Macquarie Park Innovation Precinct – Utilities Report

05 October 2023

Macquarie Park Innovation Precinct – Utilities Report

07/07/2023

Our Ref:

30157553

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1	25/05/2023	Draft for review	DK, CL, SP, CN	GI
2	07/07/2023	DPE Comment Update	AH	DK
3	10/07/2023	DPE Comment Update 2	AH	DK
4	05/10/2023	Revised Yield Schedule	AH	DK

Contents

Appendices

Acronyms and Abbreviations

Acronym	Definition
MPIP / MPID	Macquarie Park Innovation Precinct or District
DPE	Department of Planning and Environment
SISA	Strategic Infrastructure and Services Assessment
BYDA	Before You Dig Australia
WWTP	Waste Water Treatment Plant (for producing recycled water)
GFA	Gross Floor Area

Executive Summary

The Department of Planning and Environment (DPE) is seeking to rezone land within Macquarie Park Innovation Precinct (MPIP) predominantly directly owned, tenanted and controlled (and thus potentially re-developed) by parties other than NSW Government or a principal Master Developer.

Purpose of Report: Arcadis has been engaged by DPE to prepare this report for the utility infrastructure required to facilitate this rezoning as well as to meet the social and recreational needs of the community.

Objectives of Report: This report intends to identify and assess the existing utility services constraints, opportunities, key issues and network capacity to service the MPIP and identifies any augmentation and servicing options to support the proposal.

Work Completed to date: This report is in line with MPIP's Place Strategy (August 2022) and the recommendations outlined in the Strategic Infrastructure and Services Assessment (SISA) (September 2022).

Key Findings: Initial investigations indicate that connections to the existing networks can be made and may require local amplifications to potable water, wastewater, communications and electrical delivery systems to service increased demand from the development. Options for recycled water is also discussed.

This Report considers utility demands across both traditional Business as Usual (BAU) Municipal supply and alternative precinct approaches including evolution for the above noted factors from the previously developed SISA Report.

The rezoning in relation to non NSW Government controlled development land provides two primary considerations/ approaches for influencing utilities approach:

1. **Large redevelopment opportunities** within the precinct, including inter alia conversions of existing commercial to residential uses. These 'sub-precincts' would be influenced by the planning instrument currently under development thus opportunities to implement sub-precinct alternate approaches (centralised heating/ cooling and wastewater treatment) could be considered (although currently not within the planning mandate).
2. **Existing operating assets** where the buildings have existing utility supplies. It would be problematic commercially, technically and from a regulatory/ governance perspective to implement an alternate utility approach without requiring substantial reconfiguration of existing building services systems and the associated significant cost and operational impact.

Sustainability Consideration: In Developing this Report it is noted that emerging sustainability, market driven and policy trends around precinct infrastructure are leading to a reconsideration of precinct utilities approaches. Namely:

- Decarbonisation and Net Zero aspirations are pushing overall energy mixes from natural gas towards entirely electrified precincts
- Centralised energy (cooing, heating etc.) and water networks are being mandated and implemented on more and more equivalent scale precincts in Sydney and throughout Australia
- Adoption of EV charging requirements and transition is driving changes to electrical demands, through both a peak and annual usage perspective

This report has been assessed against the sustainability design guidance prepared as part of the MPIP Stage 1 Neighbourhoods – Design Guide.

1 Introduction

The MPIP is a 350-hectare area approximately 10km northwest of Sydney CBD. It stretches from Macquarie University to the north and extends south to North Ryde Metro Station. The area is bound by Epping Road, Delhi Road, M2 Motorway and Vimiera Road. It is adjacent to the Lane Cove National Park and includes three railway stations (Macquarie University, Macquarie Park, and North Ryde).

DPE, alongside City of Ryde Council, the Greater Cities Commission (GCC), Transport for NSW and State agencies, is investigating a 170-hectare area (refer to Figure below) to include a business park and commercial core. This area has not been rezoned and is the subject of a master planning process to facilitate potential future rezonings. Future growth of the precinct will focus on education, healthcare, medtech, health and biomedical sciences, advanced manufacturing and digital & telecommunications.

The North Ryde Station Activation Precinct Macquarie University (Herring Road) Urban Activation Precinct were rezoned in 2013 and 2015 respectively.

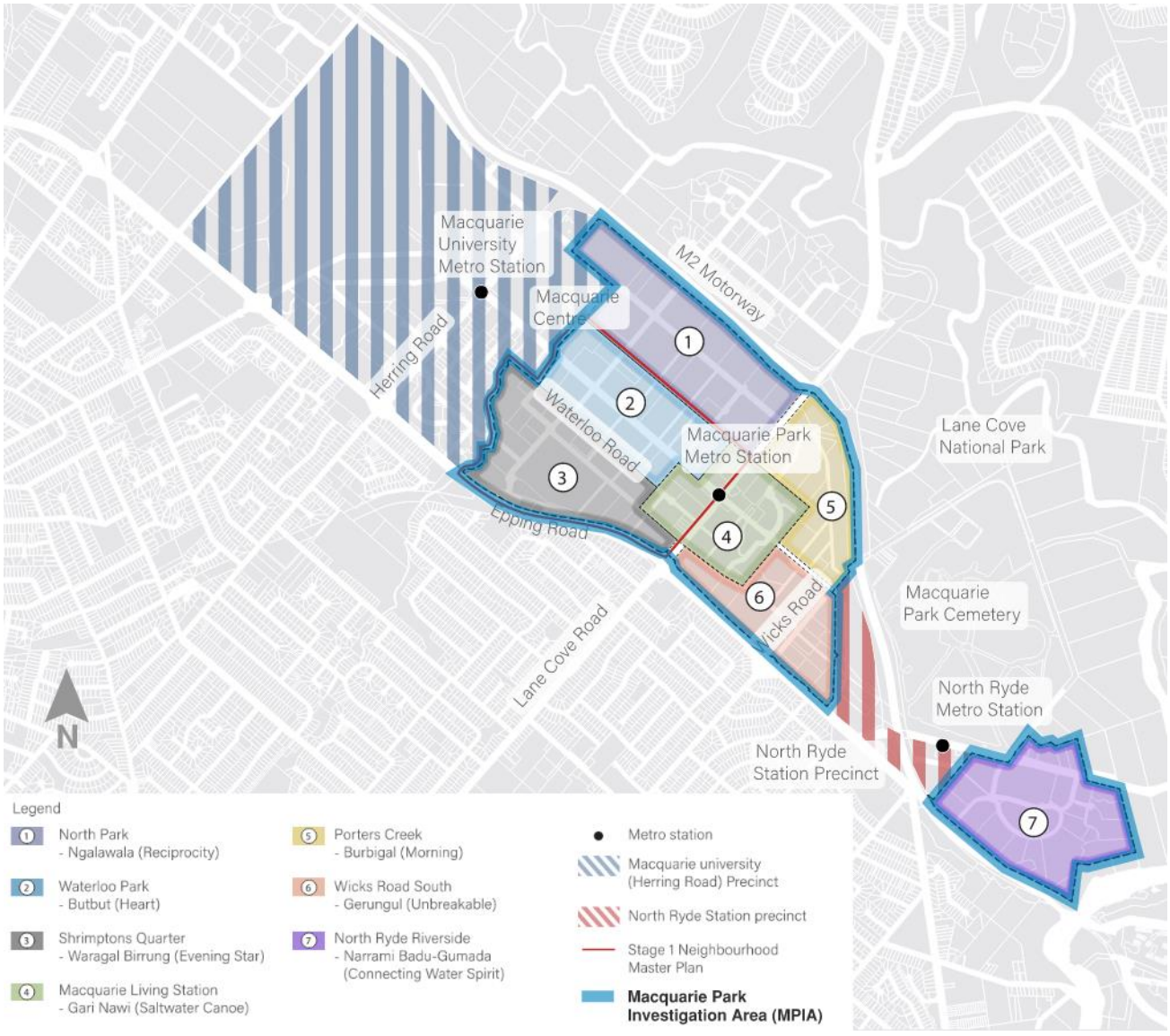


Figure 1: MPIP Map with the 7 Proposed Neighbourhoods

2 Sustainability Initiatives

Sustainability initiatives have the potential to improve the energy and resource efficiencies of the existing Precinct as well as changing the manner in which both energy and water are sourced and used. The following are key utility scale sustainability initiatives to be considered for further investigation and assessment:

- Centralised electricity generation and distribution through measures including solar plant, waste to energy, grid battery type plant, etc. with dedicated sites for implementation
- Centralised district heating and cooling plant and networks to service buildings within the precinct
- Wastewater treatment plant and recycled water network

The primary challenge in the implementation of centralised networks in Macquarie Park is that, unless mandated through planning instruments it may be challenging to develop a positive business case for the implementation of precinct infrastructure without a degree of subsidy.

This challenge is resultant from a large component of the precinct having been already developed and potentially incurring significant retrofit costs to systems to adopt to measures like district heating, cooling and recycled water. With new redevelopment sites this barrier is significantly lower.

Measures for sustainability initiatives are further outlined and detailed in the MPIP Stage 1 Neighbourhoods – Design Guide. Further each section herein outlines both Business-as-usual (BAU) solutions for utilities and considerations for integrated precinct measures that could drive more effective sustainability outcomes.

3 Utilities and Infrastructure Services

3.1 General

There are a number of significant utilities running through and around the Precinct which require further coordination, protection and potential modification.

Arcadis has investigated the in-ground utilities and services located in the vicinity of the development site. As part of these investigations Arcadis has completed a Before You Dig Australia (BYDA) review. The following sections summarise the findings of these investigations. The responses to our DBYD enquiry have been included in Appendix A.

Future services connections to the site will depend on extent and type of development, yield and service requirements. A preliminary calculation based on the Reference Master Plan has been undertaken to forecast services demands and assist in identifying any required augmentation to existing infrastructure. The calculations are based on the MPIP Indicative Area Schedule (rev. E) dated 23 June 2023:

Indicative Floor Space Yield Summary	**Test-Fit Scenario 1 (Sqm GFA)**	**Test-fit Scenario 2 (Sqm GFA)**
Data Centre, existing assumed retained	10,390	10,390
Hotel, existing assumed retained	15,434	15,434
Office, existing assumed retained	424,888	424,888
Office, current approvals assumed delivered	258,755	200,970
Office, current proposals assumed delivered	31,190	31,190
Commercial, proposed in test-fit	784,051	148,694
Community, proposed in test-fit	5,300	5,300
Residential, proposed in test-fit	272,589	954,678

Note that the floor space figures above are based on two test-fit scenarios prepared by AJC Architects. Figures are not intended to reflect the maximum floor space area if all sites were redeveloped to their full capacity. Figures may differ from final test-fits exhibited.

GFA's discussed above are provided for the purpose of assessing the feasibility and required utility infrastructure upgrades and are subject to change as part of regular design development. The Reference Master Plan has made sufficient spatial allowance for the utility service infrastructure.

Arcadis has completed a high-level assessment of the estimated loads required for the allocation of the services to the proposed development. These are explained in the demand assessments below.

3.2 Potable Water

3.2.1 Background and Existing Assets

The SISA states that Sydney Water is responsible for the delivery of water management across the project site. The area is serviced by the Marsfield and Chatswood reservoirs within the Ryde water delivery system. The supply to the area is mostly sourced from the Marsfield reservoir, except for the North Ryde Riverside neighbourhood, which is supplied by the Chatswood reservoir.

The water source for the Ryde delivery system is the Prospect Water Filtration Plant via the Ryde Water Pumping Station at West Ryde.

Based on the BYDA information, there are several Sydney Water potable water assets laid within the site with sizes ranging from DN100-DN250. Two major trunk mains DN1200 SCL cross the site through Khartoum Streeet.

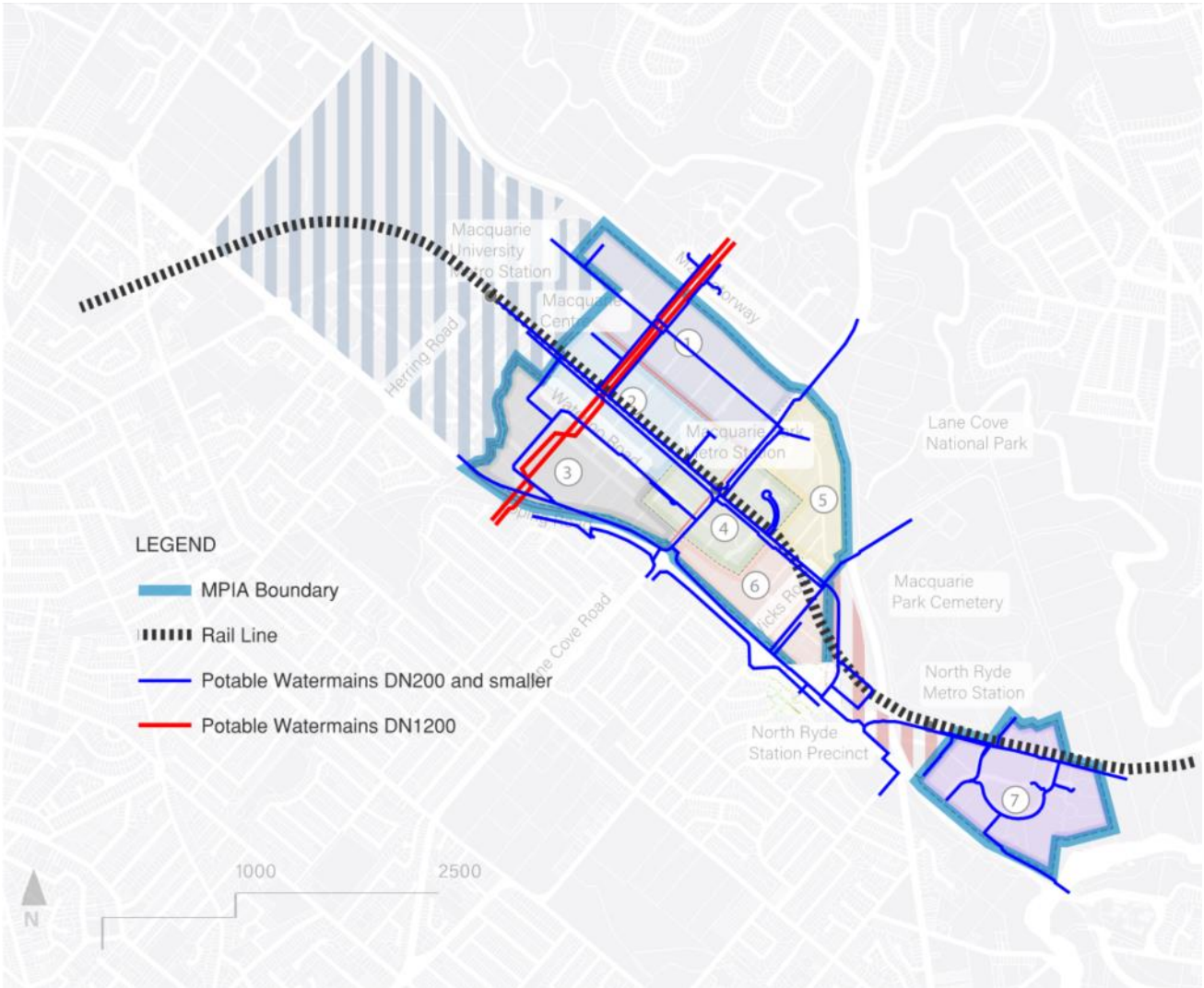


Figure 2: Existing Sydney Water Potable Watermains

3.2.2 Demand Assessment

The calculated potable water daily demand estimate for the Precinct is **3,218 kL/day** for Test Fit Scenario 1 and **3,976 kL/day** for Test Fit Scenario 2, based upon the following assumptions:

- Conversion rate of 2.79 EP's per ET
- ETs taken from Section 64 determination of ET Guidelines - Water directorate WASA/NSW refer section 7-10 April 2017 revision
- Using 230KL/EP/a = 225L/p/d for potable for an EP (230KL/EP/a average water consumption is based on average residential consumption. This information has been extracted from Section 64 Determinations of Equivalent Tenements Guidelines document)
- Water Supply Code of Australia utilised for demands by occupancy types
- MWH/PB Flow Study Report utilised for demands by occupancy types
- Sydney Water Commissioned Water Usage Survey Data utilised for demands by occupancy types
- Potable water conservative diversity = 20% diversity

3.2.3 Potential Sustainability Initiatives

Improvements in the overall use (reduction) of potable water are to be driven through the following mechanisms:

- Improvement building performance through the implementation of water efficiency measures as detailed within the 'Water Quality, Flooding and Stormwater' Section of the MPIP Stage 1 Neighbourhoods – Design Guide
- Provision of recycled water network to reduce overall potable water demand (refer next section).

3.2.4 Augmentation and Servicing Options

The following points are noted in the SISA regarding system augmentation:

- The funding source for Sydney Water's infrastructure is the customer base within Sydney Water's area of operations.
- Pipelines in the MPC are underground and do not require easements due to their small diameter.
- The Marsfield reservoir which services the area with drinking water is located south west of the MPC. An additional reservoir would be needed to service growth and would occupy approximately 2,000 square metres of land within the existing site.
- Underground wet weather storages connecting to the wastewater system would also need to be installed.

3.2.5 Approvals and Next Steps

Any modifications to existing services or new water connections will require further investigation. Arcadis recommends that a Feasibility Application is lodged with Sydney Water to confirm viable servicing options. More detail on engagement with Sydney Water is provided in Section 3.3.

3.3 Recycled Water

3.3.1 Background and Existing Assets

Sydney Water recycled water network and infrastructure do not currently exist wihtin the precinct.

The following points are noted in the SISA regarding system augmentation:

- A precinct-based recycled water scheme in the area was investigated by Sydney Water. Sydney Water are currently in discussions with DPE and the design team (AJC and Arcadis). The assessment of financial viability and funding mechanism is still in progress and needs to be finalised prior to any commitment. A clear mandate for new developments to provide a 'third pipe' reticulated recycled water service is required to support the delivery of the scheme and needs to be decided once the

financial viability is finalised. A collaborative approach is needed for this to be implemented successfully.

- The estimated costs are high level based on options assessment and will need to be further developed based on detailed designs.

Further discussions are underway with Sydney Water regarding the provision of a recycled water plant and network within MPIP with a view to aligning an approach to suit the wider masterplan spatial planning and sustainability aspiration.

3.3.2 Demand Assessment

The recycled water daily demand estimate of **965 kL/day** for Test Fit Scenario 1 and **1,193 kL/day** for Test Fit Scenario 2 is based on the following assumptions:

- Recycled water volume = 30% of potable
- Water Supply Code of Australia utilised for demands by occupancy types
- MWH/PB Flow Study Report utilised for demands by occupancy types
- Sydney Water Commissioned Water Usage Survey Data utilised for demands by occupancy types
- Recycled water conservative diversity of 20%

3.3.3 Potential Sustainability Initiatives

Increased recycled water usage within the precinct will reduce potable water requirements and encourage circular economy considerations.

Engagement with Sydney Water will determine appropriate locations for centralised treatment infrastructure and mechanisms to embed third pipe infrastructure as part of the wider precinct improvements to mitigate the cost of implementation. From early discussions, appropriate locations have been reviewed, with one option below now the current consideration.

Figure 3: Potential location of centralised Wastewater Treatment Plant

3.3.4 Approvals and Next Steps

Discussions have commenced and will continue with Sydney Water to determine an optimal implementation approach for a Wastewater Treatment Plant (WWTP) and associated recycled water network. The next steps for engagement will be confirming the location of plant (as illustrated above), then developing a business case (by Sydney Water) and asset structure to determine responsibility for ownership and operations.

3.4 Sewer

3.4.1 Background and Existing Assets

The SISA notes:

- The development is serviced by the Lane Cove wastewater system. Wastewater from the Lane Cove catchment is transferred by gravity and treated at the North Head wastewater treatment plant in Manly. Treated wastewater is discharged to the ocean.
- The wastewater network has capacity to satisfy dry weather performance requirements, except for at one location, where an existing main is proposed for amplification.
- The network has capacity limitations and cannot satisfy wet weather performance requirements. To address this issue, Sydney Water is implementing source control works as part of the wet weather overflow abatement program, which will include installation of a wet weather storage tank.

Based on the BYDA information, Sydney Water sewer assets laid within the site range from DN225-DN300. A DN600 sewer runs adjacent Shrimptons Creek along the northwest boundary of the Macquarie Park Investigation Area. A box culvert 1000m x 1600m (unlined rock, depth unknown) crosses southeast of the site.

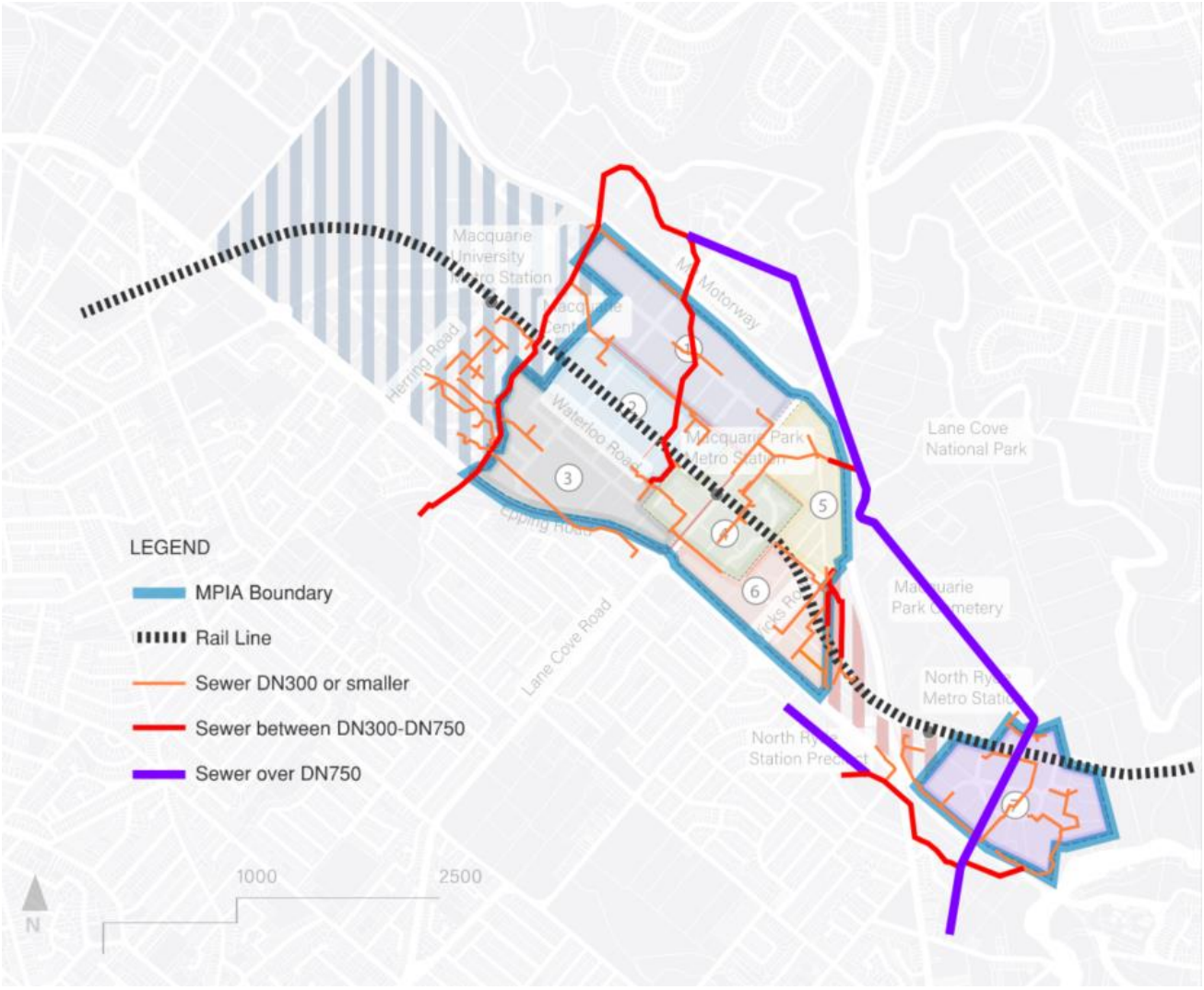


Figure 4: Existing Sydney Water Sewer Mains

3.4.2 Demand Assessment

The sewer daily demand estimate of **2,574 kL/day** for Test Fit Scenario 1 and **3,181 kL/day** for Test Fit Scenario 2 is based on the following assumptions:

- Sewer based on 80% conversion of Potable water demands being normal practice
- Using Conversion of 2.79 EP's per ET
- ETs taken from Section 64 determination of ET Guidelines - Water directorate WASA/NSW refer section 7-10 April 2017 revison
- Using 230KL/EP/a = 225L/p/d for potable, times 80% gives sewer EP
- Water Supply Code of Australia (WSA) utilised for demands by occupancy types
- MWH/PB Flow Study Report utilised for demands by occupancy types
- Sydney Water Commissioned Water Usage Survey Data utilised for demands by occupancy types

3.4.3 Potential Ecological Sustainable Development (ESD) Initiative

ESD initiatives are outlined in the previous section. Please refer to section 3.3.3

3.4.4 Approvals and Next Steps

Any modifications to existing sewer service will require further investigation. Arcadis recommends that a Feasibility Application is lodged with Sydney Water to confirm viable servicing options. Engagement with Sydney Water is ongoing to determine the potential interface between the sewer, WWTP and recycled water networks. The spatial configuration of the proposed sewer network are unlikely to impact the masterplan. The final configuration will be determined following the business case of the new WWTP being undertaken by Sydney Water, refer Section 3.3.3 and 3.3.4.

3.5 Electrical

3.5.1 Background and Existing Assets

Ausgrid provide electrical services to the existing MPIP development site with high voltage underground cables and substations surrounding and crossing the site. Their network runs along Herring Road, Waterloo Road, Epping Road, and Talavera Road. There is combination of residential and commercial sites powered within the existing MPIP development site.

The existing Ausgrid electrical infrastructure, in the vicinity of the site, has been identified based on Before you Dig Australia (BYDA) and Ausgrid's Geographic Information System (GIS), as shown in Figure 5.

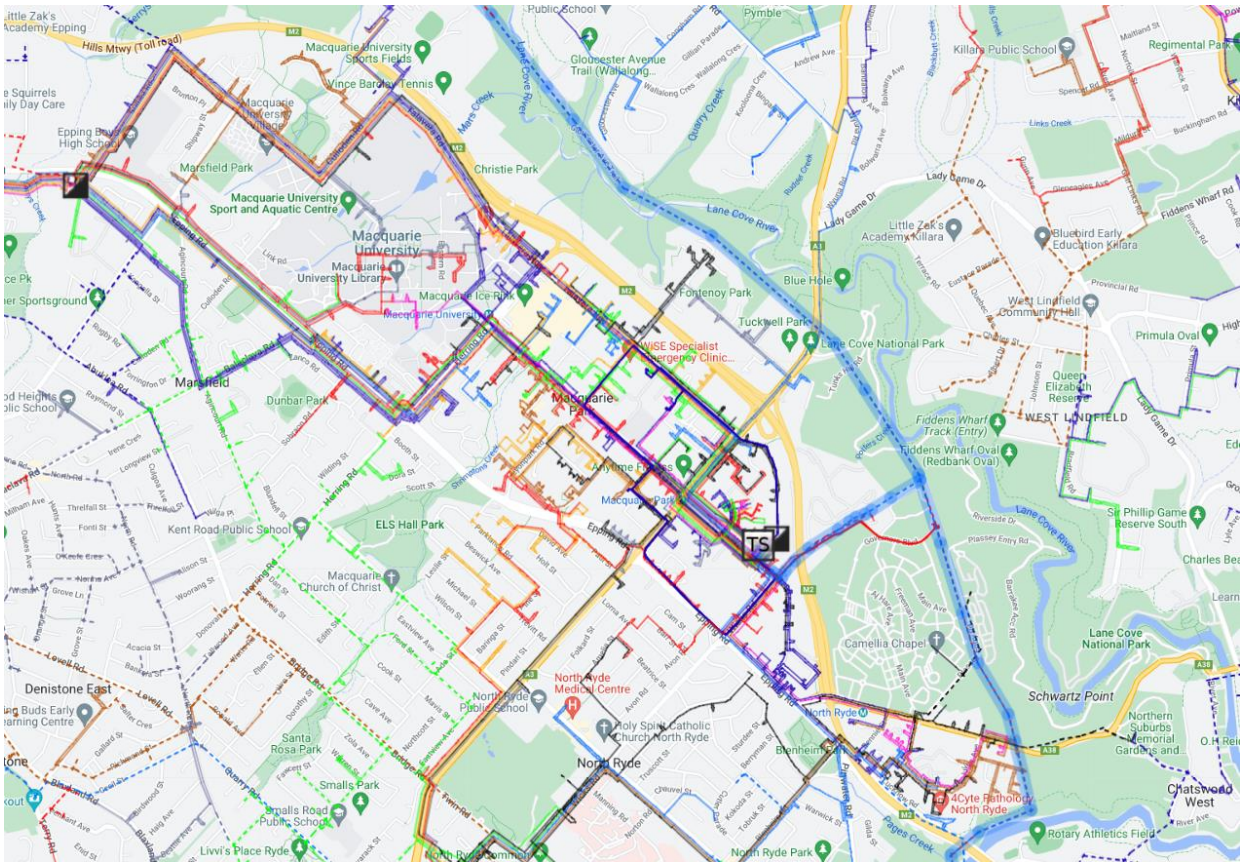


Figure 5: Existing Ausgrid Network

The MPIP is situated between multiple Ausgrid High Voltage (HV) Feeders and an Ausgrid Zone and Transmission substation, as shown in Figure 6.

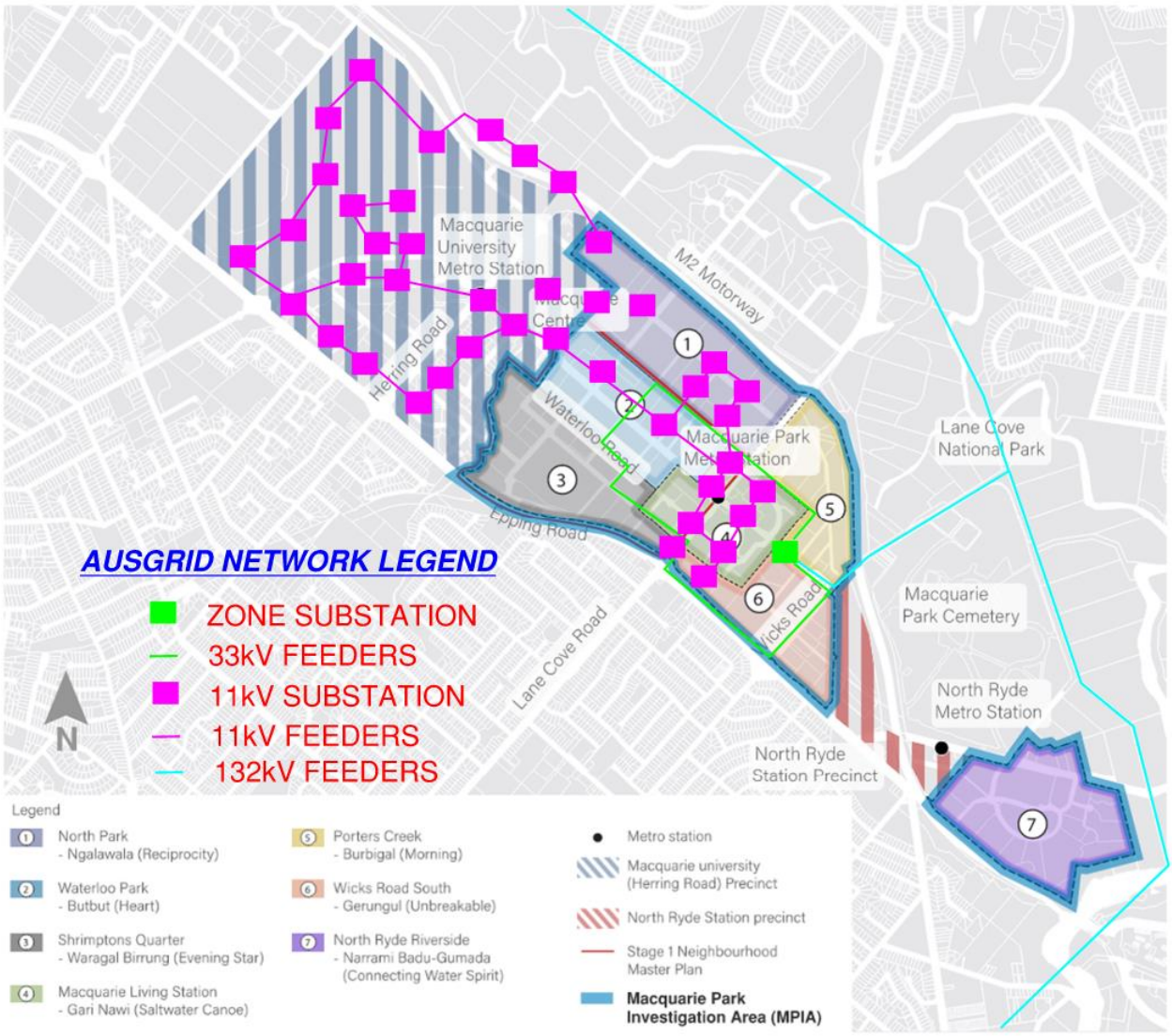


Figure 6: Existing Ausgrid Substation Locations

3.5.2 Demand Assessment

An assessment of the estimated increase in electrical demand, generated from the MPIP development yield schedule from AJC, has been conducted to determine the required infrastructure upgrades. Individual project areas have been based on the average number of dwellings and proposed GFA for retail and commercial development.

Electrical demands are based on Ausgrid's After Diversity Maximum Daily (ADMD) for Underground Residential Developments and Ausgrid's Demand Method for Non-Domestic Installations (AS3000 Table C3). Please refer to Table 1 and Table 2 below.

Table 1: Ausgrid's Demand Method for Underground Residential Development Installations

Area	ADMD Value
Upper Hunter	5.0kVA
Hunter	3.5kVA
Central Coast	3.5kVA
Sydney – North	3.5kVA
Sydney - South	3.5kVA

Table 2: Ausgrid's Demand Method for Non-Domestic Installations (AS3000 Table C3)

Type of Development		Range VA/m²	Average VA/m²
Offices -	- Not air-conditioned - air-conditioned - cooling only	40-60 70-100	50 85
	- reverse cycle - electrical reheat open areas - electrical reheat zonal or package units - variable volume	60-90 80-120 90-130 60-80	75 100 110 70
Car parking	- open air - ventilated	0-10 10-20	5 15
Warehousing	- unventilated - ventilated	5-15 10-20	10 15
Shops	- Not air-conditioned - air conditioned	40-100 60-140	70 100
Shopping centres (assumed air-conditioned shops)	- Not air-conditioned public areas - air conditioned public areas	60-140 80-160	100 120
Industrial	- light - if ventilated add - if air-conditioned add (see note)	10-20 10-20 30-50	15 15 40
Theatres, halls, etc	- ventilated - air-conditioned	50-70 80-120	60 100
Hotels, Taverns, Restaurants (Residential section, use Annexure C)		60-100	80

The following load ranges were adopted based on a combination of defined unit rates from Ausgrid, AS3000 and past Arcadis experience with building developments in Table 3 below. The rates from Ausgrid are assumed to be inclusive of diversity while the AS3000 rates are assumed not to include diversity.

Table 3: Adopted Maximum Demand Unit Rates

Electrical Loads	Unit	kVA/unit	Diversity Factor	kVA/unit (including Diversity Factor)	Source
Hotel	m²	0.25	0.8	0.20	*Ausgrid's Demand Method for Non-Domestic Installations*

Data Centre	m^2	0.1	0.8	0.08	*AS3000 Table C3*
Retail	m^2	0.25	0.8	0.20	*Assumed Value*
Community	m^2	0.1	0.8	0.08	*AS3000 Table C3*
Residential	m^2	0.1	0.8	0.08	*AS3000 Table C3*
Commercial	m^2	0.1	0.8	0.08	*AS3000 Table C3*

3.5.3 Potential Sustainability Initiatives

Investigations into alternative energy sources, building electrification and on-site generation are being considered for the MPIP development.

The sustainability initiatives affecting the electrical demand which have currently been investigated and are proposed for implementation for the MPIP development (through the 'Greenhouse Gas Emissions and Energy' Section of the MPIP Stage 1 Neighbourhoods – Design Guide Design Guide) include:

1. The elimination of gas supply to reduce dependence on fossil fuels.
2. On-site energy generation (façade PV, wind turbines)
3. Building orientation
4. Centralised heat extraction system
5. Passive designs such as:
    - External Sunshades
    - Efficient Façade/fabric,
    - Natural ventilation
    - Natural glazing

The sustainability initiative of building electrification involves the removal of fossil fuels for the use of space/water heating, cooking, and power generation. The removal of gas has already been requested for the MPIP development, with the impact on the maximum electrical demand calculated in Sections 3.5.2 and 3.5.3. Short term increase in the project carbon emissions due to the elimination of gas can be brought down through renewable power purchases and the transformation of the grid. As well as the implementation of the above sustainability initiatives, the following emerging technologies/techniques are recommended for further investigation for the possible reduction of the MPIP development electrical demand:

1. The use of building integrated photovoltaics for solar power generation from the façade.
2. Hydrogen fuel cell energy storage technology to produce electricity and an associated investigation into the use of “Green hydrogen” produced by using solar/wind electricity.
3. The use of B5 and B20 biodiesel for standby power generation.

3.5.4 Augmentation and Servicing Options

Arcadis have completed a desktop review of the existing infrastructure using Ausgrid’s Geographic Information System (GIS). There is a new major zone substation (ZN08000) located along Waterloo Road, Macquarie Park that currently feeds the proposed MPIP and surrounding area.

Figure 7: Existing Ausgrid Zone Substation ZN08000 Macquarie Park

Ausgrid have noted that the above referenced new major substation will cater for data centres and provides information to inform roadway and easement planning on the south-western side of Waterloo Road.

Additionally, Ausgrid notes that another suitably sized and located site is required an additional substation, likely on the western side of Waterloo Road, near the university precinct.

The development is in the Carlingford network area of Ausgrid's electricity supply network. It contains significant commercial load arising from key areas including Macquarie University and the Macquarie Park commercial area.

Significant commercial development is expected to continue in this area and can drive very large electricity demand, especially data centres, many of which are in the area.

In addition to the significant commercial load, there is also significant residential load from high density areas including the Macquarie University (Herring Road) UAP, and the North Ryde Station UAP.

The network is supplied by two separate sub-transmission systems: a 66kV system connected to Endeavour Energy's Carlingford sub-transmission substation, and a 132kV system connected to Trans Grid's Sydney North Bulk Supply Point and Lane Cove Switching Station.

Ausgrid has two zone substations at Epping and Macquarie Park which distribute electricity to customers in the MPC. Delivery of an additional sub-transmission station, primarily to service large industrial electricity consumers, was recently completed at the existing Macquarie Park zone substation.

3.5.5 Approvals and Next Steps

Arcadis recommends that a formal application for connection is submitted to Ausgrid to confirm viable servicing options. This investigation would also provide advice on any amplification to the existing network that may be required, as well as the capacity of the current network. More information on making a formal application for connection to Ausgrid can be found here: https://www.ausgrid.com.au/Connections/Get-connected.

3.6 Gas

3.6.1 Background and Existing Assets

Jemena operates the existing gas infrastructure network within the MPIP precinct.

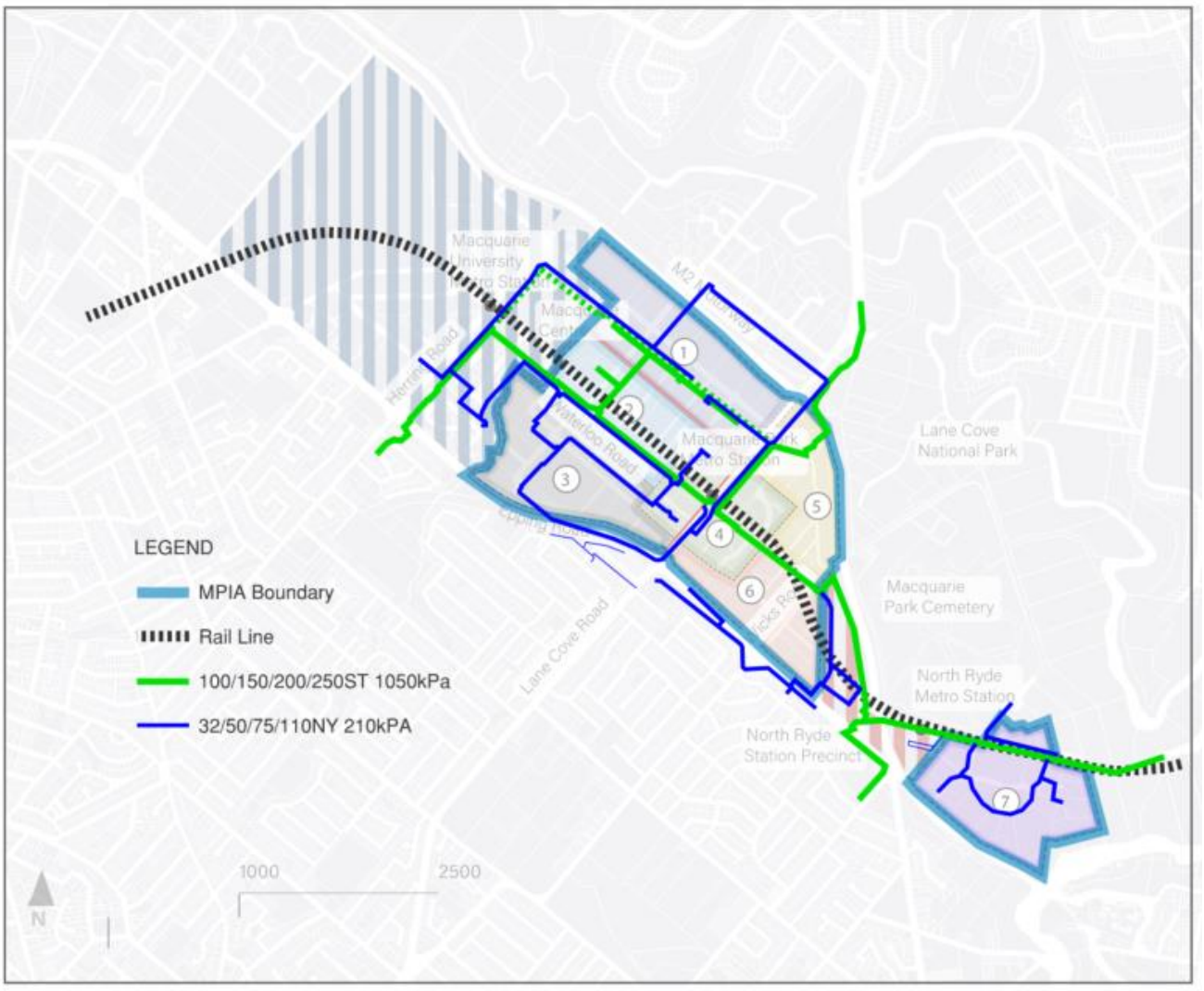


Figure 8: Existing Gas Infrastructure

3.6.2 Demand Assessment

As part of both mandated and market drivers, natural gas use is declining as non-industrial energy customers decarbonise or pursue net zero strategies. Arcadis have consequently not undertaken a demand assessment for natural gas usage within the precinct.

3.6.3 Potential Sustainability Initiatives

The 'Greenhouse Gas Emissions and Energy' Section of the MPIP Stage 1 Neighbourhoods – Design Guide requirements will support the shift away from natural gas through to electrification through measures including:

- Cooking equipment will be electrical. Existing gas appliances will be upgraded to electrical.

- Independent mechanical and/or district heating systems are proposed to utilise electric heat pump / heat recovery hot water to achieve the Net Zero 2035 carbon neutral targets through removal of fossil fuel energy sources.

3.6.4 Approvals and Next Steps

No proposed further steps are required in relation to gas networks.

3.7 Conclusion

The table below summarises the current recommendations and next steps required for each utility.

Table 4: Summary of recommendations and next steps

Utility	Key Recommendation	Next Steps
Potable Water	Utilise existing potable water supply infrastructure.	Lodge Feasibility Application with Sydney Water to confirm viable servicing options
Recycled Water	Develop local recycled water network to utilise water generated from WWTP	Continue engagement with Sydney Water and confirm the location of WWTP, develop a business case for asset.
Sewer	Continue to investigate option of centralised WWTP for precinct to service the site and generate recycled water.	Continue engagement with Sydney Water and confirm the location of WWTP, develop a business case for asset.
Electrical	Engage with Ausgrid and utilise their existing and planned infrastructure to service site demands.	Submit a formal application for connection to Ausgrid to confirm viable servicing options
Gas	Exclude gas from precinct to support sustainability aspirations	Exclude gas from precinct to support sustainability aspirations

Appendix A

BYDA Review (Subject Site)

A0

DBYD Address:
396 Lane Cove Road
Macquarie Park NSW 2113

DBYD Job No: 33868330

DBYD Sequence No: 222645406

SYDNEY WATER CORPORATION

Scale: 1:2000

Date of Production: 22/03/2023

Plan 1 of 5

N

0m 30m 60m 90m 120m 150m

A0

DBYD Address:
396 Lane Cove Road
Macquarie Park NSW 2113

DBYD Job No: 33868330

DBYD Sequence No: 222645406

SYDNEY WATER CORPORATION

Scale: 1:2000

Date of Production: 22/03/2023

Plan 2 of 5

0m 30m 60m 90m 120m 150m

A0

DBYD Address:
396 Lane Cove Road
Macquarie Park NSW 2113

DBYD Job No: 33868330

DBYD Sequence No: 222645406

SYDNEY WATER CORPORATION

Scale: 1:2000

Date of Production: 22/03/2023

Plan 3 of 5

0m 30m 60m 90m 120m 150m

A0

CLIFFORD LOVE BRIDGE

Contingency Plan Penbills Australia Limited, Lane Cove

Elevated GAS Levels in Sewer

DBYD Address:
396 Lane Cove Road
Macquarie Park NSW 2113

DBYD Job No: 33868330

DBYD Sequence No: 222645406

SYDNEY WATER CORPORATION

Scale: 1:2000

Date of Production: 22/03/2023

Plan 4 of 5

N

0m 30m 60m 90m 120m 150m

A0

DBYD Address:
396 Lane Cove Road
Macquarie Park NSW 2113

DBYD Job No: 33868330

DBYD Sequence No: 222645406

SYDNEY WATER CORPORATION

Scale: 1:2000

Date of Production: 22/03/2023

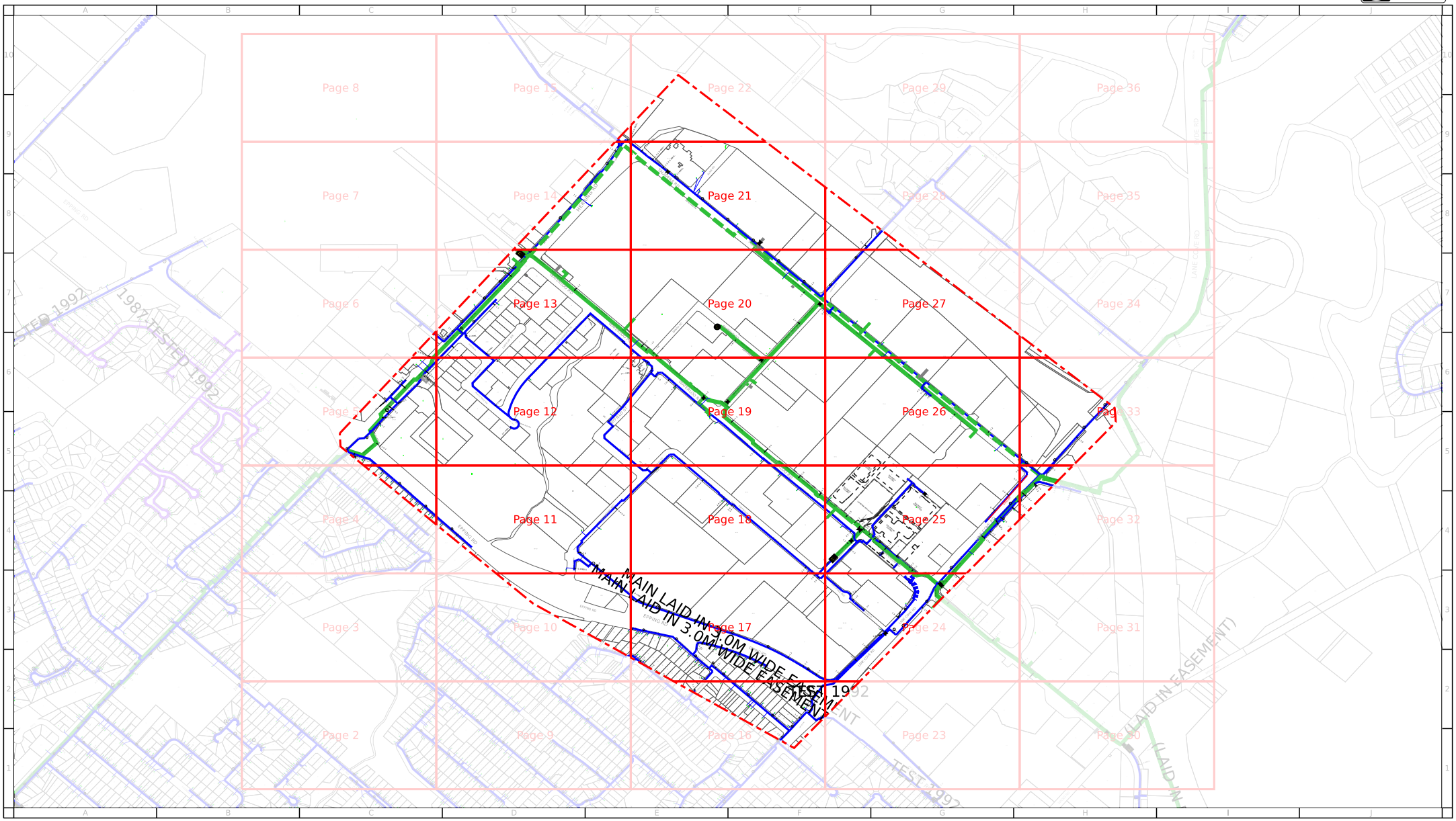
Plan 5 of 5

N

0m 30m 60m 90m 120m 150m

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 85-91r Waterloo Road Macquarie Park NSW, 2113



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

N W E S

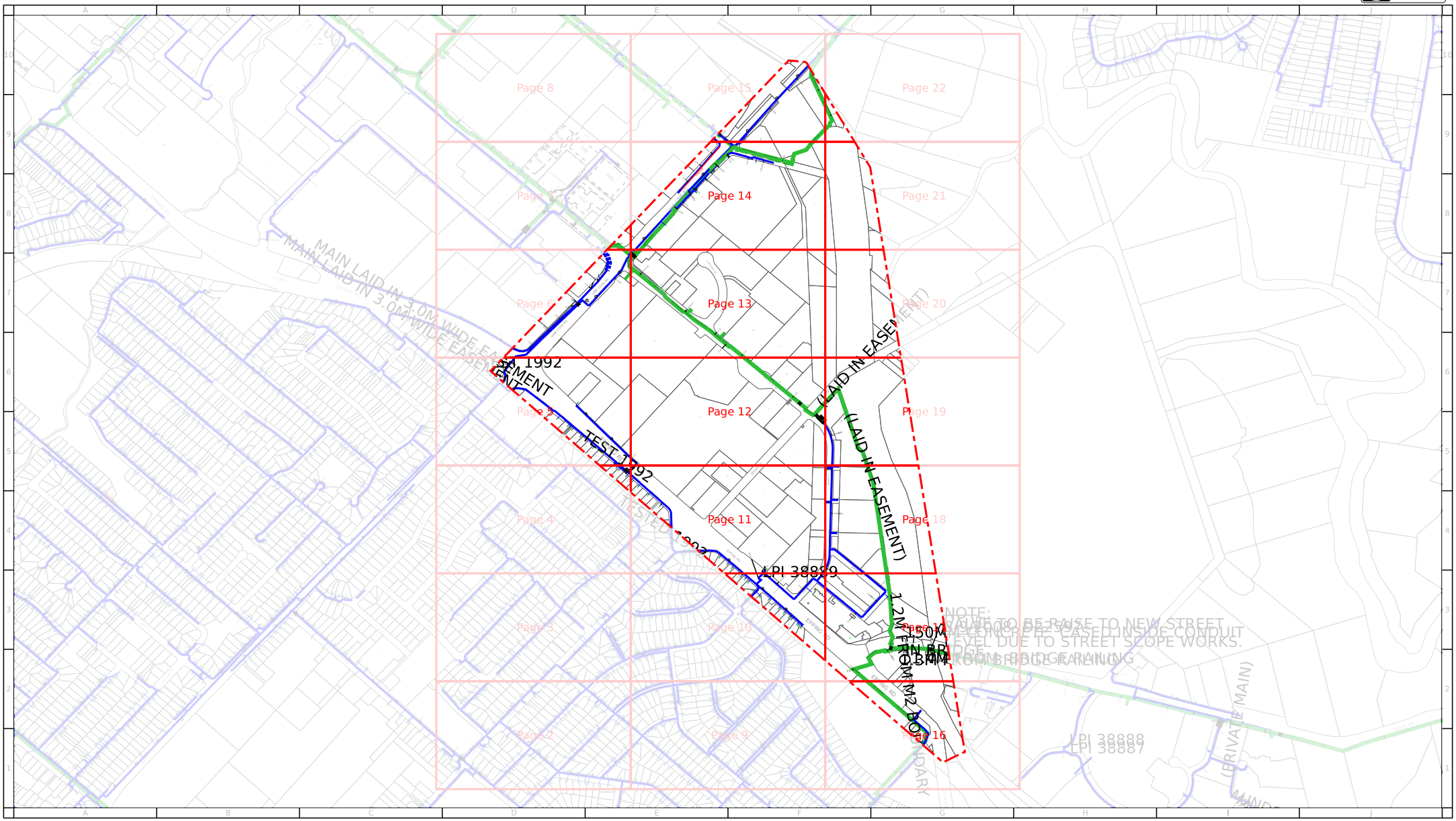
Scale: 1:14702

Issue Date: 06/07/2023
DBYD Seq No: 226729810
DBYD Job No: 34561529
Overview Page:

WARNING: This is a representation of Jemena Gas Networks underground assets only and may not indicate all assets in the area. It must not be used for the purpose of exact asset location in order to undertake any type of excavation. Please read all conditions and information on the attached information sheet. This extract is subject to those conditions.
The information contained on this plan is only valid for 28 days from the date of issue.

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 16 Waterloo Road Macquarie Park NSW, 2113



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

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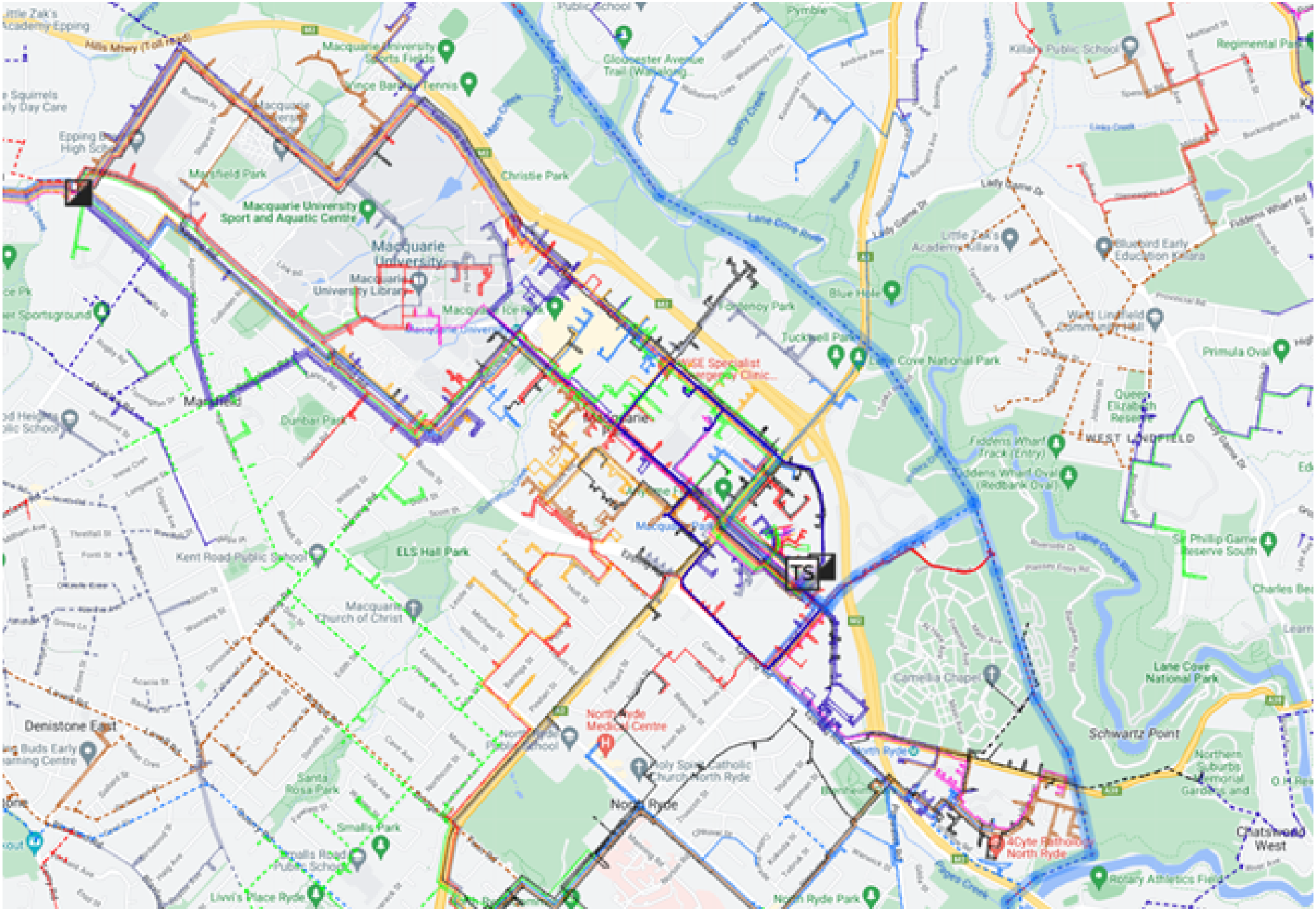
Scale: 1:14702

Issue Date: 06/07/2023
DBYD Seq No: 226729932
DBYD Job No: 34561547
Overview Page:


Macquarie University
Macquarie University Sport and Aquatic Centre
Christie Park
Mars Creek
Lane Cove River
Lane Cove National Park
Blue Hole
Tuckwell Park
Primula Oval
Fiddens Wharf Track (Entry)
Fiddens Wharf Oval (Redbank Oval)
WEST LINDFIELD
Queen Elizabeth Reserve
Dumbarton Park
ELS Hall Park
Kent Road Public School
Denistone East
Santa Rosa Park
Smalls Park
Lovell's Place Ryde
North Ryde
North Ryde Park
Schwartz Point
Camellia Chapel
Rotary Athletics Field
Chatswood West
TS

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