

infrastructure & development consulting

Pymont Peninsula Place Strategy
Utilities Infrastructure Assessment

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1 Introduction

Infrastructure & Development Consulting (IDC) have been engaged by NSW Department of Planning, Industry and Environment (the Department) to undertake a utilities infrastructure assessment for the Pyrmont Peninsula.

1.1 Methodology

The following project methodology was undertaken:

- Obtain GIS mapping of existing utilities infrastructure from the service authorities.
- Identify and map all relevant existing infrastructure within the study area.
- Obtain existing population distribution across the study area from the project team.
- Conduct meetings with the service authorities to determine existing capacity issues, planned projects and to discuss the project in general.
- Identify service catchments for each key piece of infrastructure in conjunction with the service authorities.
- Using the existing population distribution and service capacity information, plot the existing infrastructure shortfalls and critical areas.

- Obtain proposed land use scenarios and proposed population distribution across the study area.
- Based on the proposed population growth and distribution, prepare service load calculations for the study area.
- Map committed infrastructure upgrades in the study area and compare capacity increases to population uplift.
- Undertake an analysis of the additional required infrastructure upgrades required over the study period to adequately service two development scenarios.
- Analyse infrastructure timing and sequencing across the study area over the study period.
- Prepare summary report with mapping to illustrate the results of the above analysis.

1.2 Study Limitations

The advice provided in this report is for strategic purposes only. Advice provided by the service authorities is high level in nature and does not constitute a servicing strategy for the study area.

The information contained within this study broadly outlines trunk servicing requirements to meet the proposed future demand in the study area.

This report is based on publicly available information and advice provided to IDC by the

service authorities at the time of writing. Should new information be made available, this report will be updated accordingly.

2 Pyrmont Peninsula

2.1 Regional Context

The Pyrmont Peninsula is located within the City of Sydney LGA and is situated adjacent the Sydney CBD. The study area comprises the suburbs of Pyrmont, Ultimo and parts of Darling Harbour and the Bays Precinct.

The Peninsula is characterised by urban areas including high density residential developments and commercial areas such as Darling Harbour. Residential neighbourhoods are largely located along the ridge and in the northern portion of the study area.

The Peninsula includes regionally significant tourism and entertainment sites along the eastern boundary and the Sydney Fish Market and Blackwattle Bay to the west. Other prominent uses include Sydney International Convention Centre, Harbourside Shopping Centre, Australian National Maritime Museum, Star Casino, Sydney Fish Market, Wentworth Park and the University of Technology Sydney (UTS). The Pyrmont Peninsula study area is shown in Figure 1.

Figure 1 - Pyrmont Peninsula Study Area



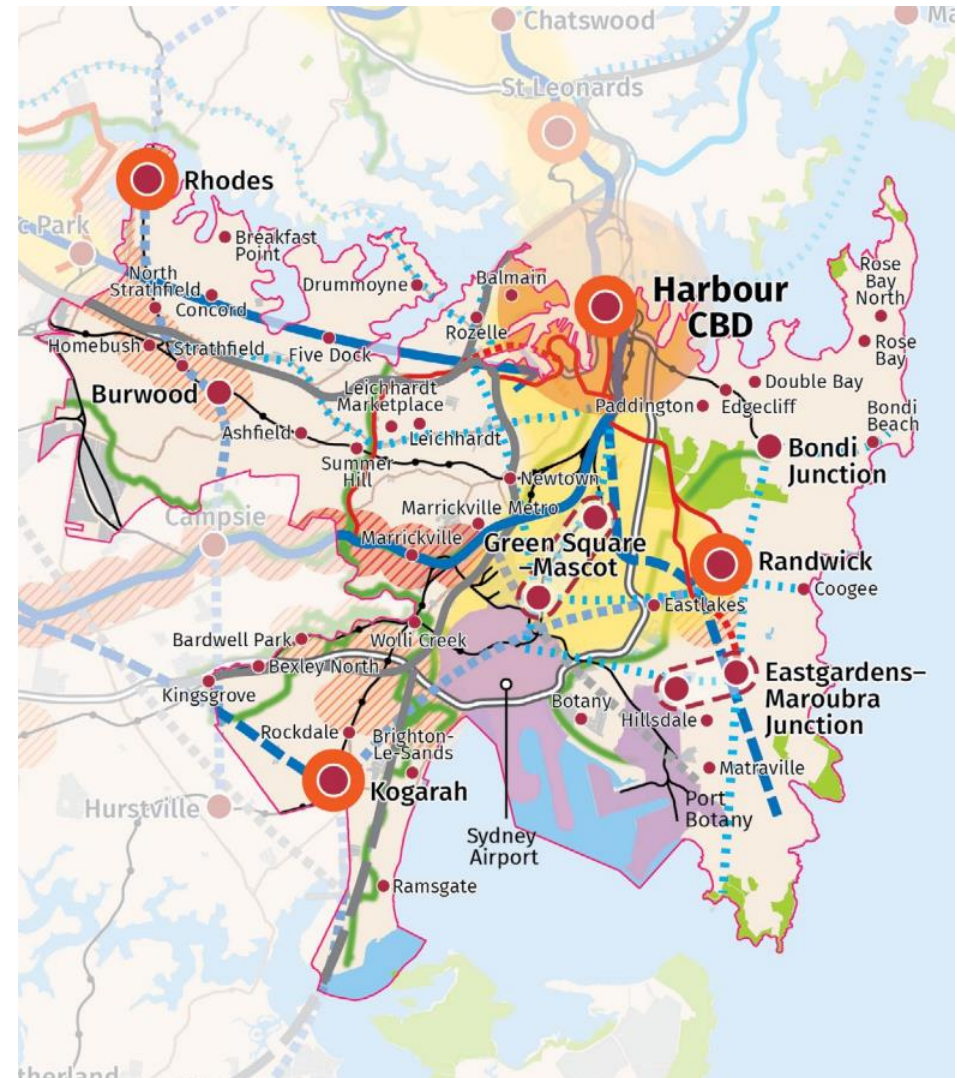
Source: Directions for the Pyrmont Peninsula Place Strategy – NSW Department of Planning & Environment (March 2020)

2.2 Greater Sydney Region Plan

In 2018 the Greater Sydney Commission released the *Greater Sydney Region Plan – A Metropolis of Three Cities* which outlined a vision for Sydney over the next 40 years. The plan centres on a vision of three cities where most residents live within 30 minutes of their jobs, education and health facilities, services and great places.

The Pyrmont Peninsula is located within the Eastern Harbour City which covers the Bayside, Burwood, City of Canada Bay, City of Sydney, Inner West, Randwick, Strathfield, Waverley and Woollahra local government areas. The *Eastern City District Plan* outlines how economic, social and environmental matters will be managed to achieve the 40-year vision of the *Greater Sydney Region Plan*. The District Plan assists councils to plan for and support growth and change and informs local strategic planning statements and local environment plans.

Figure 2 - Eastern City District Context



Source: Eastern City District Plan – Greater Sydney Commission (March 2018)

2.3 Pyrmont Peninsula Sub-Precinct

The study area has been divided into seven sub-precincts which will accommodate different typologies and development intensities:

- Darling Island
- Pirrama
- Blackwattle Bay
- Pyrmont Village
- Wentworth Park
- Tumbalong Park
- Ultimo

The sub-precincts are shown in Figure 3.

Figure 3 - Pyrmont Peninsula Sub-Precincts



2.4 Development Scenario

The development scenario was prepared by the project team through integration of existing master plan studies with additional sites for change identified in the Hassall Built Form Potential Report dated 1 June 2020.

The NSW Government is continuing to investigate the feasibility of building a Metro station in Pyrmont. This includes further industry engagement and transport and economic modelling to assess its feasibility and affordability.

The development scenario assumes that a metro station is located within the study boundary. This allows for greater uplift in non-residential floor space.

Two options have been assessed:

- Assuming a higher density for commercial floorspace (Table 1).
- Assuming a lower density for commercial floorspace (Table 2).

Residential uplift is consistent across both options and represents a moderate increase in development across the study area.

For the purpose of this assessment, utilities calculations have been based on the higher density option to provide a conservative estimate of the infrastructure requirements.

Table 1 – High Density Development Yield

Sub Precinct	Total Growth	Commercial GFA Growth	Residential GFA Growth	Jobs	Population	Dwellings
Pirrama	22,500	15,000	7,500	358	188	88
Pyrmont Village	63,500	58,000	5,500	1,384	138	65
Darling Island	139,000	115,000	24,000	2,744	601	282
Blackwattle Bay	322,000	240,000	82,000	5,727	2,055	965
Tumbalong Park	202,000	120,000	82,000	2,864	2,055	965
Wentworth Park	97,500	53,000	44,500	1,265	1,115	524
Ultimo	456,000	362,000	94,000	8,638	2,356	1,106
Total	1,302,500	963,000	339,500	22,980	8,507	3,994

Table 2 – Low Density Development Yield

Sub Precinct	Total Growth	Commercial GFA Growth	Residential GFA Growth	Jobs	Population	Dwellings
Pirrama	19,500	12,000	7,500	335	188	88
Pyrmont Village	55,000	49,500	5,500	1,380	138	65
Darling Island	122,000	98,000	24,000	2,732	601	282
Blackwattle Bay	289,000	207,000	82,000	5,771	2,055	965
Tumbalong Park	185,000	103,000	82,000	2,871	2,055	965
Wentworth Park	87,500	43,000	44,500	1,199	1,115	524
Ultimo	406,000	312,000	94,000	8,698	2,356	1,106
Total	1,164,000	824,500	339,500	22,985	8,507	3,994

3 Water

3.1 Existing Infrastructure

The study area is serviced by the Sydney Water potable water network. Trunk water supply likely originates from a 600mm trunk main is located along Jones Street and Bulwara Road. Smaller trunk mains supplying development are located within Harris Street, Union Street and Pirrama Road. The existing potable water network is shown in Figure 4.

3.2 Sydney Water Growth Servicing Plan

In 2019 Sydney Water released a Growth Servicing Plan (GSP) which outlines the servicing strategy to support planned growth in Greater Sydney up to 2024. The GSP indicates that infrastructure to support the Bays Precinct is currently in the strategic planning phase as there is limited existing trunk capacity. Infrastructure to support development in the Bays Precinct, Glebe Island and White Bay is not expected until 2023.

The Growth Servicing Plan has not considered any other major development sites within the vicinity of the study area.

3.3 Stakeholder Engagement

IDC held a meeting with Sydney Water on 3rd June 2020 to discuss the Pyrmont Peninsula project. The purpose of the meeting was to discuss existing infrastructure within the study area and determine existing capacity issues and planned projects. A subsequent meeting was held on 13th July 2020.

The growth scenarios have been provided to Sydney Water for comment and assessment. This section will be updated upon receipt of Sydney Water advice.

3.4 Proposed Network

A high-level assessment was undertaken using the Water Supply Code of Australia (WSA) to determine the infrastructure requirements to support the proposed development. This involved determining the minimum trunk main size by calculating the peak hourly demand.

The maximum water demand rates were extracted from the Water Supply Code of Australia. These rates were used to determine the peak hour demand for each land use type. For the purpose of this assessment all residential development within the study area has been classified as high density residential, and all non-residential development has been classified as city high rise commercial. These land use types have an associated max day

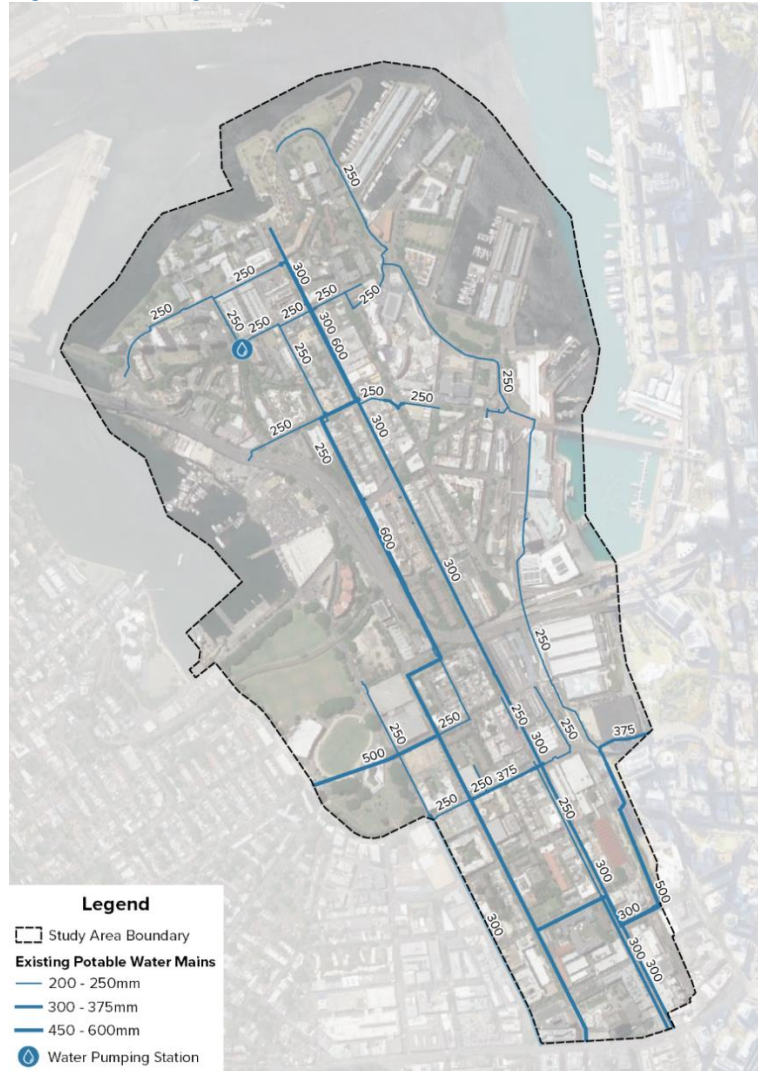
demand rate of 0.8kL/dwelling/day for residential and 66kL/net ha/day for commercial.

The uplift values from the higher density development yield have been adopted as this option has the greatest proposed uplift. Infrastructure requirements to support this option reflect the highest demand scenario from a utilities servicing perspective. Should the lower density development yield option be progressed, the recommended upgrades could be scaled back accordingly.

The infrastructure recommendations are expressed as additional infrastructure – to be provided in addition to the infrastructure supplying existing development within the Pyrmont Peninsula. Additional infrastructure can be provided as new infrastructure based on the recommended minimum pipe size detailed in Table 3, or by augmenting the existing infrastructure to provide additional capacity.

The results of the assessment are provided in Table 3. The increase in demand is greatest in the Ultimo, Tumbalong Park and Blackwattle Bay precincts. New or upgraded mains will likely be required to support development in these areas, while precincts with smaller demand increases such as Pirrama and Pyrmont Village can likely be accommodated within the existing infrastructure.

Figure 4 - Existing Water Infrastructure



Source: GIS data provided by Sydney Water (29/6/20)

Table 3 – Proposed Additional Potable Water Demand

Precinct	Units	Quantity	Max Day Demand (kL/day)	Peak Hour Demand (L/s)	Total (L/s)	Minimum Pipe (mm)
Pirrama	Dwellings	88	70.4	1.63	3.82	100
	GFA	15,000	94.5	2.19		
Pyrmont Village	Dwellings	65	52.0	1.20	9.66	100
	GFA	58,000	365.4	8.46		
Darling Island	Dwellings	282	225.6	5.22	21.99	150
	GFA	115,000	724.5	16.77		
Blackwattle Bay	Dwellings	965	772.0	17.87	52.87	225
	GFA	240,000	1,512.0	35.00		
Tumbalong Park	Dwellings	965	772.0	17.87	35.37	225
	GFA	120,000	756.0	17.50		
Wentworth Park	Dwellings	524	419.2	9.70	17.43	150
	GFA	53,000	333.9	7.73		
Ultimo	Dwellings	1106	884.8	20.48	73.27	300
	GFA	362,000	2,280.6	52.79		
Total			9,262.9	214.4	214.4	

4 Sewer

4.1 Existing Infrastructure

The study area is serviced by the Sydney Water sewer network.

Pymont Peninsula is characterised by a ridgeline running in a north-south direction through the centre of the peninsula. Existing sewer infrastructure largely drains away from the ridgeline, towards the peninsula coastline to a series of sewer pump stations (SPS). From the pump stations, sewer is transferred via a series of rising mains and trunk mains to a SPS located at the end of Pymont Street (SP0001), in the eastern part of the study area. Sewer is then pumped to the Malabar wastewater Treatment Plant.

A number of large trunk mains are located within the study area which service a greater region, including development outside the study area. A 1.7x1.0m box culvert traverses William Henry Street and appears to drain to SP001. Two additional trunk mains also appear to drain to this pump station via Darling Drive to both the north and south. From SP0001, a 600mm pressure main transfers flows eastward, towards Malabar Wastewater Treatment Plant.

Pump stations are also located within the Wentworth Park sub-precinct, on the corner of Pymont Bridge Road and Wattle Street (SP0002), and in the Darling Island Precinct on Pirrama Road (SP0020 and SP1087).

These pump stations transfer flows from their respective catchments to SP0001 via the trunk main on William Henry Street.

It should be noted that SP0002 is located in a heritage listed building. While upgrades to the pump station can occur, there may be restrictions relating to modification of the building structure which should be considered.

4.2 Sydney Water Growth Servicing Plan

In 2019 Sydney Water released a Growth Servicing Plan which outlines the servicing strategy to support planned growth in Greater Sydney up to 2024. The Growth Servicing Plan indicates that infrastructure to support the Bays Precinct is currently in the strategic planning phase as there is limited existing trunk capacity. Infrastructure to support development in the Bays Precinct, Glebe Island and White Bay is not expected until 2023.

The Growth Servicing has not considered any other major development sites within the vicinity of the study area.

4.3 Stakeholder Engagement

IDC held a meeting with Sydney Water on 3rd June 2020 to discuss the Pymont Peninsula project. The purpose of the meeting was to discuss existing infrastructure within the study area and determine existing capacity issues and planned projects. A subsequent meeting was held on 13th July 2020.

The growth scenarios have been provided to Sydney Water for comment and assessment. This section will be updated upon receipt of Sydney Water advice.

4.4 Proposed Network

A high-level assessment was undertaken using the Sewage Supply Code of Australia (SSA) to determine the infrastructure requirements to support the proposed development. The load on the sewer network is expressed in Equivalent Population (EP). The Equivalent Population for each land use was extracted from the SSA. For the purpose of this assessment all residential development within the study area has been classified as single occupancy high density units, and all non-residential development has been classified as high density commercial. These land use types have an associated Equivalent

Population of 2.5 EP/dwelling and 500 EP/Ha respectively.

As outlined in Section 3.4, the uplift values from the higher density development yield have been adopted for this assessment as the infrastructure requirements to support this option reflect the highest demand scenario from a utilities servicing perspective.

Should the lower density development yield option be progressed, the recommended upgrades could be scaled back accordingly.

As the sewer network within the study area largely drains from the crest through the centre of the peninsula outwards, the additional load on the sewer network has been separated based on the sub-precincts identified in Section 2.3. The approximate total Equivalent Population and associated sewer main size required for each sub-precinct is summarised in Table 4.

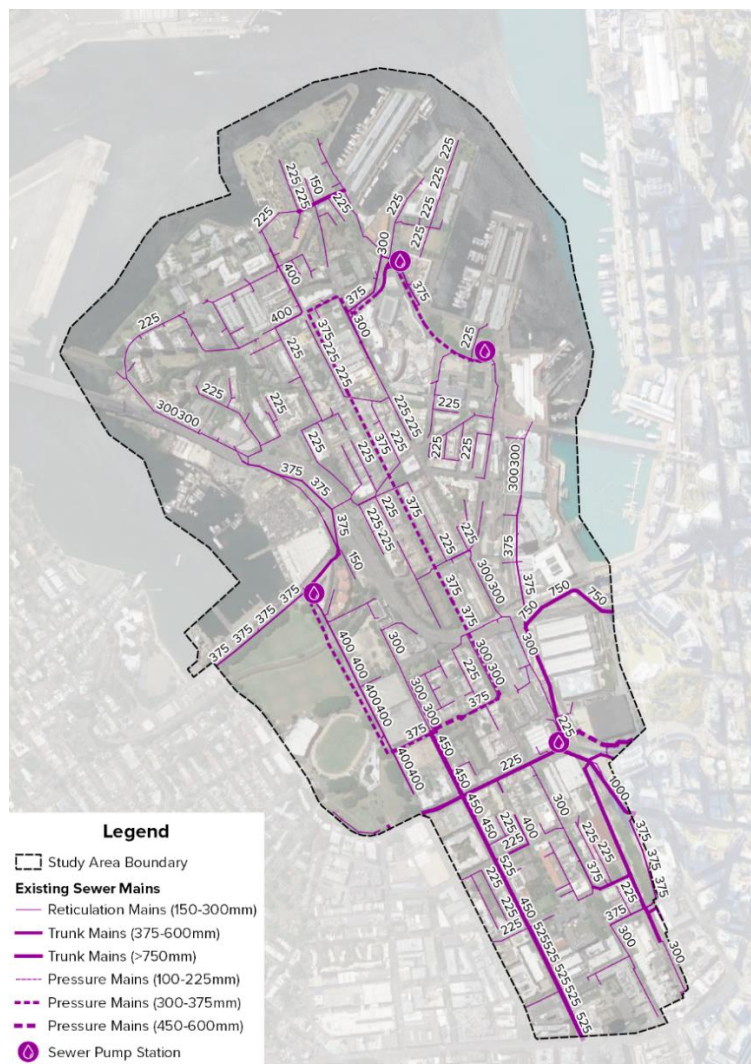
It should be noted that the infrastructure recommendations are expressed as additional infrastructure – to be provided in addition to the infrastructure supplying the existing development within the study area. Additional infrastructure can be provided as new infrastructure based on the recommended minimum pipe size detailed in Table 4, or by augmenting the existing infrastructure to provide additional capacity.

As discussed in Section 3.4, additional demand in sub-precincts such as Pirrama and Pyrmont Village can likely be accommodated within the existing infrastructure. For all other sub-precincts, it is likely that augmentations or additional infrastructure would be required to support the proposed development.

An assessment of pump stations has not been undertaken as the total and available capacity of these infrastructure items is unknown at this stage.

Given the large uplift in the Blackwattle Bay, Tumbalong Park and Darling Island sub-precincts, augmentation of pump stations may be required to support the increased development in these areas. Sydney Water will advise on the status of these pump stations and any upgrades that may be required to support development in the study area. These details will be included in a subsequent revision of this report.

Figure 5 - Existing Sewer Infrastructure



Source: GIS data provided by Sydney Water (29/6/20)

Table 4 – Proposed Additional Sewer Demand

Sub-Precinct	Residential (2.5 EP/dwelling)	Commercial (500 EP/Ha)	Total	Min. Required Pipe (mm)
Pirrama	220.6	750.0	970.6	225
Pyrmont Village	161.8	2,900.0	3,061.8	225
Darling Island	705.9	5,750.0	6,455.9	300
Blackwattle Bay	2,411.8	12,000.0	14,411.8	375
Tumbalong Park	2,411.8	6,000.0	8,411.8	300
Wentworth Park	1,308.8	2,650.0	3,958.8	300
Ultimo	2,764.7	18,100.0	20,864.7	375/450

5 Electricity

5.1 Existing Infrastructure

The study area is located in the Ausgrid electrical supply zone and forms part of the Camperdown and Blackwattle Bay load area. There are four substations located within the study area:

- Darling Harbour 132/11kV zone substation
- Pyrmont Sub-Transmission Substation
- Camperdown 33/11kV zone substation
- Blackwattle Bay 33/5kV zone substation

The Pyrmont sub-transmission substation (STS) is co-located with the Darling Harbour zone substation (ZS). Both substations are supplied at 132kV from the Haymarket Bulk Supply Point (BSP), located adjacent the study area boundary in the south east.

The Camperdown Zone Substation and Blackwattle Bay Zone Substation are supplied from the Pyrmont STS. The Pyrmont STS also provides supply to three major customers at Barangaroo South, Sydney Trains and Global Switch.

The substations and BSP are connected via a series of 132kV and 33kV transmission lines. The existing electrical transmission network within the vicinity of the study area is shown in Figure 7.

Blackwattle Bay is among the oldest zone areas within the Ausgrid network and is the only zone within the network that operates a 5kV distribution system. As a result, the Blackwattle Zone Substation has very limited load transfer capability with adjacent zones. Ausgrid's policy is to progressively replace the 5kV system with 11kV assets to increase operational flexibility and allow load transfers between adjacent zone substations if required.

Ausgrid have committed to decommission the Blackwattle Zone Substation by converting the 5kV assets to an 11kV system and transferring the load to the adjacent substations at Camperdown and Darling Harbour. The project is expected to be completed in November 2020 and will cost an estimated \$16.5 million.

To facilitate the decommission of the Blackwattle ZS, existing loads were transferred to the Camperdown, Leichhardt and Darling Harbour Zone Substation. A fourth transformer was commissioned for the Camperdown Zone Substation to allow for the future load transfer from nearby substations. Load transfers from the Darling Harbour Zone Substation to the Camperdown Zone Substation are expected in 2020 and 2023.

5.2 Stakeholder Engagement

IDC held a meeting with Ausgrid on 3rd June 2020 to discuss the Pyrmont Peninsula project. The purpose of the meeting was to introduce the project, discuss existing infrastructure within the study area and determine existing capacity issues and planned projects within the area.

Ausgrid have indicated that it is likely the existing substations and transmission lines within the study area will have sufficient capacity to support the proposed development within the study area. Capacity constraints may exist within the high voltage feeder network (11kV feeders) which originate from substations and supply development sites.

Should the existing 11kV feeders have insufficient capacity to support the proposed development, additional feeders would need to be constructed.

5.3 Proposed Network

A high-level assessment was prepared to estimate the electrical infrastructure requirements to support the proposed development. The electrical demand generated within the Pyrmont Peninsula was calculated using electrical demand rates provided by Endeavour Energy.

For the purpose of this assessment all residential development within the study area has been classified as high density residential, and all non-residential development has been classified as mixed-use office. These land use types have an associated load allocation of 3,000VA/dwelling and 100VA/m² respectively.

As outlined in Section 3.4, the uplift values from the higher density development yield have been adopted for this assessment as the infrastructure requirements to support this option reflect the highest demand scenario from a utilities servicing perspective.

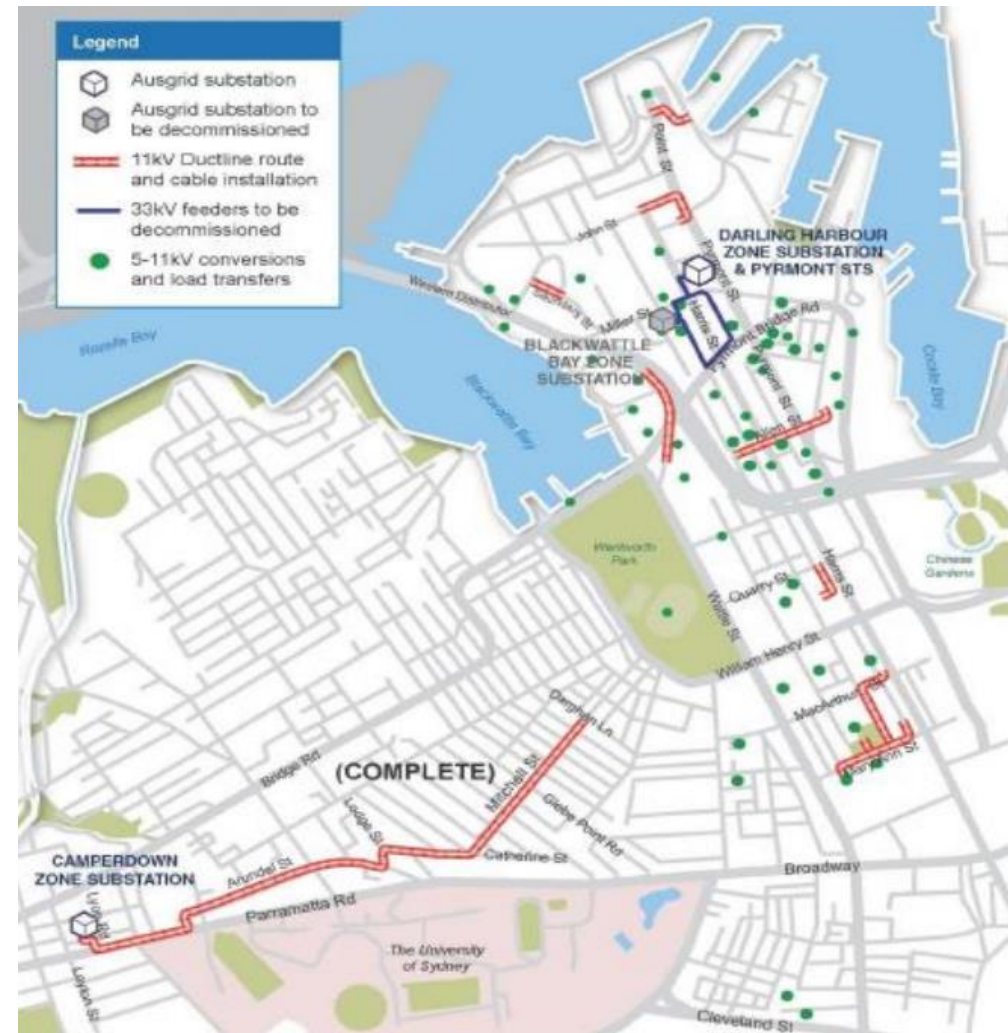
Should the lower density development yield option be progressed, the recommended upgrades could be scaled back accordingly.

The total load was calculated and a diversification factor of 0.8 was applied to the total load in line with standard industry practice. The results of this assessment are summarised in Table 5.

Assuming an 11kV feeder can supply 4.5MVA, the proposed development within the Pyrmont Peninsula would require approximately 19 feeders for electrical supply. It is worth noting that the peak periods for electrical consumption between the residential and non-residential development will not occur concurrently. Residential peaks will occur during the morning and evening, while non-residential peaks will occur during the day. Therefore, it is likely that the peak demand generated by the study area will be considerably lower than the calculated rate in Table 4.

There may be capacity in existing feeders to supply some development, however it likely that new feeders will be required. Servicing requirements will be confirmed with Ausgrid once development sites have been identified and feasibility applications are lodged.

Figure 6 – Blackwattle Zone Substation Project Works



Source: Distribution and Transmission Annual Planning Report – Ausgrid (December 2019)

Figure 7 – Blackwattle Bay Electrical Load Area

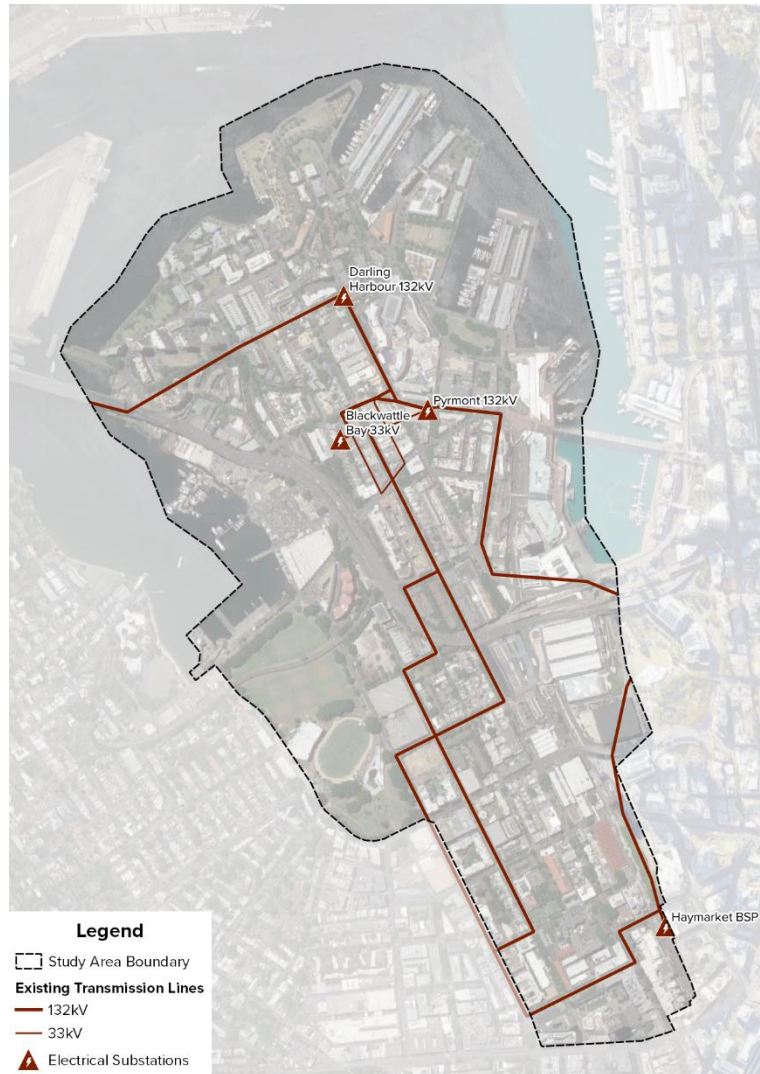


Table 5 – Proposed Additional Electrical Demand

Sub-Precinct	Development Type	Dwellings/ GFA	Load (kVA)	Diversified Load (MVA)	Total
Pirrama	Office	15,000	1,500.0	1.2	1.4
	High Density	88	264.0	0.2	
Pyrmont Village	Office	58,000	5,800.0	4.6	4.8
	High Density	65	195.0	0.2	
Darling Island	Office	115,000	11,500.0	9.2	9.9
	High Density	282	846.0	0.7	
Blackwattle Bay	Office	240,000	24,000.0	19.2	21.5
	High Density	965	2,895.0	2.3	
Tumbalong Park	Office	120,000	12,000.0	9.6	11.9
	High Density	965	2,895.0	2.3	
Wentworth Park	Office	53,000	5,300.0	4.2	5.5
	High Density	524	1,572.0	1.3	
Ultimo	Office	362,000	36,200.0	29.0	31.6
	High Density	1,106	3,318.0	2.7	
Total			108,285.0	86.6	86.6

6 Gas

6.1 Existing Infrastructure

Natural gas is supplied to the study area by Jemena via a combination of high pressure and reticulation mains. GIS data of the existing gas network was provided to IDC by Jemena. Jemena have indicated that there are no trunk assets located within the study area. All Jemena assets are for distribution purposes.

High pressure secondary gas mains (1050kPa) are located in Pirrama Road, Gipps Street, Harris Street, Miller Street, Bowman Street and Bunn Street. Distribution mains (210kPa) are located in most other streets. The existing gas infrastructure within the study area is shown in Figure 8.

6.1 Stakeholder Engagement

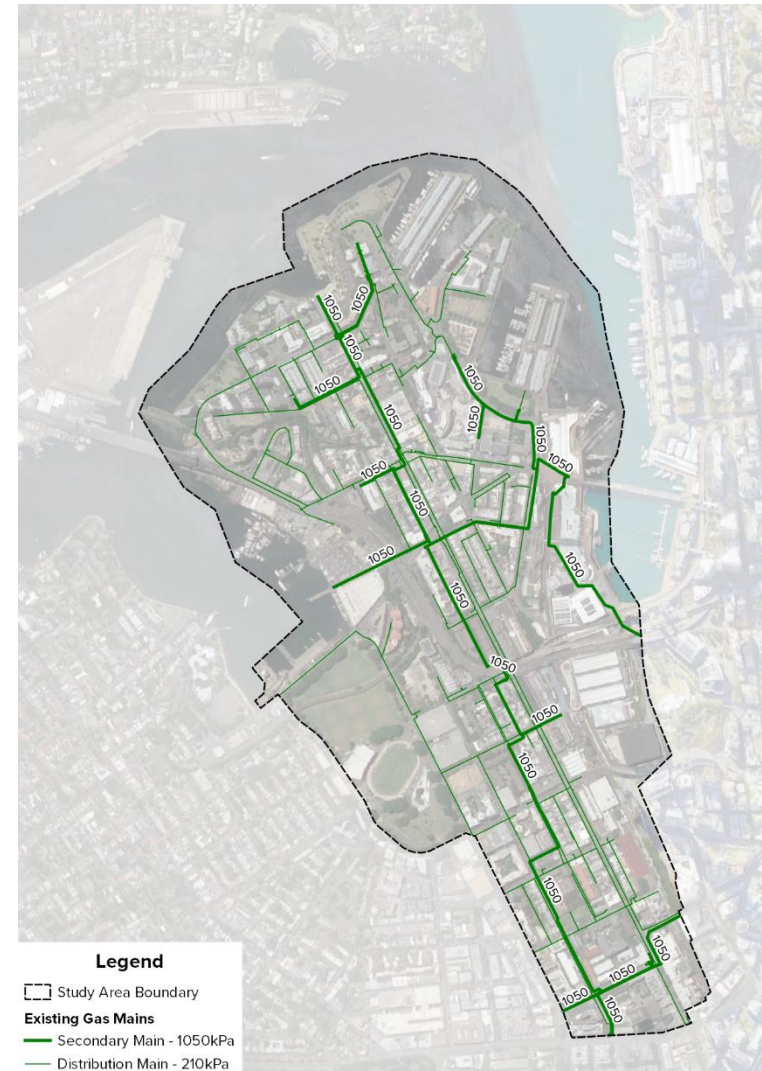
IDC held a meeting with Jemena on 16th June 2020 to discuss the Pyrmont Peninsula project. The purpose of the meeting was to introduce the project, discuss existing infrastructure within the study area and determine existing capacity issues and planned projects. Jemena indicated that there are not planned major works to existing assets within the study area.

6.1 Proposed Network

IDC anticipate that there will be little demand for gas infrastructure generated by the proposed non-residential development. Moderate demand can be expected from new residential development within the study area. Jemena will support the demand generated by residential development as required.

The growth scenarios have been provided to Jemena for comment and assessment. This section will be updated upon receipt of Jemena advice.

Figure 8 - Existing Gas Infrastructure



Source: GIS data provided by Jemena (5/6/20)

7 Telecommunications

7.1 Existing Infrastructure

Telecommunications servicing in the study area is provided by a number of service providers. The following providers own or operate assets in the study area:

- Telstra
- NBN Co.
- Optus
- AAPT
- AARNet
- Nextgen
- Primus
- TPG
- Verizon

Dial Before You Dig (DBYD) plans indicate that underground assets are located within the verge of most streets in the study area.

These assets include fibre optic cables. This infrastructure can be challenging to relocate and may incur additional costs and time delays to projects. Where possible, relocation of fibre optic assets should be avoided.

7.2 Stakeholder Engagement

NBN Co.

A telephone discussion was held with NBN Co. on 1st July 2020 to discuss the Pymont Peninsula project.

NBN Co. have indicated that they are responsible for the provision of telecommunications infrastructure for all new developments.

Telstra

A telephone discussion was held with Telstra on 16th June 2020 to discuss the Pymont Peninsula project. The purpose of the discussion was to introduce the project, discuss existing infrastructure within the study area and determine existing capacity issues and planned projects within the area.

Telstra indicated that there are no planned fibre optic projects in the study area that would pose a constraint to development.

As NBN Co. are responsible for ensuring all new development can be serviced with telecommunications infrastructure, Telstra's network deployment is based on commercial feasibility.

Once specific development sites have been identified, Telstra can assess the servicing

requirements and advise of any likely network impacts resulting from the development.

7.3 Proposed Network

Based on IDC's discussions with NBN Co. and Telstra, it is understood that future development within the study area will be provided with telecommunications infrastructure by NBN Co.

NBN Co. are responsible for providing infrastructure capacity as needed. Services will be provided wherever requests for connection are made and developments have the capacity to pay for the service. In addition, NBN Co. have advised that telecommunication exchanges can be upgraded to provide additional bandwidth as required. The provision of telecommunications infrastructure is therefore not expected to pose a constraint to development.

NBN Co. policy includes connection fees of \$600 and \$400 for single dwelling units and multi dwelling units respectively.

8 Next Steps

This report outlines the existing utilities infrastructure within the study area and provides a high-level assessment of the likely impacts of the proposed development on the utilities networks.

This report will be updated to include authority feedback and recommendations and more detailed analysis of the development impacts when more detailed information regarding floorspace distributions is available.