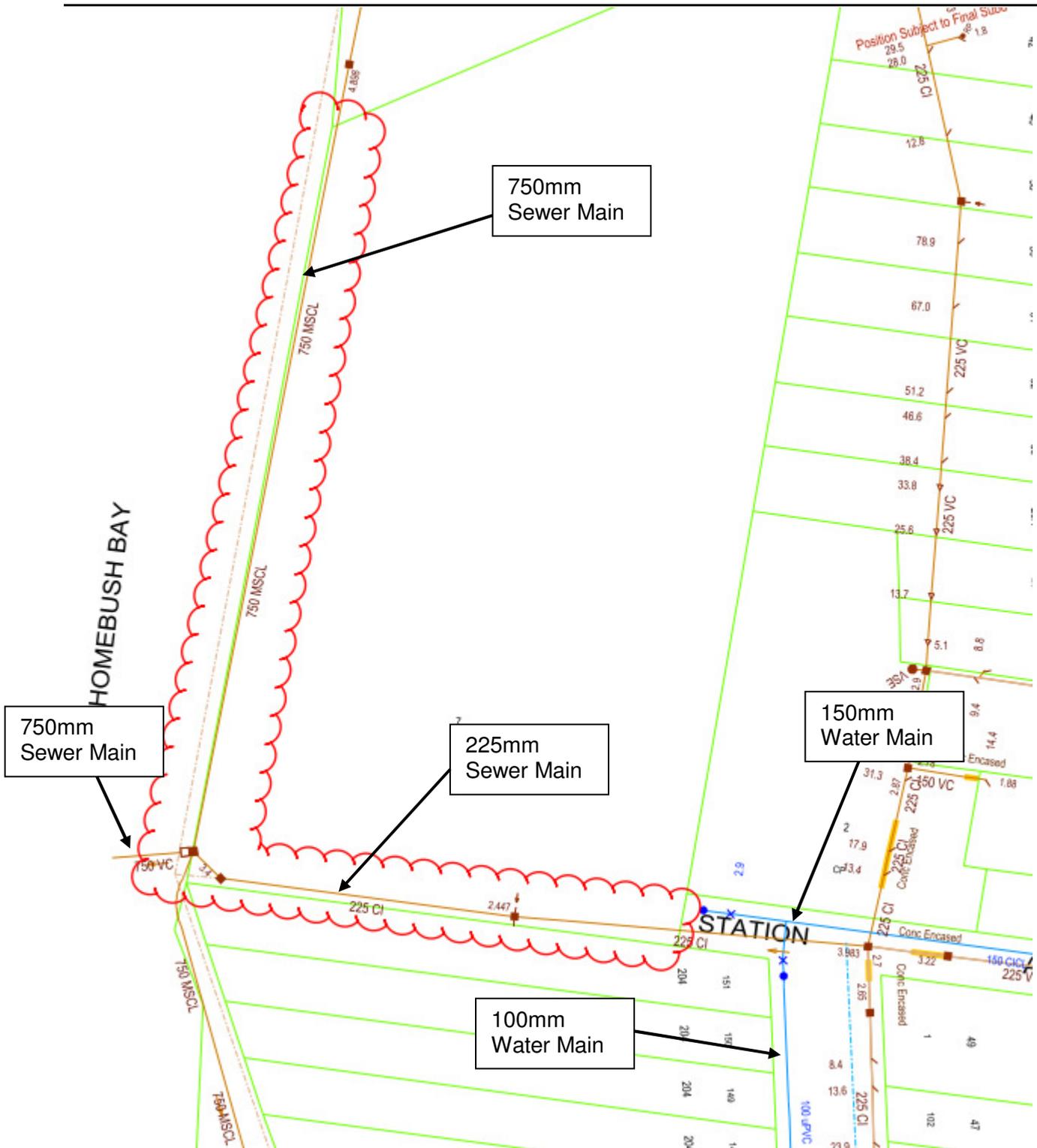


Figure 9 – Sydney Water Sewer/Water Diagram

8.4 Summary and Conclusions

There is adequate mains water infrastructure in the vicinity of the site that can easily cater for the proposed new development.

The mains water will most likely need to be internally boosted. This will be confirmed by the Pressure/Flow Enquiry.

9. SEWER

9.1 Sewer Maximum Demand

Sewer maximum demand has been estimated as follows:

- Sanitary / Sewer Discharge 115,000 l/day.

9.2 Existing Services

There appears to be major sewer services reticulating within the site boundary. The sewer main is shown clouded above in Figure 9.

9.3 Sewer Infrastructure in the Vicinity of the Site

Sydney Water is also the responsible authority for the provision of sewer services to and through the site. Information provided by Sydney Water shows 225mm gravity sewer services reticulating along southern boundary and 750mm gravity sewer services reticulating along the western boundary.

The sewer main reticulating along the southern boundary will be sufficient to cater for drainage services requirements of the proposed new development.

This will be confirmed by the Section 73 that will be lodged with Sydney Water after a development approval is obtained.

9.4 Summary & Conclusions

There is adequate sewer infrastructure in the vicinity of the site that can easily cater for the proposed new development.

The sewer mains reticulating to the southern and western boundaries will need to be considered with respect to the future development and location of the basement car parks.

A servicing strategy will be developed for the site post-Gateway.

APPENDICES

Appendix A

Pressure & Flow Enquiry

To be appended when obtained from Sydney Water