Western Parkland City Authority

Bradfield City Centre Master Plan Application

Utility Infrastructure and Servicing Report

Prepared by AECOM

October 2023

wpca.sydney

NSW GOVERNMENT

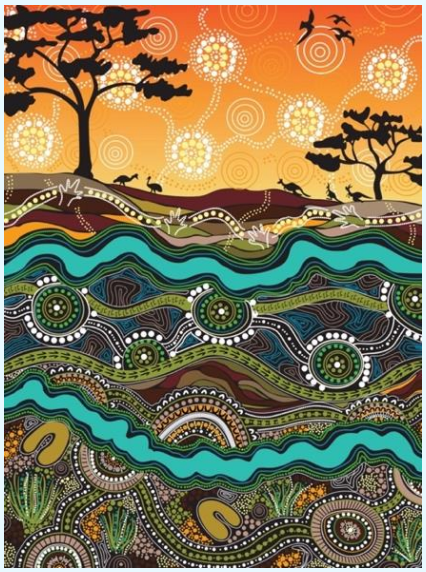
Acknowledgement of Country

Aboriginal people have had a continuous connection with the Country encompassed by the Western Parkland City (the Parkland City) from time immemorial. They have cared for Country and lived in deep alignment with this important landscape, sharing and practicing culture while using it as a space for movement and trade.

We Acknowledge that four groups have primary custodial care obligations for the area: Dharug/Darug, Dharawal/Tharawal, Gundungurra/Gundungara and Darkinjung. We also Acknowledge others who have passed through this Country for trade and care purposes: Coastal Sydney people, Wiradjuri and Yuin.

Western Sydney is home to the highest number of Aboriginal people in any region in Australia. Diverse, strong and connected Aboriginal communities have established their families in this area over generations, even if their connection to Country exists elsewhere. This offers an important opportunity for the future of the Parkland City.

Ensuring that Aboriginal communities, their culture and obligations for Country are considered and promoted will be vital for the future of the Parkland City. A unique opportunity exists to establish a platform for two-way knowledge sharing, to elevate Country and to learn from cultural practices that will create a truly unique and vibrant place for all.



Garungarung Murri Murri Nuru
(Beautiful Grass Country)
Artwork created by Dalmarri artists Jason Douglas and Trevor Eastwood for the Western Parkland City Authority

Version	Status	Date	Prepared By	Reviewer	Comments
6	Draft	14.03.22	Gwion Schiavone Anna Luong	Gijs Roeffen	
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Executive Summary

The new Bradfield City Centre is located within the Western Sydney Aerotropolis, complementing the metropolitan cluster of centres including Penrith, Liverpool and Campbelltown and will be a diverse, dynamic and sustainable global city precinct supporting a curfew free airport, delivering attractive places for workers, residents and visitors. It has the potential to deliver 50,000 – 60,000 jobs, leveraging the positive economic impact of the Western Sydney International (Nancy Bird Walton) Airport, creating Greater Sydney's next global gateway.

The Aerotropolis and surrounding state-significant projects are being developed by agencies like Sydney Metro, Transport for New South Wales (TfNSW), Local Government Areas (LGAs) and private infrastructure developments such as data centres have staggered programs, so it becomes critical to understand, coordinate and confirm the bulk utilities servicing strategy for the greater area and how that is delivered in Bradfield City Centre.

This Report compares the last two years of available and relevant planning advice and reports and the current data available around Bradfield City Centre. Furthermore, this Report reviews the currently available services and establishes expected future demand. Advice received through engagement with utility authorities has been included where relevant. Expected program is for the First Building to be opened in early 2024. The site will be close to the Aerotropolis Metro station with the intent for the site to be serviced by incumbent utility providers and regional servicing strategies. Temporary servicing and utilities may be required to service the site as an interim measure before permanent services are established by the utility authorities. Beyond 2026, received advice from utility authorities indicates that the Bradfield City Centre can be fully serviced via business as usual (BAU) processes, as the City Centre grows and evolves over the next 30 years.

Previous investigations and other utility reports indicate that local amplifications to potable and recycled water, wastewater, electrical and gas delivery systems will be required to service the increased demand in the Aerotropolis. It is noted that feasibility advice provided as part of Master Plan stakeholder engagement should be reviewed and updated as WPCA moves into the detailed design phase.

Indicative service loads are summarised below, which are provided to inform lead-in infrastructure requirements only and are subject to modification through design development and staging.

Demand calculations provide the following estimates based on a ±15% range in development yields:

- Potable water between **14,400 – 19,500 kL/day** (total demand reduced by Recycled Water uptake);
- Recycled water between **7,530 – 10,200 kL/day**;
- Wastewater between **230 – 310 L/s**;
- Electrical load between **172.41 – 233.26 MVA**; and
- Gas demand between **910,293 – 1,231,573 GJ/hour**.

Preliminary investigation on current utility servicing has been obtained from DBYD records and feasibility feedback from Utility Authorities. A summary of the anticipated upgrades has been provided below.

Table 1 - Summary of Required Service Upgrades

Utility Service	Potable Water	Recycled Water	Wastewater	Electrical	Gas***	Data and Telecoms
Utility Authority Asset	Sydney Water Corporation	Sydney Water Corporation	Sydney Water Corporation	Endeavour Energy	Jemena	NBN Co, Telstra, Opticomm, Vocus and others
Adequate Capacity for Proposed Development (2023)?*	Yes	No (temporary service for First Building only)	No (temporary service for First Building only)	Yes	No	Yes (Telstra only available)
Adequate Capacity for Proposed Development (2026+) with amplification?*	Yes	Yes	Yes	Yes	Yes	Yes
Proposed Works	Local network amplifications	Local network amplifications	Local network connections	Local network amplifications	Extension of secondary network	Local network connections
Funding	Sydney Water / WPCA	Sydney Water / WPCA	Sydney Water / WPCA	Endeavour Energy/WPCA	Jemena / WPCA	WPCA
Date of availability of major trunk infrastructure	FY2023-2024 for initial services	TBC**	FY 2025- 2026 for initial services	FY 2025- 2026 for initial services	TBC**	TBC**

*Current capacity and servicing requirements to be confirmed with relevant utility authority as a part of a supplementary feasibility application which considers maximum allowable yield. Refer to **Section 6.4** for limitations.

**To be confirmed after receipt of agency feedback

The most relevant utilities information available to AECOM has been compared, benchmarked and where possible, expanded on. This report states the next steps and provides the basis for those steps.

*** It is anticipated that ultimately there will be no or little gas servicing to the residential land usage in order to meet Net Zero Carbon by 2030. Where gas is required, this will be reserved for commercial/industrial uses that rely on gas servicing.

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Glossary of Terms

AS	Australian Standard
Aerotropolis	Western Sydney Aerotropolis
AWRC	Advanced Water Recycling Centre
BAU	Business As Usual
CIV	Capital Investment Value
DA	Development Application
DP	Deposited Plan
DPE	Department of Planning and Environment
EP&A Act	Environmental Planning and Assessment Act 1979
GFA	Gross Floor Area
IOP	Interim Operation Procedure
LCC	Liverpool City Council
LGA	Local Government Area
NSW Government	State Government for NSW
SEPP	State Environmental Planning Policy
SWGA	South West Growth Area
TfNSW	Transport for New South Wales
WPCA	Western Parkland City Authority
WWTP	Wastewater Treatment Plants

References

Ref	Title	Author	Date
1	*Initial Place-based Infrastructure Compact Area Technical Report*	Greater Sydney Commission	November 2020
2	*Distribution Annual Planning Report*	Endeavour Energy	2020
3	*Draft Aerotropolis Precinct Plan*		November 2020

1 Introduction

The Master Plan Application Report has been prepared in accordance with the State Environmental Planning Policy (Precincts – Western Parkland City) 2021 (Western Parkland City SEPP) and Master Plan Guidelines which establish the optional master planning process for land within the Western Sydney Aerotropolis.

1.1 Purpose of This Report

The Western Parkland City Authority (WPCA) has engaged AECOM to prepare a Current State and Demand Analysis Report to provide advice on infrastructure and utilities adjacent to and within the Aerotropolis to support the approval of a master plan for Bradfield in the Western Sydney Aerotropolis.

Specifically, the purpose of this report is to:

- Summarise the existing services infrastructure located within the Bradfield site
- Forecast and analysis of existing and committed utilities infrastructure to service projected demand;
- Advise on alignment or gaps across existing publicly available reports and planning opportunities and constraints; and
- Summarise next steps including supporting planning advice and authority engagements to confirm the findings outlined in this report.

This report considers the following services infrastructure:

- Potable Water;
- Wastewater;
- Recycled Water;
- Electrical;
- Gas; and
- Communications.

It should be noted that details of existing infrastructure found in this report are based on plan drawings and data provided by the relevant utility authorities and knowledge of surrounding developing projects. This information will need further confirmation through site investigations prior to the commencement of detailed design.

This report accompanies the Master Plan Application for the Bradfield City Centre submitted to the Department of Planning and Environment (DPE) pursuant to Chapter 4 Part 4.7 Division 2 of Western Parkland City SEPP.

The WPCA is seeking to secure a Master Plan approval for the Bradfield City Centre, which comprises of a 115-hectare site centred around a new Sydney Metro station.

Part 4.7 of the Western Parkland City SEPP sets out the statutory requirements for Master Plans in the Aerotropolis. In particular, Division 2, Section 4.41 of the Western Parkland City SEPP states that a Master Plan must:

a) *apply to an area of 100 hectares or more of contiguous land with at least 70% of the land owned by one*

person, and

b) *specify the particular development that may be carried out as complying development on the land to which the master plan applies, and*

c) *contain development controls for the complying development, and*

d) *contain the matters required by the master plan guidelines.*

The proposed Master Plan for mixed-use development of the Bradfield City Centre comprises industrial, commercial, residential uses, public open space and transport infrastructure surrounding a new Sydney Metro station.

The following sections introduce the site, context and nature of the Bradfield City Centre Master Plan.

1.2 The Western Sydney Aerotropolis

The Western Sydney Aerotropolis is an 11,200-hectare region set to become Sydney's third city (the Western Parkland City), and the gateway and economic powerhouse of Western Sydney.

The Aerotropolis comprises of the new Western Sydney (Nancy-Bird Walton) International Airport surrounded by five initial precincts which include the Aerotropolis Core, Wianamatta– South Creek, Northern Gateway, Agri-business and Badgerys Creek outlined in **Figure 1** below.

The final Aerotropolis planning package, including the Precinct Plan and State Environmental Planning Policy (SEPP) Amendment, was gazetted by DPE in March 2022 and the Development Control Plan Phase 2 was finalised in November 2022. These documents have been used to inform the preparation of the Bradfield City Centre Master Plan.

The proposed Master Plan Application for the site has also been prepared using the Western Sydney Aerotropolis Master Plan Guideline and Master Plan Requirements.

2 Bradfield City Centre

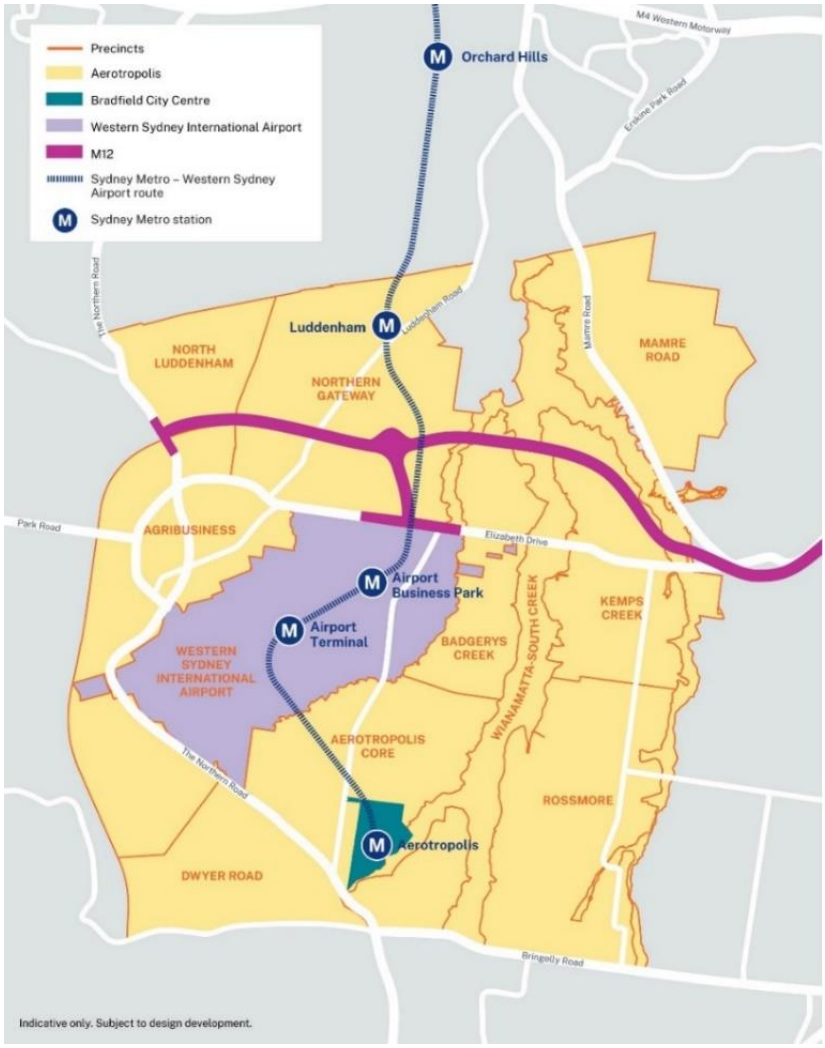
2.1 Strategic Context

The Bradfield City Centre is located to the south-east of the new Western Sydney International (Nancy-Bird Walton) Airport at the intersection of Badgerys Creek Road and The Northern Road (see **Figure 1** below).

The Sydney Metro Western Sydney Airport line runs through the site, providing connections from the key centre of St Marys through to stations at Orchard Hills, Luddenham, Airport Business Park, Airport Terminal and the Aerotropolis which is located within the site.

The site is surrounded by several key roads and infrastructure corridors including Bringelly Road, Badgerys Creek Road, Elizabeth Drive, M12 and The Northern Road.

Figure 1 – Strategic Context



Set on natural waterways, Bradfield City Centre presents a rare opportunity to showcase the best urban design and to create a thriving, blue and green, connected City in which Australians will want to live, learn and work. The Bradfield City Centre will be a beautiful and sustainable 22nd Century City. It will foster the innovation, industry and technology needed to sustain the broader Aerotropolis and fast track economic prosperity across the Western Parkland City.

2.2 The Master Plan Site

The street address for Bradfield City Centre is 215 Badgerys Creek Road, Bradfield (the Site) within the Liverpool Council Local Government Area (LGA). The site is legally described as Lot 3101 DP 1282964 and has an area of 114.6 hectares, with road access to Badgerys Creek Road located at the north-western corner. The site spans across the Aerotropolis Core and Wianamatta-South Creek Precinct, within Western Sydney Aerotropolis. The Site is outlined in **Figure 2** below.

The Site is predominantly zoned Mixed Use under the Western Parkland City SEPP, with a small portion of Enterprise zoned land located on the north-western corner of the site. The site also includes Environment and Recreation zoned land mostly along Thompsons Creek.

Figure 2 – Master Plan Site

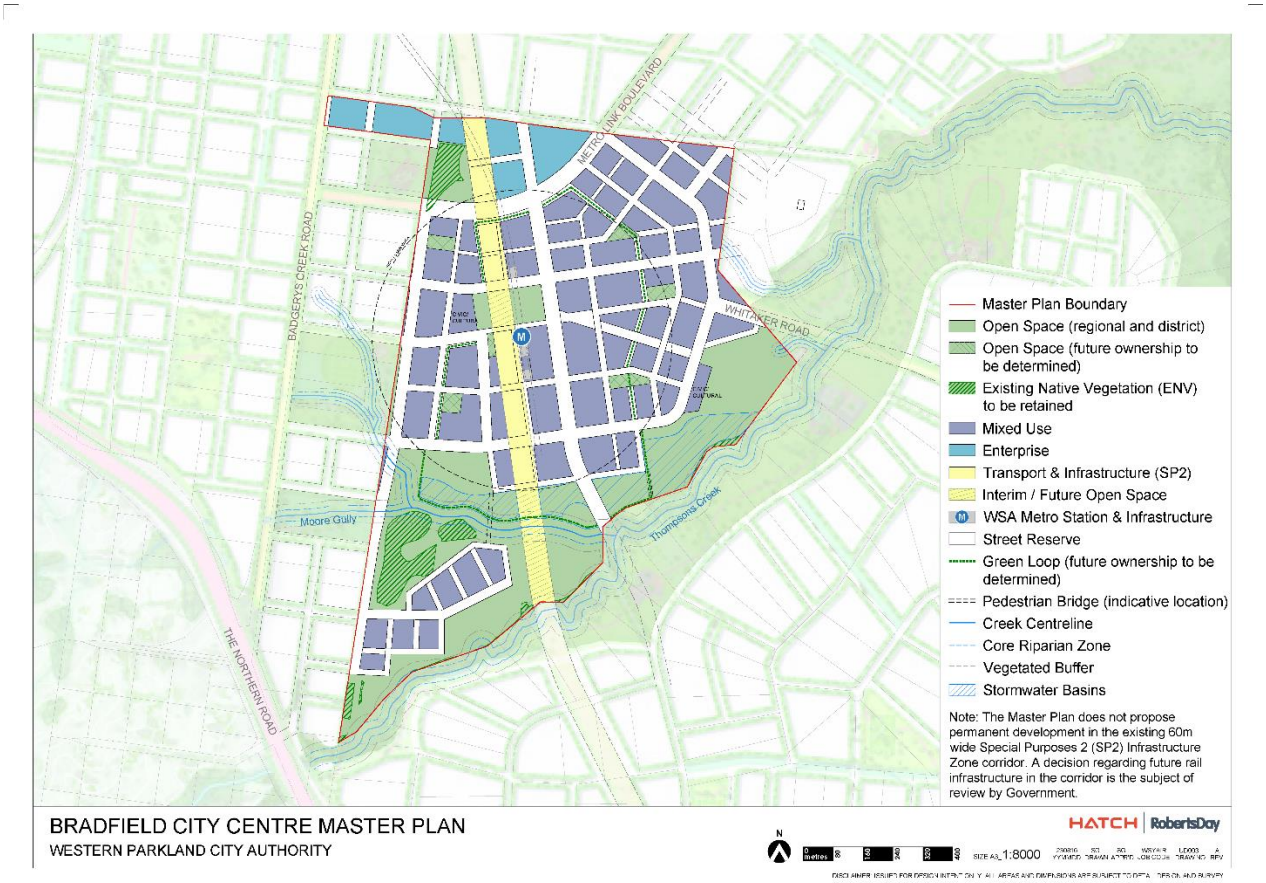
2.3 The Bradfield City Centre Master Plan

The WPCA has prepared a Master Plan **(Figure 3** below) in accordance with the DPE Master Plan Requirements.

The Master Plan sets out a framework for future development within the Bradfield City Centre which includes:

- Road network, key connectors to adjoining land and the arterial and sub-arterial road network (existing and future)
- Block structure
- Indicative open space network
- Sustainability strategy
- Social and infrastructure strategy
- Arts and culture strategy
- Infrastructure servicing strategy

Figure 3 – Master Plan



2.4 The Proposal

The Bradfield City Centre Master Plan is intended to facilitate the growth of the centre over time. The Master Plan has established the following three planning horizons for technical assessments.

Table 2 - Planning & Development Horizons

Phase	Indicative Timeframe	Estimated employment	Estimated residential population	Estimated Gross Floor Area (cumulative)
Immediate	2026	1,000 - 1,200 jobs	0 residents	48,500 sqm
Medium-term	2036	8,000 - 8,300 jobs	3,000 - 3,100 residents	341,000 sqm
Long-term	2056	20,000 – 24,000 jobs	15,000 – 15,200 residents	1,258,000 sqm

Note: The table above is an estimate of the population and employment forecast used for the purposes of modelling only.

The master plan has the capacity to accommodate ~10,000 residential dwellings. In accordance with NSW Government policy a proportion of the residential dwellings will be affordable housing. The timing and delivery of residential dwellings will be subject to market demand and future master plan reviews that consider the impact of additional population on the scope and timing of social and physical infrastructure.

3 Baseline Investigations

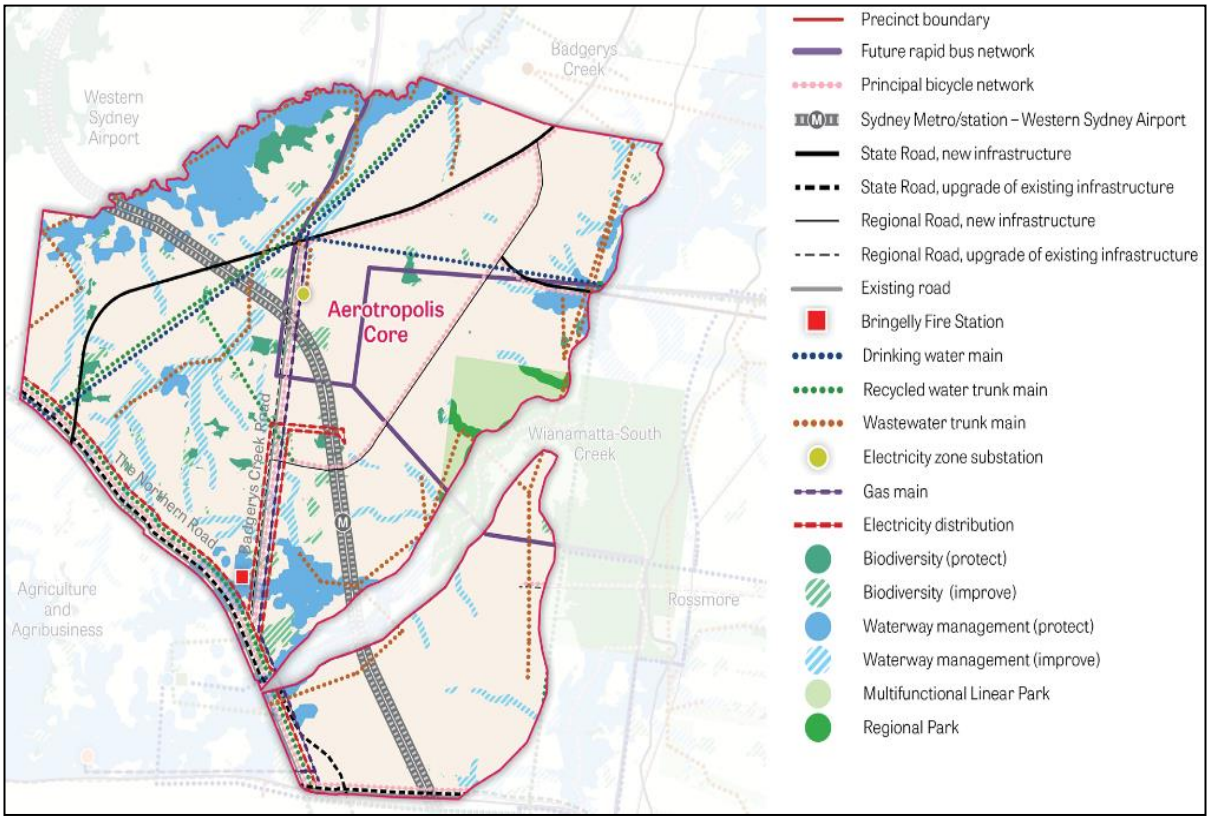
With the Bradfield City Centre being a greenfield development, there are limited existing services throughout the site. This allows increased flexibility and opportunity to install infrastructure to support current and future smart city initiatives.

3.1 Study Area Description and Surrounding Area

3.1.1 Technical Baseline Site Consideration

The 11,200-hectare Western Sydney Aerotropolis Precinct sits within the centre of the Western Parkland City. Wianamatta-South Creek, flowing south to north defines the eastern boundary of Aerotropolis Core Precinct, while Badgerys Creek from the north runs diagonally to the south-west. The ridges rise from the largely flat creek floodplain, creating a gentle undulating topography. The Aerotropolis Core Precinct proposed servicing shown in **Figure 4** below is taken from the *Initial Place-based Infrastructure Compact Area Technical Report*, dated November 2020 (Greater Sydney Commission).

Figure 4 – Aerotropolis Potential Future Services



A summary of the required upgrades for each core utility to meet the proposed development is provided in **Table 3**.

Table 3 - Summary of Existing Utility Services Infrastructure and Required Upgrades

Utility Service	Potable Water	Wastewater	Recycled Water	Electrical	Gas	Communications
Utility Authority Asset	Sydney Water Corporation	Sydney Water Corporation	Sydney Water Corporation	Endeavour Energy	Jemena	NBN Co, Telstra. and others
Proposed Works	Lead in infrastructure	Establish plant and pumps strategy	Lead in infrastructure	Establish 132kv ZS and feeders	Extension from secondary networks	Backbone routes and towers

3.1.2 Area of Focus

Area of focus for this report is the identification of existing utilities services, assessment of expected utilities demands, and summary of proposed connection strategy based on coordination with services authorities.

4 Assessment Requirements and Policy Context

Plans have progressed for the Western Sydney Aerotropolis with the finalisation of the Western Sydney Aerotropolis Plan (WSAP), the State Environment Planning Policy (Precinct - Western Parkland City) 2021 (SEPP) and the Western Sydney Aerotropolis Development Control Plan (DCP) Phase 2.

To accompany these finalised documents, there is a Finalisation Report. The report summarises feedback received on the draft Western Sydney Aerotropolis Planning Package during exhibition and how that feedback has been addressed in the final documents.

These documents have been developed by the Planning Partnership for the Minister for Planning and Public Places in collaboration with the NSW Government and local councils. This includes:

- Western Sydney Aerotropolis DCP - Phase 2 (Nov 2022);
- Western Sydney Aerotropolis Finalisation Report;
- Western Sydney Aerotropolis Plan 2020;
- Western Sydney Aerotropolis SEPP 2020;
- Western Sydney Aerotropolis SEPP Maps; and
- Western Sydney Aerotropolis Structure Plan.

4.1 Master Plan Requirements

The Department of Planning and Environment have issued the Master Planning Requirements (MPRs) and the Western Sydney Aerotropolis DCP Phase 2 for coordination. The below requirements are from DCP Phase 2 and are relevant to this report.

Table 4 – Master Plan Requirements

Reference	Master Plan Requirement	Report Section	Page
10	Identifies any applicable contribution plans, Voluntary Planning Agreements or Special Infrastructure Contribution plans that affect land to which the application relates	Section 7.5.3	Page 47
	Demonstrates mechanisms for delivery of infrastructure for future development, including how they address any contributions applicable under any contribution plans/planning agreements/works-in-kind	Section 7.5.1	Page 46

Reference	Master Plan Requirement	Report Section	Page
	Identifies infrastructure (including transport, green, social, cultural and utilities) required to service the entire master plan area; and distinguish (where possible) state, regional and local infrastructure	Section 6 (Transport, green and social infrastructure is addressed in separate studies)	Page 22
	Identifies the financial and delivery impacts for State and local governments and utility providers resulting from proposed changes to infrastructure and utilities as outlined in the Precinct Plan	Section 7.5.1	Page 46
	Details how, when and by whom the infrastructure will be provided, and how this aligns to any proposed staging including details on annual and ultimate yields for water and wastewater servicing. This should include assumptions related to take up rates over the course of the development timeframe, including how infrastructure and utilities are staged, to determine the adequacy of proposed staging/delivery	Section 7 Details on Potable and Wastewater yields are covered in sections 6.2 and 6.3.	Page 25
	Identifies any utility augmentation required to accommodate the proposed development and easements and their locations	Appendix 1, Section 8.3	Page 53
	Provide details of any further material public benefit to be delivered through the master plan	Section 7.5.2	Page 47
	Investigates opportunities to implement a multi-utilities corridor approach as part of the planning and delivery of major road corridors within the site	WPCA is preparing a separate report addressing this item	
	Includes a property acquisition and activation staging plan, outlining when particular properties facilitating access and infrastructure are to be brought into public ownership or the control of the master plan developer. The staging should account for the processes of acquisition in line with best practice and the Just Terms Compensation Act	WPCA is preparing a separate response addressing this item	

Table 5 – Agency and Council Comments

Reference	Agency and Council Comment	Report Section	Page
Liverpool Council (Page 4)	d) Provision of Public Utility Infrastructure	Section 7.5.1	Page 46
Liverpool Council (Page 4)	The Master Plan is to outline how appropriate public utility services are to be provided to the site in accordance with Clause 4.49 of SEPP (Precincts - Western Sydney Parkland) 2021.	Section 8.2	Page 49
Sydney Water, (Page 1)	Additionally the Master Plan is to demonstrate how infrastructure provision will result in an improvement to the stated infrastructure requirements under Section 3 of the WSA Precinct Plan.	Section 8.2	Page 49
Penrith City Council 'Proposed Technical Studies for Masterplan Requirements	Whilst Sydney Water understands the Master Plan proposes no amendments to approved road layouts, Sydney Water advises that our trunk drinking and recycled water trunk mains generally align with roads. We therefore ask that we be advised of any proposed changes where applicable.	Section 7	

5 Technical Approach / Framework

5.1 Utilities Information

There are existing and proposed utility services in and around the site which are summarised below and discussed in detail in this report:

- **Potable Water:** Drinking water is provided by the Sydney Water Corporation (SWC).
- **Wastewater:** Wastewater facilities servicing is provided by SWC with sewer mains and treatment plants in the surrounding suburbs.
- **Recycled Water:** There is currently no existing recycled water servicing the site – however advice from SWC confirms plans to ultimately service the site with Recycled Water.
- **Electrical:** Electrical supply is provided by Endeavour Energy, there is one existing zone substation and two proposed zone substations within supply range.
- **Gas:** Jemena currently supplies a lead in gas main to the immediate area just north of the site.
- **Telecommunications:** Some telecommunications providers have assets in the vicinity of the site including Telstra and NBN Co.

5.2 Service Demand Calculations

Land Use and Gross Floor Area (GFA) information has been provided by WPCA (21 February 2022) and used for high-level calculations to estimate the forecasted service demand through to 2061. AECOM has rounded the GFA delivery by year for simplicity and to ensure estimates are sufficiently conservative.

Table 6 and **Table 7** below summarises this information across nine milestone years (5-year periods). To approximate residential dwelling numbers, WPCA has assumed that a typical apartment floor area of 85m2, which is equivalent to a density of 118 units/net ha. To approximate hotel / serviced apartment numbers to establish servicing demands, the typical serviced apartment floor area of 50m^2 has been assumed. This is equivalent to a density of 200 units/net ha. These figures have been used in anticipation of the finalisation of a housing typology plan.

In preparing its preliminary servicing masterplans, AECOM has assumed a limit of 18 storeys, this is consistent with most land use typologies as defined in the Western Sydney Aerotropolis Urban Design and Landscaping Plan Report prepared for Western Sydney Planning Partnership by Hassell Nov 2020. It is expected that subject to outcome of the masterplan approval and proposed changes to the Precinct Plan (specifically the High Density Residential Mixed-Use Precinct, the prescribed Height Limit and zoning) this assumption may need to be reviewed and a subsequent iteration of the servicing strategy developed.

Table 6 – Yearly GFA Staging Plan

	Milestone Year (GFA – m^2)								
Land Use Category	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**	**2056**	**2061**	**Post 2061**
Commercial	47,500	60,000	61,500	75,000	75,000	75,000	76,000	88,000	395,188
Retail	1,000	10,000	14,000	17,000	18,000	18,000	18,000	18,000	80,736
Education			10,000	10,000	10,000	10,000	10,000	4,000	38,243
Cultural and Community			5,000	5,000	5,000	5,000			14,164
Hotel / Serviced Apartments (dwellings)		7,000 (140)	10,000 (200)	10,000 (200)	10,000 (200)	10,000 (200)	10,000 (200)	10,000 (200)	47,450 (949)
Residential (dwellings)		40,000 (471)	75,000 (882)	90,000 (1,059)	100,000 (1,176)	120,000 (1,412)	140,000 (1,647)	162,000 (1,906)	514,880 (6,057)
GFA by year	48,500	117,000	175,500	207,000	218,000	238,000	254,000	282,000	1,090,661
Summary Dwellings	-	611	1,082	1,259	1,376	1,612	1,847	2,106	7,006

Table 7 – Cumulative GFA Staging Plan

	Milestone Year (GFA – m^2)								
Land Use Category	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**	**2056**	**2061**	**Post 2061**
Commercial	47,500	107,500	169,000	244,000	319,000	394,000	470,000	558,000	953,188
Retail	1,000	11,000	25,000	42,000	60,000	78,000	96,000	114,000	194,736
Education			10,000	20,000	30,000	40,000	50,000	54,000	92,243
Cultural and Community			5,000	10,000	15,000	20,000	20,000	20,000	34,164
Hotel / Serviced Apartments (dwellings)		7,000 (140)	17,000 (340)	27,000 (540)	37,000 (740)	47,000 (940)	57,000 (1,140)	67,000 (1,340)	114,450 (2,289)
Residential (dwellings)		40,000 (471)	111,500 (1,353)	205,000 (2,412)	305,000 (3,588)	425,000 (5,000)	565,000 (6,647)	727,000 (8,553)	1,241,880 (14,610)

	Milestone Year (GFA – m^2)								
Land Use Category	2026	2031	2036	2041	2046	2051	2056	2061	Post 2061
Cumulative GFA	48,500	165,500	337,500	548,000	766,000	1,004,000	1,258,000	1,540,000	2,630,661
Summary Dwellings	0	611	1,693	2,952	4,328	5,940	7,787	9,893	16,899

5.3 Service Demand Summary

Table 8 – Cumulative Service Demand Summary

Cumulative Utility Demand	2026	2031	2036	2041	2046	2051	2056	2061	Post 2061
Potable Water (kL/day)	372	1,129	2,261	3,590	4,987	6,509	8,130	9,926	16,908
Recycled Water – factor of potable water (kL/day)	186	565	1,130	1,795	2,494	3,255	4,065	4,963	8,854
Wastewater (L/s)	10	24	42	64	86	109	133	158	268
Electrical (MVA)	9	20	34	50	67	84	101	120	203
Gas (GJ/hour)	20,759	81,609	162,121	253,809	346,184	438,559	528,234	621,959	1,070,933

Make-up of demands is discussed further in **Section 7.1** to **7.4**.

5.4 Limitations

The demand calculations provided are estimates only generally derived from high level planning documents.

The above demands are based on maximum yields allowable under available planning controls. Feasibility applications were submitted on a masterplan arrangement which considered a lower yield than the allowable maximum. It is recommended that feasibility advice be revisited should demands exceed those noted in the authority responses.

6 Technical Assessment

6.1 Potable Water, Wastewater and Recycled Water

6.1.1 Background

Within the South West Growth Area (SWGA) servicing area of Sydney Water there are multiple water and wastewater servicing projects at various levels of planning (Master Planning, Detailed Planning and Options assessment, etc) undertaken over the past few years by Sydney Water to firm up the short-term and long-term servicing strategies for the SWGA.

To confirm the latest water and wastewater servicing strategies developed by Sydney Water to service the SWGA including the Western Sydney Aerotropolis, AECOM has sent an initial supply enquiry to Sydney Water in May 2021 the response to this is included in **Appendix 2** – Authority Advice. **Figure 5** and **Figure 6** show the Sydney Waters high-level potable and wastewater servicing strategy to date with further indicative servicing plans included in Sydney Waters Feasibility Response in **Appendix 2** – Authority Advice. There has been significant development around the Greater Sydney area and the Sydney Water Growth Servicing Plan 2022 – 2027 is expected to be further developed throughout the project lifecycle. It is expected that the proponent will consult with Sydney Water at all times throughout the lifecycle of the project to ensure adequate infrastructure services are planned, delivered and operated to Sydney Water's standards.

Figure 5 – South West Region - Sydney Water Growth Servicing Plan 2022 - 2027 (Drinking Water)

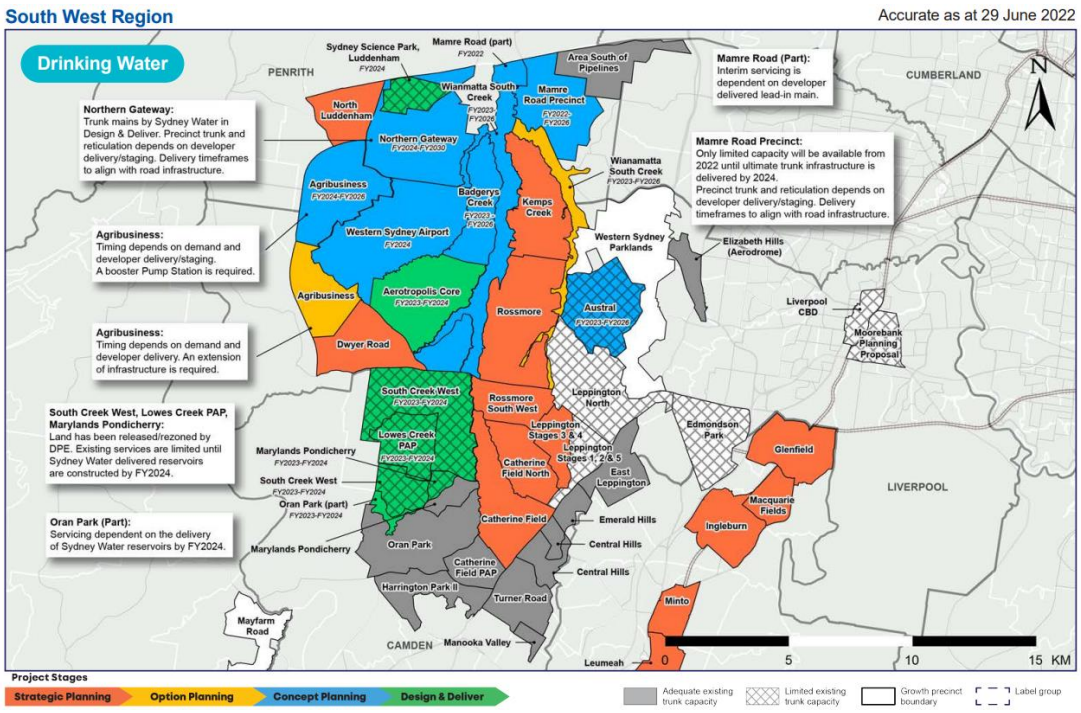
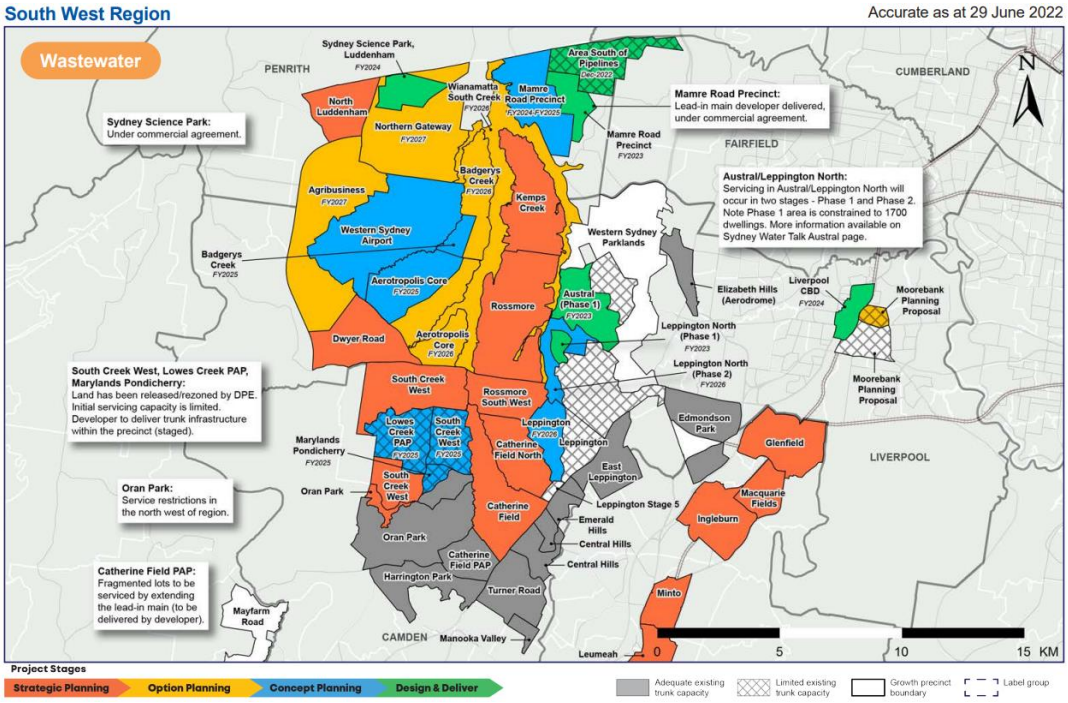


Figure 6 – South West Region - Sydney Water Growth Servicing Plan 2022 - 2027 (Wastewater)



6.1.2 Potable Water Servicing

The water servicing strategy for the wider Aerotropolis relies on the supply from either the existing Cecil Park Water Supply Zone (WSZ) or the New Oran Park WSZ. New reservoirs are proposed at Oran Park as well as the existing Cecil Park reservoir site which are expected to be constructed by 2026 and will provide additional reserve storage in these systems. Also, the upgrades and new mains proposed to link the Cecil Park and Oran Park WSZs will provide additional capacity to transfer water between these two systems and the relevant developments in between (e.g., Bradfield City Centre).

Advice from Sydney Water received in June 2021 (included in **Appendix 2** – Authority Advice) has advised that trunk network amplifications are currently being delivered to service growth in the wider Western Sydney Aerotropolis Growth Area (WSAGA). Trunk amplifications on Badgerys Creek Rd by FY2023 will provide sufficient network capacity to service the initial development in Bradfield City Centre. Indicative potable water servicing plans are included in **Appendix 1** – Bradfield Services Masterplans and Typical Sections.

6.1.3 Potable Water Demand Assessment

An assessment of the estimated increase in potable water demand generated from the Bradfield City Centre has been conducted to provide an initial estimate of the infrastructure upgrades. Demand has been based on estimated number of dwellings and proposed GFA for retail and commercial development outlined in the demand assessment yields presented in **Section 6.2**.

Demand estimates for potable water have been calculated using the Water System Planning Guideline (Sydney Water, Version 1, September 2014) and are based on Maximum Daily Demand. Sustainability reduction targets have been taken from the Aerotropolis Precinct Plan (March 2022) table SR3 index targets.

A summary of the water demand unit rates is presented below in **Table 9**.

Table 9 – Potable Water Demand Unit Rates

Land Use Category	Design Criteria	Potable Water Demand	Units	Source
City High Rise Commercial	Max Day Demand	0.0063	kL/m^2/day	Water System Planning Guideline (Sydney Water, Version 1, September 2014), Section 3, Table 3-3
Multi-Unit (101 – 140 units/net/ha)	Max Day Demand	0.88	kL/unit/day	Water System Planning Guideline (Sydney Water, Version 1, September 2014), Section 3, Table 3-2
Multi-Unit (>140 units/net/ha)	Max Day Demand	0.8	kL/unit/day	Water System Planning Guideline (Sydney Water, Version 1, September 2014), Section 3, Table 3-2
BASIX Sustainability Target (Water)		40% (60% reduction from benchmark)		Aerotropolis Precinct Plan March 2022 – Table SR3 and Building Sustainability Index Targets

6.1.4 Potable Water Forecast Demand

An estimate of the future potable water demand for each precinct has been calculated based on development yields provided by WPCA. These figures provide information on the estimated number of dwellings for residential and hotel / serviced apartment use and GFA for other developments. The site has been classified as “Mixed Use”, comprising a range of uses including commercial, retail, education, cultural and community, hotel / serviced apartments, residential and others.

Commercial, retail, education, cultural and community potable water demand has been calculated with the same assumptions used for suburban commercial potable water demand. This is based on an equivalent potable water demand rate of 0.0063 kL/m^2/day assuming a City High Rise Commercial usage for large shopping complexes as a conservative estimate.

In accordance with BASIX sustainability targets the Aerotropolis aims to reduce mains-supplied potable water consumption by 60% (as outlined in Aerotropolis Precinct Plan March 2022– Table SR3). A BASIX reduction factor has been applied to residential and hotel / serviced apartment land usage. Other land usages have not had a sustainability reduction target applied in anticipation that their demand may forego the target. Metro demand requirements have been provided by the Sydney Metro design team and included in demand calculations. The cumulative Maximum Daily Demand (MDD) is summarised below in **Table 10.**

Table 10 – Estimated Cumulative Maximum Daily Potable Water Demand

	Milestone Year Demand Creation (kL/day)								
Land Use Category	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**	**2056**	**2061**	**Post 2061**
Commercial	299	378	387	473	473	473	479	554	2490
Retail	6	63	88	107	113	113	113	113	509
Education	0	0	63	63	63	63	63	25	241
Cultural and Community	0	0	32	32	32	32	0	0	89
Hotel / Serviced Apartments	0	67	96	96	96	96	96	96	456
Residential	0	249	466	559	621	746	870	1006	3198
Metro Station	67	0	0	0	0	0	0	0	0
Total	372	757	1132	1329	1397	1522	1621	1795	6982
Cumulative Total	**372**	**1129**	**2261**	**3590**	**4987**	**6509**	**8130**	**9926**	**16908**
Low Range (-15%)	316	960	1922	3052	4239	5533	6911	8437	14372
High Range (+15%)	428	1298	2600	4129	5736	7486	9350	11414	19444

Concerning industrial land precincts, notable large potable water demand use associated with high use industrial purposes have been excluded from demand calculations. Industries such as food processing plants, hospitals, schools, milk, and concrete factories for example are not factored into the above calculations. Should these assumptions change reassessment of water demands would be required.

6.1.5 Wastewater Servicing

Sydney Water Corporation's Western Sydney Master Plan considered the provision of several new Wastewater Treatment Plants (WWTP) to service the SWGA. At the time of AECOM's involvement in developing the pathways for the Western Sydney Master Plan project, the option between eventually providing two or three new WWTPs was investigated. In June 2021, SWC advised that Bradfield City Centre will be within the Upper South Creek Advanced Water Recycling Centre (AWRC) catchment which will have capacity to treat wastewater generated. Stage 1 construction of the AWRC is due to be delivered by FY2026 to align with operation of the new Western Sydney International (Nancy Bird Walton) Airport. Forecasted delivery of the trunk wastewater collection network transferring wastewater from Bradfield City Centre to the AWRC is due by FY2026. This delivery milestone was subsequently confirmed in Sydney Waters advice from 2nd August 2022 – where SWC noted both catchments in the precinct are in the Options planning and Concept Design Phases. Through consultation with SWC, AECOM and WPCA are also exploring opportunities to service the initial stages of development through onsite collection tanks, which would be implemented on

an 'as needed' basis. Indicative wastewater servicing plans are included in **Appendix 1** – Bradfield Services Masterplans and Typical Sections.

6.1.6 Wastewater Demand Assessment

An assessment of the estimated increase in sewer loading generated from the Bradfield City Centre development yield 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 commercial and industrial development outlined in the demand assessment yields presented in **Section 6.2**.

The design criteria used to forecast future sewer loading are taken from Gravity Sewerage Code of Australia, WSA 02-2014 (Water Services Association, Version 3.1, 2014) and is expressed as an Equivalent Population for a land use. In lieu of definition within the Aerotropolis Precent Plan March 2021, BASIX reduction has been taken from the Building Sustainability Index targets, these are summarised below in **Table 11**.

Table 11 – Wastewater Demand Unit Rates

Land Use Category	Design Criteria	Potable Water Demand	Units	Source
High Density Commercial	0.08	EP/m^2	Gravity Sewerage Code of Australia, WSA 02-2014 (Water Services Association, Version 3.1, 2014), Appendix B	Water System Planning Guideline (Sydney Water, Version 1, September 2014), Section 3, Table 3-3
Hotel / Serviced Apartments	2	EP/dwelling	Reduction of High Density Residential (Gravity Sewerage Code of Australia, WSA 02-2014 (Water Services Association, Version 3.1, 2014), Appendix B) value to reflect lower occupancy	Water System Planning Guideline (Sydney Water, Version 1, September 2014), Section 3, Table 3-2
High Density Residential	2.5	EP/dwelling	Gravity Sewerage Code of Australia, WSA 02-2014 (Water Services Association, Version 3.1, 2014), Appendix B	Water System Planning Guideline (Sydney Water, Version 1, September 2014), Section 3, Table 3-2
Average Dry Weather Flow (ADWF)	0.0021	L/s	Gravity Sewerage Code of Australia, WSA 02-2014 (Water Services Association, Version 3.1, 2014), Appendix C	Aerotropolis Precinct Plan March 2022 – Table SR3 and Building Sustainability Index Targets
BASIX Sustainability Target	40%		Building Sustainability Index Targets	

6.1.7 Wastewater Forecast Demand

An estimate of the future wastewater loading for each precinct has been calculated based on development yields provided by WPCA. These figures provide information on the estimated number of dwellings for

residential use and GFA for non-residential developments. It should be noted that final reticulation sizing will be subject to final demand calculations.

In accordance with the WSA 02-2014 Gravity Sewerage Code of Australia criteria guide, the Site fits descriptions comprising of 'High Density commercial', 'hotel / serviced apartments', and 'high density residential' with an Equivalent Population (EP) per dwelling/ha as listed in **Table 11**. This category is typical for capital city CBD. Metro demand requirements have been provided by the Sydney Metro design team and included in demand calculations. The Average Dry Weather Flow (ADWF) per EP has been taken as 180 L/day or 0.0021 L/s (ADWF (L/s) = 0.0021 * EP). The large flow volume can be attributed to the discharge of groundwater into the wastewater system, rather than being released as an environmental flow.

Commercial, retail, education, cultural and community wastewater demand has been calculated with the same assumptions used for high density commercial wastewater demand. This is equivalent to assuming a demand rate of 0.08 EP/m^2. For education land usage, this is equivalent to assuming 375 students / ha.

Under BASIX requirement, new residential and hotel / serviced apartment developments are required to reduce wastewater loading by 40% (BASIX amendment as introduced in 2006) compared to the average NSW dwelling. Other land use categories have not had a BASIX reduction applied in anticipation that their demand may forego the target. The ADWF is summarised below in **Table 12**.

Table 12 – Estimated Average Dry Weather Flow (ADWF) Including BASIX (L/s)

Land Use Category	2026	2031	2036	2041	2046	2051	2056	2061	Post 2061
Commercial	7.98	10.08	10.33	12.60	12.60	12.60	12.77	14.78	66.39
Retail	0.17	1.68	2.35	2.86	3.02	3.02	3.02	3.02	13.56
Education	0.00	0.00	1.68	1.68	1.68	1.68	1.68	0.67	6.42
Cultural and Community	0.00	0.00	0.84	0.84	0.84	0.84	0.00	0.00	2.38
Hotel / Serviced Apartments	0.00	0.35	0.50	0.50	0.50	0.50	0.50	0.50	2.39
Residential	0.00	1.48	2.78	3.34	3.70	4.45	5.19	6.00	19.08
Metro Station	2.00*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	10.15	13.60	18.49	21.82	22.35	23.10	23.16	24.99	110.23
Cumulative Total	10.15	23.74	42.23	64.05	86.40	109.49	132.66	157.65	267.88
Low Range (-15%)	8.63	20.18	35.90	54.44	73.44	93.07	112.76	134.00	227.70
High Range (+15%)	11.67	27.31	48.57	73.65	99.36	125.92	152.56	181.29	308.06

*max allowance for discharge to sewer (SW208, Sydney Water) – as advised by Sydney Metro 13/12/2022. Allowance is understood to include groundwater discharge – for which pre-discharge treatment would need to be provided as a result of high salinity.

Concerning industrial land precincts, notable large wastewater demand use associated with high use industrial purposes have been excluded from demand calculations. Industries such as food processing plants, hospitals, schools, milk, and concrete factories for example are not factored into the above calculations.

Should these assumptions change reassessment of sewer loading would be required.

6.1.8 Recycled Water Servicing

There is no existing recycled water infrastructure in the area. As a key element of Western Sydney's circular economy, the AWRC will produce recycled water for non-drinking water use within Bradfield City Centre. Trunk recycled water supply infrastructure will be staged and delivered in line with growth, with a key dependency on supply being the delivery of the AWRC by FY2026. Detailed planning and options studies for recycled water to advise on asset sizing and locations are currently being undertaken by Sydney Water (as identified in Sydney Waters advice in **Appendix 2**).

AECOM understands from the WSAGA Indicative Servicing Plan that SWC is in the planning stages of a regional recycled water network. While preliminary – this scheme shows a recycled water reservoir and pumping station south of Bradfield City Centre area located south of The Northern Road and Badgerys Creek Road. Indicative recycled water servicing plans are included in **Appendix 1**.

Subject to confirmation or pipe sizing and pressures it is anticipated that reticulation connection will be on trunk infrastructure rather than rising mains, with pressure reducing valves potentially required closer to the reservoir. Connection strategies should be clarified in further detail with SWC to ensure coordination with general servicing strategy.

6.1.9 Recycled Water Demand

The Stormwater and Water Cycle Management study produced by Sydney Water (December 2021) for the Western Sydney Aerotropolis, assumes up to 50% of potable water use may be replaced by recycled water where it can be used for toilets, irrigation and laundry. Similarly – for non-residential use, it may also represent up to 50% of potable water demand for non-drinking purposes. AECOM has employed this assumption in deriving the Recycled Water Demand (Table 13). Sydney Water notes that these assumptions have been derived from evidence-based demands for residential and non-residential land use in Sydney. It is noted that the below demands may be supplemented by irrigation demands from large public parks, which could also be irrigated using recycled water – subject to treatment quality.

Table 13 – Estimated Cumulative Maximum Daily Potable and Recycled Water Demand

	Milestone Year Demand Creation (kL/day)								
Land Use Category	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**	**2056**	**2061**	**Post 2061**
Commercial - Potable	299	378	387	473	473	473	479	554	2,490
Recycled	150	189	194	236	236	236	239	277	1,245
Retail - Potable	6	63	88	107	113	113	113	113	509
Recycled	3	32	44	54	57	57	57	57	254
Education - Potable	0	0	63	63	63	63	63	25	241
Recycled	0	0	32	32	32	32	32	13	120
Cultural and Community - Potable	0	0	32	32	32	32	0	0	89

	Milestone Year Demand Creation (kL/day)								
Land Use Category	2026	2031	2036	2041	2046	2051	2056	2061	Post 2061
Recycled	0	0	16	16	16	16	0	0	45
Hotel / Serviced Apartments - Potable	0	67	96	96	96	96	96	96	456
Recycled	0	34	48	48	48	48	48	48	228
Residential - Potable	0	249	466	559	621	746	870	1,006	3,198
Recycled	0	124	233	280	310	373	435	503	1,599
Metro Station* - Potable	67	0	0	0	0	0	0	0	0
Recycled	33	0	0	0	0	0	0	0	0
Total - Potable	372	757	1,132	1,329	1,397	1,522	1,621	1,795	6,982
Recycled	**186**	**378**	**566**	**665**	**699**	**761**	**810**	**898**	**3,891**
Cumulative Total - Potable	372	1,129	2,261	3,590	4,987	6,509	8,130	9,926	16,908
Recycled	**186**	**565**	**1,130**	**1,795**	**2,494**	**3,255**	**4,065**	**4,963**	**8,854**
Recycled Low Range (-15%)	158	480	961	1,526	2,120	2,766	3,455	4,218	7,526
Recycled High Range (+15%)	214	649	1,300	2,064	2,868	3,743	4,675	5,707	10,182

**Metro potable demand is based on 3.7 L/s Peak demand. Through consultation Metro have advised that there is also a requirement for 45L/s for Firefighting and 30 L/s for track purposes. These demands should be considered as part of any lead-in design*

6.2 Electrical

The area is currently mostly serviced by the nearby Bringelly ZS (Zone Substation) and Kemps Creek ZS. With the current design progress on the surrounding motorway upgrades at Elizabeth Drive and the M12, it is understood that early works to accommodate 132kV routes is underway utilising Luddenham Rd and Elizabeth Dr, however southern cable routes at Bringelly Rd are also considered. Endeavour Energy is the supplier of electricity for the Bradfield City Centre study area.

6.2.1 Background

The existing electrical infrastructure around the Bradfield City Centre has been identified based on Endeavour Energy's public records provided from the *Distribution Annual Planning Report, 2020* as well as feasibility advice received from Endeavour Energy on 11 August 2021. The site is proposed to be serviced by substations and feeders as shown below in **Figure 7** and **Figure 8**.

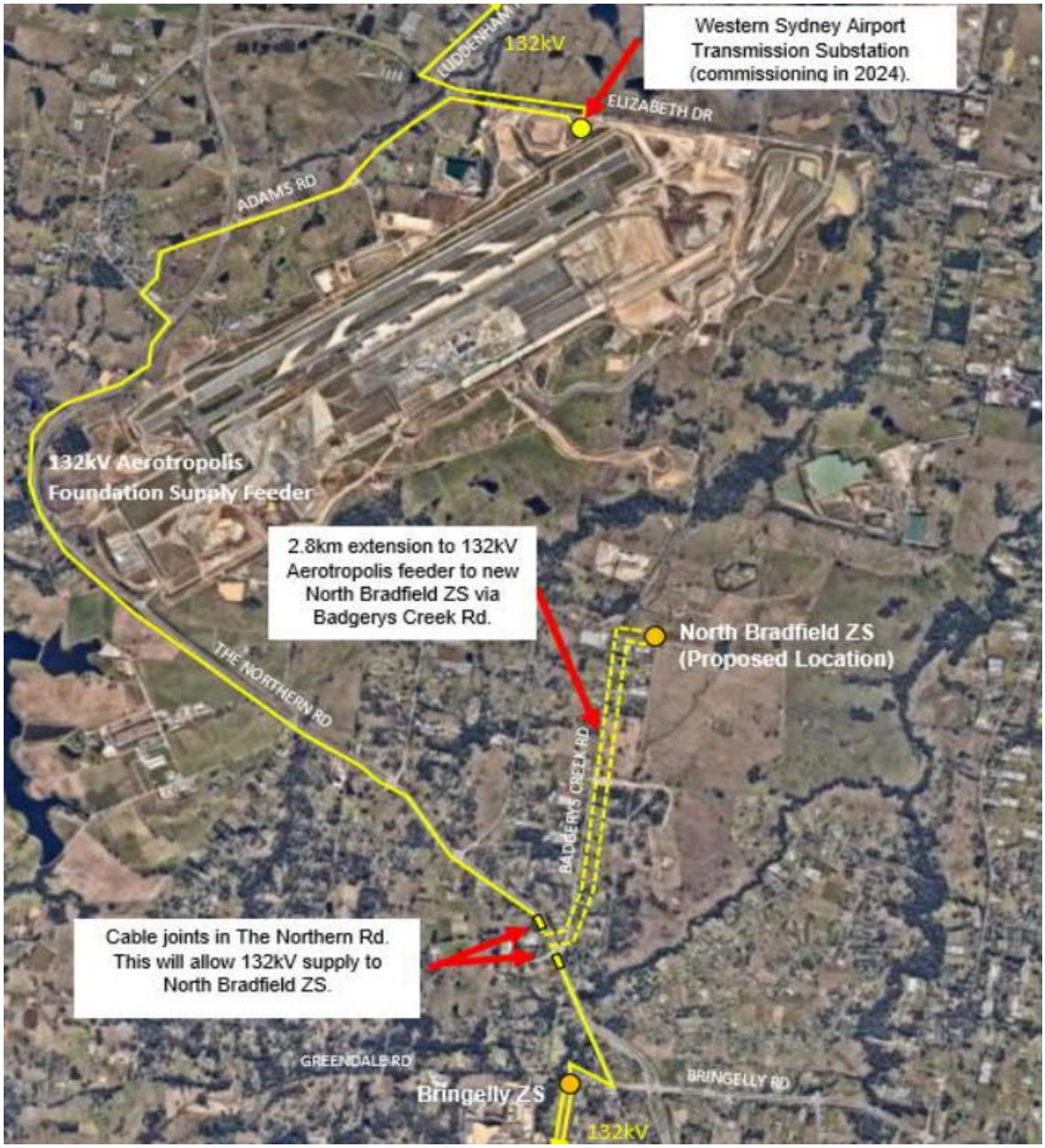
There are existing and proposed electrical assets adjacent to the site, in particular:

- Existing Bringelly ZS;
- Existing Kemps Creek ZS;
- 11kV distribution main X881 adjacent to the site;
- 33kV feeder 512 south of Bradfield approximately 1km away along The Northern Road;
- Proposed North Bradfield ZS; and
- Proposed Airport ZS.

The exact depths and routes of the proposed or existing cable mains are unknown at this stage. It is understood that a proposed Aerotropolis 132kV feeder between South Erskine Park Zone Substation and Bringelly Zone Substation is to be commissioned by Q1 2025 in time for the North Bradfield Zone Substation, Science Park Zone Substation and the Metro Zone Substation to be connected.

Figure 7 – Endeavour Energy Existing Transmission Network (Source: Endeavour Energy 2021)

Figure 8 – Proposed North Bradfield ZS in Relation to Existing and Proposed 132kV Supply (Source: Endeavor Energy 2022)



As part of Sydney Metro works, an 11kV feeder from Bringelly ZS will be installed within Bradfield City Centre with a requirement of 3.5MVA. The existing 11kV network may supply expected loads up to 2026 (estimated ~9MVA).

Supply beyond 2026 will depend on timing and network load demands. Endeavour Energy has commenced construction on its North Bradfield Zone substation in the site directly north of the Bradfield City Centre. It understood that this will be completed 2025/2026 (RIT-D Draft Project Assessment Report – EE 7th October 2022). This new ZS will service the Bradfield City Centre and other precincts. As part of these works EE is required to extend two 132kV mains along Badgerys Creek Road (shown in **Figure 8**).

6.2.2 Demand Assessment

An assessment of the estimated increase in electrical demand generated from the Bradfield City Centre development yield 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 outlined in the demand assessment yields presented in **Section 6.2**.

Electrical demands were estimated using Endeavour Energy Growth Servicing After Diversity Maximum Daily (ADMD) demand unit rates, AS3000 Table C3 and Ausgrid specifications summarised in **Table 14**, **Table 15** and **Table 16**.

Table 14 – Endeavour Energy Growth Servicing Plan 2019 - Table 1 - ADMD by application

Level of Network	Residential Dwelling Type	ADMD kVA	Example Application
Distribution Substation and Low Voltage network	Detached House	5 (medium) 6.5 (large)	Size Distribution Transformer
	Apartments	3.5	
11kV feeders	Detached House	4	Area Studies
	Apartments	3	
Zone Substation	Detached House	3.2	Summer Demand Forecast
	Apartments	2.4	
	Detached House	4	Area Planning
	Apartments	3	

Table 15 – AS3000 - Table C3 Maximum Demand – Energy Demand Method for Non-Domestic Installations

Type of occupancy		Energy demand	
		Range, VA/m²	Average, VA/m²
Offices	Light and power	40–60	50
	Airconditioning:		
	— Cooling	30–40	35
	— Reverse cycle	20–30	25
	— Zonal reheat	40–60	50
	— Variable volume	20	20
Carparks	Open air	0–10	5
	EV charging	5–15	10
	Basement	10–20	15
	EV charging	10–30	20
Retail shops	Light and power	40–100	70
	Airconditioning	20–40	30
Warehouses	Light and power	5–15	10
	Ventilation	5	5
	Special equipment	(use load details)	
Light industrial	Light and power	10–20	15
	Ventilation	10–20	15
	Airconditioning	30–50	40
	Special equipment	(use load details)	
Taverns, licensed clubs	Total	60–100	80
Theatres	Total	80–120	100

NOTE: EV charging relates to charging equipment associated with electric vehicles and should be considered in addition to all other energy demands.

Table 16 – Ausgrid NS109 Design standards for overhead supply developments and distribution centres

Annexure B – Tables for Assessment of Maximum Demand

B1 Typical load density values (VA/m2) for different types of floor area usage (Nett Areas)

These load density values depend on many factors including:

(a) the effects of the outside environment on the building structure and type of air conditioning system;

(b) the effects of heat or electrical equipment loads within the premises;

(c) the proposed lighting design; and

(d) the degree of environment control and load management within the premises.

The figures in the Table below may be used as a guide only to typical load densities. Higher load densities may apply for some types of buildings and occupancies.

Table 4 Guide to typical load densities

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

Note: Medium and heavy industrial areas require full details of connected load before an assessment of demand can be made. Only uniformly distributed loads such as lighting and air-conditioning can be assessed using this area usage method.

The following load ranges were adopted based on a combination of defined demand rates from Endeavour Energy, AS3000 and Ausgrid standards with demand load factors provided in **Table 17** below. The rates from

Endeavour Energy are assumed to be inclusive of diversity (reduction factor for off peak use) while the AS3000 and Ausgrid rates are assumed not to include diversity. The Aerotropolis Precinct Plan March 2022 sustainability targets for residential land use have been adopted at 60% (equivalent to a 40% reduction target). Commercial and industrial land usages have not had a sustainability reduction target applied in anticipation that commercial and industrial demand may forego the target.

Table 17 – Adopted Maximum Electrical Demand Unit Rates

Electrical Load Use	Electrical Demand (kVA/unit)	Unit	Diversity Factor	Electrical Demand (incl. Diversity Factor) (kVA/unit)	Source
Shopping Centres with Air Conditioning	0.16	kVA/m^2	0.8	0.128	Ausgrid Annex B
Retail Shops with Air Conditioning	0.14	kVA/m^2	0.8	0.112	AS3000 & Ausgrid Annex B
Hotels, Taverns, Restaurants	0.10	kVA/m^2	0.8	0.080	Ausgrid Annex B
Apartments	3.50	kVA/dwelling	-	3.500	Endeavour Energy Growth Servicing Plan 2019 – Table 1

6.2.3 Forecast Demand

Table 18 below summarises the total maximum electrical demands for each precinct based on the development yields provided by the WPCA in Section 6.2. Educational and cultural and community electrical demand have both been assumed to fall under the electrical load use 'Shopping Centres with Air Conditioning'. Rapid Bus electrical demand requirements have been provided by TfNSW and are included in the demand calculations.

Table 18 – Estimated Maximum Electrical Demand

	Milestone Year Demand Creation (kL/day)								
Land Use Category	**2026**	**2031**	**2036**	**2041**	**2046**	**2051**	**2056**	**2061**	**Post 2061**
Commercial	6.08	7.68	7.87	9.60	9.60	9.60	9.73	11.26	50.58
Retail	0.11	1.12	1.57	1.90	2.02	2.02	2.02	2.02	9.04
Education	0.00	0.00	1.28	1.28	1.28	1.28	1.28	0.51	4.90
Cultural and Community	0.00	0.00	0.64	0.64	0.64	0.64	0.00	0.00	1.81
Hotel / Serviced Apartments	0.00	0.56	0.80	0.80	0.80	0.80	0.80	0.80	3.80
Residential	0.00	0.99	1.85	2.22	2.47	2.97	3.46	4.00	12.72
Rapid Bus	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	9.19	10.35	14.01	16.45	16.81	17.30	17.28	18.59	82.85
Cumulative Total	**9.19**	**19.54**	**33.55**	**50.00**	**66.81**	**84.11**	**101.39**	**119.99**	**202.84**
Low Range (-15%)	7.81	16.61	28.52	42.50	56.79	71.49	86.18	101.99	172.41
High Range (+15%)	10.57	22.47	38.59	57.50	76.83	96.72	116.60	137.98	233.26

The impact of Ecologically Sustainable Development (ESD)options detailed in **Section 7.2.4**, including Photo Voltaic (PV) cells, have not been accounted for in this electrical demand estimation as ESD options will be subject to design development. PV systems can reduce electrical demand and assist in managing peak demand. The extent of this reduction is dependent on the PV array size and associated operational losses, as such the above demand assessment can be considered to be a conservative approach.

While a gas connection has been allowed for and indicative gas demand rates have been developed, the above table generally assumes that apartments may use electricity rather than gas for cooktops and heating contributing to demand estimates.

Concerning industrial land precincts, notable large power draw usages associated with high use industrial purposes have been excluded from demand calculations. Industries such as heavy manufacturing involving welding, paper mills and data centres, hospitals and schools for example are not factored into the above calculations. Should these assumptions change reassessment of power draw would need to occur. Electricity usage by the Sydney Metro station been excluded and is expected to be advised once known.

As per Endeavour Energy's assessment (received 11 August 2021), the existing and new proposed 11kV network has a combined capacity of 12MVA capacity. This means that the network can only service development growth until 2026. Beyond this, Endeavour Energy has indicated the demands will be serviced by the future Bradfield North ZS (under development).

6.2.4 Potential ESD Initiatives and Circular Economy Initiatives

Key ESD initiatives recommended for further investigation as a part of detailed design include:

- Solar PV;
- Batteries;
- Building orientation;
- Natural ventilation of common areas;
- Electric car charging;
- Centralised heat extraction system;
- District cooling;
- Geothermal cooling;
- Smart metering; and
- Glazing options to improve thermal comfort and reduce heating and cooling loads.

Implementation of any of these initiatives (individually or in combination) will have an impact on the final electrical peak demand and associated infrastructure upgrade requirements. Finally – while the above presents opportunities for precinct wide initiatives there may also be opportunities for sub-precinct initiatives such as micro-grids that can be implemented across one or multiple superlots to consolidate supply and demand onsite. It is expected these systems would still be connected to the grid for baseline and emergency power.

6.2.5 Future Work

There are proposed Sydney Metro Tunnel Boring Machine (TBM) 11kV supplies that may become repurposed after their need has been fulfilled, however confirmation of timing and feasibility is yet to be confirmed. The Sydney Metro 11kV cables themselves would be absorbed into the future HV reticulation by Endeavour Energy.

The two most significant Endeavour Energy capital works proposals that will be critical to Bradfield City Centre are the Western Sydney Aerotropolis Growth Area 132kV Supply and the North Bradfield ZS. Details of the proposed capital investment by Endeavour Energy in **Table 19** below.

Table 19 – Summary of Key Existing Utility Services Infrastructure and Required Upgrades (Endeavour Energy)

Network Element	Sub-transmission Line	Zone Substation
Asset ID	PR741 - Western Sydney Aerotropolis Growth Area 132kV Supply	PR-439 North Bradfield ZS
Preferred network investment	Establish 132kV network to supply the developments and large loads surrounding the Western Sydney Airport	Establish a new Zone Substation to supply the proposed Aerotropolis in the local area of the Western Sydney Priority Growth Area
Residential customers affected	100%	NA
Proposed timing FNY	2024/25	2025/26
Residential customers affected	3830	NA

Network Element	Sub-transmission Line	Zone Substation
Voltage level	132kV	132kV
Demand reduction required to defer investment by 1 year	10kV	3kV
Location of constraint (start)	-33.8920406818, 150.722896545	-33.913356, 150.735393
Annual Deferral Value	$2,695,500.00	$940,500.00

6.2.6 Next Steps

To progress planning of the Bradfield City Centre electrical service infrastructure footprints and routes it is important to understand Endeavour Energy's program and concepts. Engagement with Endeavour Energy will include:

1. Coordinating on North Bradfield ZS construction and delivery timeframes
2. Confirm interim supply opportunities, surrounding ZS capacities;
3. Develop duct masterplan based on Endeavour Energy's input;
4. Confirm supply staging for the new Bradfield City Centre infrastructure;
5. Liaise with Endeavour Energy to understand the impacts and opportunities of surrounding projects supply arrangements, e.g., Sydney Metro 11kV temporary site supplies; and
6. Consider information requirements for planning advice and applications with Endeavour Energy.

6.3 Gas

6.3.1 Background

The area is supplied with natural gas through connection to the Jemena Network. It is anticipated that ultimately there will be no or little gas servicing to the residential land usage in order to meet Net Zero Carbon by 2030. Where gas is required, this will be reserved for commercial/industrial uses that rely on gas servicing. AECOM understand that the Bradfield City Centre project's ambitions are to eliminate gas demand within the precinct.

There is a limited distribution network in the area comprised a secondary main and a regulator that steps down from 1050kPa to 300kPa to service commercial customers in the immediate area of Badgerys Creek Rd. The existing gas infrastructure adjacent to the Bradfield City Centre site has been identified based on DBYD records and Google Street view. This indicates a network of gas mains within and adjacent to the Bradfield City Centre site, in particular:

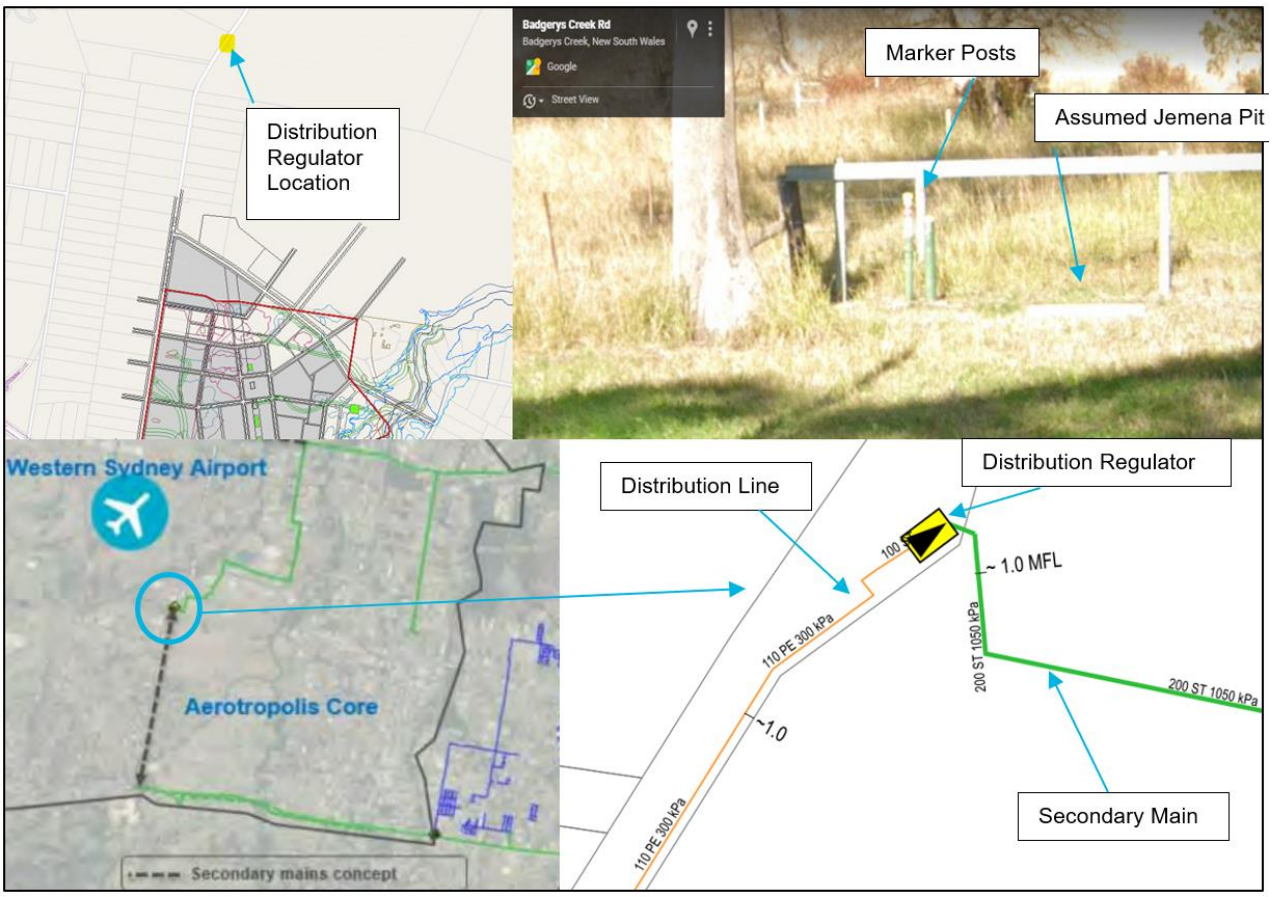
- 200mm ST 1050kPa secondary network servicing Badgerys Creek Rd;
- 110mm PE 300kPa distribution line in Badgerys Creek Rd; and
- Distribution Regulator Set.

6.3.2 Preliminary Infrastructure Assessment

It is anticipated that extensions for the Bradfield City Centre gas network will be facilitated by the existing 300kPa 110mm PE line that runs south of the regulator on Badgerys Creek Rd and terminates a few hundred metres north of the Bradfield City Centre main centre. With the demand of the greater area and infrastructure, an extension and augmentation of the existing secondary high pressure steel network would be required to accommodate the surrounding growth. Jemena are currently designing, in conjunction with the M12 designs, a route north of Elizabeth Drive via Luddenham Rd for the Sydney Science Park; however, additional coordination will be required. Feasibility advice is included in **Appendix 2** of this report.

Jemena has a concept to connect the secondary mains system along Badgerys Creek Rd to Bringelly Rd as shown in **Figure 9** from the Growth Infrastructure Compact #1, Baseline Infrastructure and Services Assessment, DBYD, Google Maps, and AECOM GIS.

Figure 9 – Jemena Gas Network on Badgerys Creek Rd



6.3.3 Demand Assessment

An assessment of the estimated increase in gas demand generated from the Bradfield City Centre development yield has been conducted to determine the required infrastructure upgrades. Individual project areas have been based on the average number of dwellings and proposed GFA as per the land use categories outlined in **Section 6.2**.

The natural gas demand unit rates for proposed developments have been estimated based on AECOM experience of recorded gas usage for similar development types. Gas consumption rates have been taken from the lower end of previous project experience. Adopting the rates at the higher end would approximately double the demand which is not considered appropriate given an overall intent to decrease hydrocarbon use. The below demand unit rates are generalised for proposed land use categories, as such demand may vary

from business use to business use. A final demand assessment should be carried out as the masterplan is delivered.

Table 20 below outlines the rates used to derive the estimated gas demand within the study area, sourced from previous project experience.

Table 20 – Gas Demand Unit Rates

Land Use Category	Gas Demand	Unit	Source
Office	1.35	GJ/hour/m2	From previous project experience
Restaurants	1.4	GJ/hour/m2	From previous project experience
Hotel	3.85	GJ/hour/m2	From previous project experience
Diversity Factor	0.5		From previous project experience

6.3.4 Forecast Demand

Table 21 presents the estimated natural gas usage, with the assumption made that there will be no residential gas demand. Commercial, education, and cultural and community gas demand have been assumed to fall under the 'Office' land use category. 50% of the retail GFA has been assumed to fall under the 'Office' land use category and the other 50% has been assumed to fall under 'Restaurants'. A diversity factor of 0.5 has been applied to all gas demand calculations.

Gas demand for the CSIRO facility has been provided by WPCA and included in the demand calculations as a separate item. As the CSIRO facility forms 18,000m^2 of the commercial land use of the site, the area used to calculate the commercial gas demand has been reduced by this much to prevent an overly conservative forecast.

Table 21 – Estimated Cumulative Gas Demand Assessment

	Milestone Year Demand Creation (GJ/hour)								
Land Use Category	2026	2031	2036	2041	2046	2051	2056	2061	Post 2061
CSIRO Facility	159	0	0	0	0	0	0	0	0
Commercial	19,913	40,500	41,513	50,625	50,625	50,625	51,300	59,400	266,752
Retail	688	6,875	9,625	11,688	12,375	12,375	12,375	12,375	55,506
Education	0	0	6,750	6,750	6,750	6,750	6,750	2,700	25,814
Cultural and Community	0	0	3,375	3,375	3,375	3,375	0	0	9,561
Hotel / Serviced Apartments	0	13,475	19,250	19,250	19,250	19,250	19,250	19,250	91,341
Residential	0	0	0	0	0	0	0	0	0
Total	20,759	60,850	80,513	91,688	92,375	92,375	89,675	93,725	448,974
Cumulative Total	**20,759**	**81,609**	**162,121**	**253,809**	**346,184**	**438,559**	**528,234**	**621,959**	**1,070,933**
Low Range (-15%)	17,645	69,367	137,803	215,737	294,256	372,775	448,999	528,665	910,293
High Range (+15%)	23,873	93,850	186,439	291,880	398,111	504,343	607,469	715,253	1,231,573

Impacts of ESD options have not been considered in the above calculations. Should industries associated with large scale gas usage such as industrial manufacturing plants, steelmaking, medicine, and food production factories express interest in locating to the subject site the demand calculations will require reassessment.

6.3.5 Future Work

When developing lots, individual developers are required to complete a connection application which needs to be lodged with Jemena. Within ten business days, Jemena will provide an offer for connection service or advise that an offer will be made for a negotiated service.

The terms of the offer will depend on the site-specific information and if upgrades are required to the system to service the estimated demand, and if the offer is accepted, Jemena will schedule and perform the required gas connections.

The current study is focused on utility supply infrastructure and does not include an allowance for adjustments of existing infrastructure layouts to suit site works.

6.3.6 Next Steps

It is proposed WPCA confirm the level of commitment to gas for the overall Bradfield City Centre site. Currently, gas is only considered for the industry capital partners providing for jobs.

The formal approval process for provision of Jemena infrastructure to be progressed through concept/detailed design processes consists of the following main steps:

1. Undertake site investigations to confirm the layout and extent of existing services (including non-Jemena infrastructure) – Post Rezoning/Development Application;
2. Submit design development plan including staging of delivery to Jemena for agreement – As a part of concept/detailed design;
3. Submit application for design to Jemena for individual concept/detailed design packages (to include proposed alignment) – As a part of detailed design; and
4. Jemena will provide a quote for construction works – As a part of concept/detailed design.

It is noted that the above information is for delivery of the Jemena network through the new street network, it is expected that the buildings will need to make separate applications for connection. Formal confirmation will require the finalisation of the design development and further consultation with Jemena.

6.4 Data and Communications

6.4.1 Background

Many above ground communication assets are scattered around the Bradfield study area, varying from 3G to 4G cells and private transmit and receiver assets. Much of the communications network is mounted to Endeavour Energy's poles, while some are in a pit and duct system.

6.4.2 Existing On-Site Utility Infrastructure

The following asset owners are made up of utility providers and private operators, the details of these assets are yet to be fully explored in any study available to date:

- Optus;
- Telstra;
- Vodafone;
- Vocus;
- NBN;
- RAAF; and
- Private (various land holders).

6.4.3 Preliminary Infrastructure Assessment

There is some data and communications infrastructure present in and around the site. The Australian Government has issued a policy *Telecommunications in new developments – a guide for industry* (Department of Communications and the Arts, 2016) on the provision of telecommunications infrastructure in new developments which ascertains the role of Telstra and NBN Co. as infrastructure providers of the last resort (IPOLR) as follows:

NBN Co. is the IPOLR in developments of 100 lots or more within its fixed-line footprint and in areas where its fixed-line network is available, or the NBN rollout has been announced.

Telstra is the IPOLR in developments of less than 100 lots where NBN's fixed-line network is not available and has not been announced. Telstra also covers developments outside the NBN fixed-line footprint in NBN fixed-wireless and satellite areas.

6.4.4 Future Work

NBN Co. has established a Feasibility Assessment process to provide early planning information and indicative backhaul contributions. These assessments are designed to assist developers in the early stages of planning and costing developments including pre-acquisition. The assessment is designed to take into consideration the location and size of each development and estimate a cost based on the existing NBN Co. network.

Upon finalisation of design developments, these will be issued formally to NBN Co. to assess the potential backhaul costs. Once the detailed design is undertaken applications to connect will be completed. Three months' notice is required for each stage prior to the commencement of construction or civil works.

6.4.5 Next Steps

Engagement with communications providers should be established early to begin identifying infrastructure needs and alignment of technologies. A Smart Cities implementation strategy is currently being developed to future proof and deliver key initiatives and themes specific to Bradfield City Centre. Some considerations listed below that may better inform what the proposed communication infrastructure requirements are through conversation with providers:

- Planned data centres;
- Cyber security and resilience;
- Critical services (national, international Optic Fibre);
- Dark Fibre (Defence or other);
- Exchange locations or upgrades, NBN roll out plans;
- Overall program and timing; and
- Shared trench opportunities.

6.5 Delivery Strategy

6.5.1 Delivery Framework

Broadly it is anticipated reticulation services will be delivered by WPCA as part of infrastructure delivery of the site, reimbursement for these works would be as per the relevant authorities' reimbursement policy at time of construction. Trunk infrastructure (such as High Voltage >11kV, wastewater pumping stations, and larger watermains beyond the site boundary) are expected to be delivered by the relevant services authorities themselves. A summary of delivery frameworks and funding models for the various services is provided in **Table 22** below.

Table 22 – Delivery Framework Summary

Utility Service	Delivery Framework	Funding
Potable Water	Delivered by WPCA as part of site development	As aligned with Sydney Waters '*Funding infrastructure to service growth*'
Wastewater	Delivered by WPCA as part of site development	As aligned with Sydney Waters '*Funding infrastructure to service growth*'
Recycled Water	Delivered by WPCA as part of site development	'Under the current regulatory framework, Sydney Water must propose a recycled water usage price (developer charge) and IPART will then assess this proposal against a set of pricing principles' As aligned with Sydney Waters '*Funding infrastructure to service growth*'
Electrical	Delivered by WPCA as part of site development	Assets carrying electrical loads smaller than 11kV likely to be funded by WPCA. Assets carrying larger electrical loads to likely to be reimbursed by Endeavour Energy
Gas	Delivered by WPCA as part of site development	WPCA likely to fund trenching works. Jemena likely to fund asset installation and connection works
Data and Telecommunications	Subject to commercial agreement between WPCA and service providers	Subject to commercial agreement between WPCA and service providers

Take-up rates are anticipated to be in line with the demand tables listed in **Section 6.3**.

Further to the above AECOM notes Clause 4.49 of SEPP (Precincts - Western Sydney Parkland) 2021 states that:

4.49 Public utility infrastructure

1) Development consent must not be granted to development to which this Division applies unless the consent authority is satisfied that —

a. public utility infrastructure that is essential for the development is available, or

b. the public utility infrastructure will be available when required.

2) In this section —

***public utility infrastructure** includes infrastructure for the following —*

a. the supply of water,

b. the supply of electricity,

c. the disposal and management of sewage.

To this end it will be crucial that development of trunk infrastructure be aligned with the proposed delivery milestones of the precinct. This report summarises the works already undertaken (whether planning or otherwise) by various stakeholders to provide trunk servicing to the precinct. This is supported further in the definition of the Bradfield City Centre as a First Priority Area as defined in Section 4 of the Aerotropolis Precinct Plan.

6.5.2 Financial and Delivery Impacts

Financial impacts to state and local government over the life of the project will be influx of an additional 24,997 jobs and 15,288 residents by the completion of the project. For the reticulation services noted in this study it is expected that reticulation will be delivered in line with the relative funding policy (i.e. reimbursement for trunk services). Capital expenditure and operational costs for trunk services will be in line with the relevant policies from the service providers.

6.5.3 Contributions Plans and Voluntary Planning Agreements

AECOM has prepared **Table 23** which presents a summary of contributions plans from the relevant authorities relevant to the services included in this report. This includes the services noted below.

It is understood there is no Voluntary Planning Agreement in place for the overall Master Plan at this time. It is expected this will be negotiated either by stage or as an overall agreement for the Precinct.

Table 23 – Contributions Plans Summary

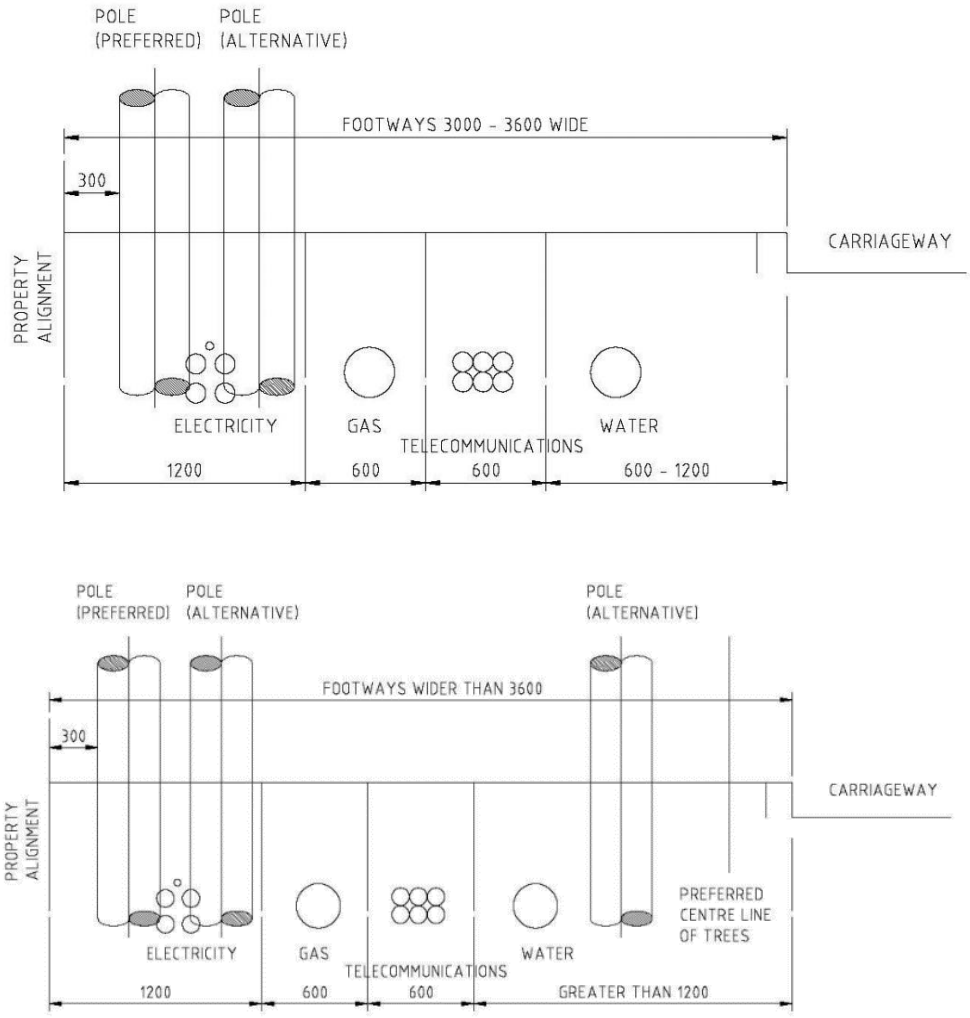
Authority	Contributions Plan	Relevant Services
Sydney Water	Funding infrastructure to service growth policy	PW, WW, RW, Drainage
Liverpool City Council	Liverpool Contributions Plan 2009	Waste Management

7 Utility Service Corridors

7.1 Streets Opening Conference Service Corridors

The NSW Streets Opening Coordination Council Guides, 2018, provides guidelines for service allocations within the footpath. It has been assumed that the majority of new utility infrastructure for the Bradfield City Centre precinct will be within new footpaths; these should broadly follow the allocations shown in **Figure 10**.

Figure 10 – Streets Dedicated After 1 January 1991 (NSW Streets Opening Coordination Council Guides, 2018)



Notes:

1. If installing assets in regional areas contact the local council for council specific requirements.
2. Where a utility/service provider providing underground services wishes to encroach on space allocated to another utility/service provider, it should consult and seek agreement with the other. Both utility/service providers should record such encroachments on their respective mapping systems.
3. The narrower water allocation shown may not be sufficient to include recycled water mains.
4. The preferred position for poles or street lighting columns is within 300mm of the property alignment. Some alternative positions are shown but location should be consistent with minimising the overall cost to the public while considering safety requirements
5. Where the erection of power poles in the 0-1200mm allocation is impracticable, these may be located in the water allocation by agreement with the appropriate Public Authority.
6. No specific allocation for trees can be identified for footways up to 3600mm wide. Consultation with utility/service providers is required and due regard must be given to tree species as outlined in *6.5 Street Trees*
7. Pillars/pedestals/Service pits etc. should be located in a position that is set back from street intersections.
8. See *Section 6.6* for guidance on new poles and pole replacements.
9. Sewer pressure mains to be laid in water allocation deeper than water mains.
10. Vacuum sewers typically laid in property but could also be in water allocation.
11. For structures to be erected over the electrical distributors footpath allocation for underground mains the electrical distributor must be consulted in accordance with Clause 5.3 Customer's Structure - Service and Installation Rules of New South Wales.
12. If both footpaths are able to be used, the assets should be able to be better distributed across both sides of the roadway so that there is space to install infrastructure at the most appropriate location with respect to minimising overall cost to the customers.

Where shallow footpaths between 2-3m are required, then shared trench arrangements may be used as shown below in **Figure 11**.

Figure 11 – Notes for Allocation of Space in Narrow Footways (NSW Streets Opening Coordination Council Guides 2018)

Footways of width less than 3000mm require special consideration to accommodate services.

Notes:

- The preferred position for poles, pillars, cabinets and street lighting columns is within 300mm of the property alignment.
- The preferred position for street lighting columns is adjacent to the property alignment or centred to the property. Where the erection of power poles in the close to property alignment, is impractical these may be located in an alternative allocation by agreement with the appropriate utility/service provider. Power pole location should be consistent with minimising the overall cost to the public while considering safety requirements.
- No specific allocation for trees can be identified for footways up to 2000mm wide. Consultation with utility/service providers is required and due regard must be given to tree species. Refer *Section 6.5.*
- Pillars/pedestals/service pits etc should be located in a position that is set back from street intersections.
- See *Section 6.6* for guidance on new poles and pole replacements.

The shared trenching arrangement is not considered appropriated where main/trunk services are provided; this includes any potential HV electrical feeders.

Further consultation will also be required with Liverpool City Council to confirm if street lighting will be separate from the electricity supply, if so, the standard allocation may require revision.

Further to the above AECOM has prepared typical sections discussed further in **Section 8.3**.

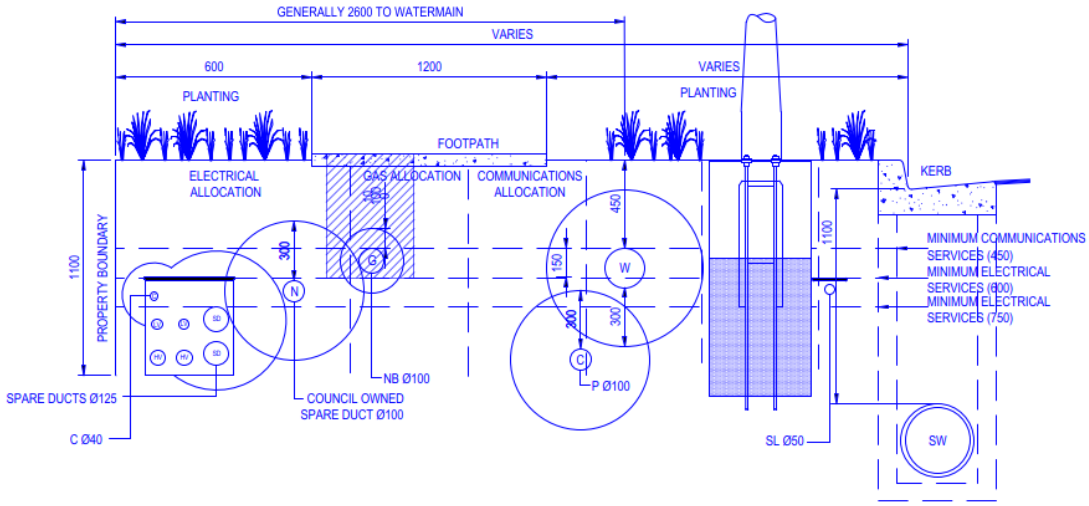
7.2 Shared Trenches

To optimise the placement of deep soil layers and encourage canopy growth the Western Sydney Streets Design Guideline recommends consideration of shared trenches (C5.1 – Shared Trenches). AECOM recommends that through consultation the option of shared trenches be discussed with services authorities as early as possible during the delivery phase. This should consider:

- Service sizes and types proposed for relevant streets;
- Consideration of future growth potential (and placement of spare ducting);
- Required offsets to each service; and
- Placement to optimise (as far as practicable) tree root area.

An indicative arrangement is provided in **Figure 12**.

Figure 12 – Indicative shared trench arrangement (Western Sydney Streets Design Guideline)



7.3 Typical Services Layout

Typical sections have been developed through a preliminary review of the streetscape and required services (see **Appendix 1** – Bradfield Services Masterplans and Typical Sections). As utility service scheme plans have not been finalised for the Master Plan, we have taken a conservative approach and included services in both verges. It is anticipated that in some cases this will be reduced, and crossings favoured in place of duplicating services in the verges.

Services sizes have been based on feedback from WPCA and preliminary third-party reports. It is anticipated that services sizes and allocation will be revisited during concept design.

To evaluate spatial availability, AECOM has included district cooling and hydrogen at the request of WPCA – this is for strategic considerations and further development will be required to assess the feasibility of this approach. The allocation and pipe sizing will be reviewed during concept design if these systems are considered feasibility to proceed.

Where services are installed in public roads as per their allocation in **Appendix 1** – Bradfield Services Masterplans and Typical Sections it is anticipated they will not require easements.

8 Conclusion

Utility constraints that may affect the site development include:

Demand calculations provide the following estimates based on a ±15% range in development yields:

- Potable water between **14,400 – 19,500 kL/day** (total demand reduced by Recycled Water uptake);
- Recycled water between **7530 – 10,200 kL/day**;
- Wastewater between **230 – 310 L/s**;
- Electrical load between **172.41 – 233.26 MVA**; and
- Gas demand between **910,293 – 1,231,573 GJ/hour**.

Opportunities and needs to support the precinct include:

- Lead-in infrastructure upgrades for water (potable and recycled), wastewater and electrical supply are required; and
- Gas and telecommunication networks have adequate capacity to provide upgrades pending formal applications.

Future work that is required includes:

- Coordination with the Urban Design team to understand development staging scenarios and develop staged delivery strategies;
- Hydraulic modelling in detailed design to confirm potable, recycled and wastewater lead-in infrastructure upgrades; and
- Further opportunities for alternative utility supply requiring further investigation as part of the ongoing masterplan development (specifically electricity generation).

A summary of the anticipated upgrades has been provided below.

Table 24 – Summary of Required Service Upgrades

Utility Service	Potable Water	Recycled Water	Wastewater	Electrical	Gas***	Data and Telecoms

Utility Authority Asset	Sydney Water Corporation	Sydney Water Corporation	Sydney Water Corporation	Endeavour Energy	Jemena	NBN Co, Telstra, Opticomm, Vocus and others
Adequate Capacity for Proposed Development (2023)?*	Yes	No (temporary service for First Building only)	No (temporary service for First Building only)	Yes	No	Yes (Telstra only available)
Adequate Capacity for Proposed Development (2026+) with amplification?*	Yes	Yes	Yes	Yes	Yes	Yes
Proposed Works	Local network amplifications	Local network amplifications	Local network connections	Local network amplifications	Extension of secondary network	Local network connections
Funding	Sydney Water / WPCA	Sydney Water / WPCA	Sydney Water / WPCA	Endeavour Energy/WPCA	Jemena / WPCA	WPCA
Date of availability of major trunk infrastructure	FY2023-2024 for initial services	TBC**	FY 2025- 2026 for initial services	FY 2025- 2026 for initial services	TBC**	TBC**

*Current capacity and servicing requirements to be confirmed with relevant utility authority as a part of a supplementary feasibility application which considers maximum allowable yield. Refer to **Section 6.4** for limitations

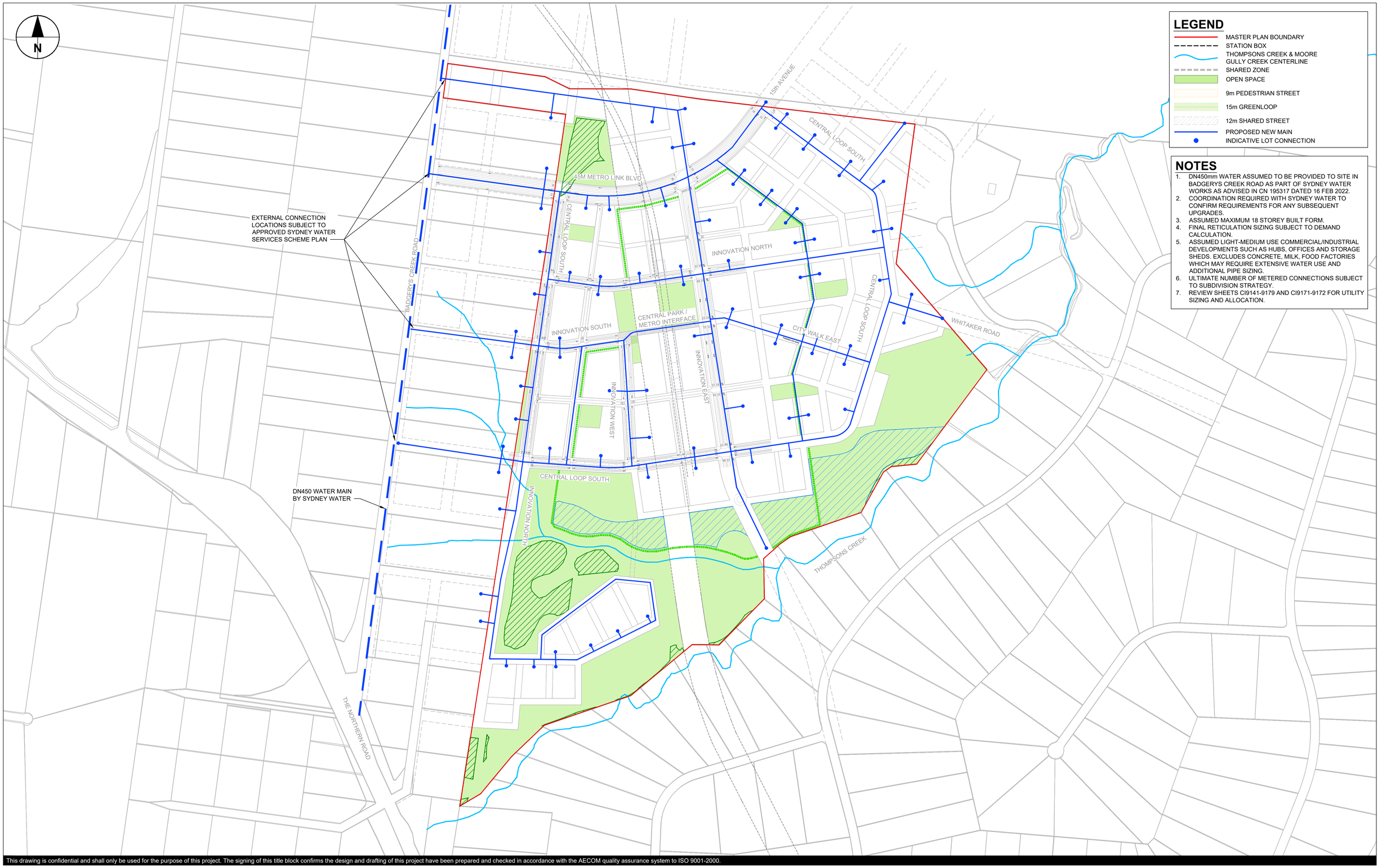
**To be confirmed after receipt of agency feedback

The most relevant utilities information available to AECOM has been compared, benchmarked and where possible, expanded on. This report states the next steps and provides the basis for those steps.

*** It is anticipated that ultimately there will be no or little gas servicing to the residential land usage in order to meet Net Zero Carbon by 2030. Where gas is required, this will be reserved for commercial/industrial uses that rely on gas servicing.

Appendix 1 – Bradfield Services Masterplans and Typical Sections

ISO A1 594mm x 841mm



LEGEND

- MASTER PLAN BOUNDARY
- STATION BOX
- THOMPSONS CREEK & MOORE GULLY CREEK CENTERLINE
- SHARED ZONE
- OPEN SPACE
- 9m PEDESTRIAN STREET
- 15m GREENLOOP
- 12m SHARED STREET
- PROPOSED NEW MAIN
- INDICATIVE LOT CONNECTION

NOTES

1. DN450mm WATER ASSUMED TO BE PROVIDED TO SITE IN BADGERYS CREEK ROAD AS PART OF SYDNEY WATER WORKS AS ADVISED IN CN 195317 DATED 16 FEB 2022.
2. COORDINATION REQUIRED WITH SYDNEY WATER TO CONFIRM REQUIREMENTS FOR ANY SUBSEQUENT UPGRADES.
3. ASSUMED MAXIMUM 18 STOREY BUILT FORM.
4. FINAL RETICULATION SIZING SUBJECT TO DEMAND CALCULATION.
5. ASSUMED LIGHT-MEDIUM USE COMMERCIAL/INDUSTRIAL DEVELOPMENTS SUCH AS HUBS, OFFICES AND STORAGE SHEDS. EXCLUDES CONCRETE, MILK, FOOD FACTORIES WHICH MAY REQUIRE EXTENSIVE WATER USE AND ADDITIONAL PIPE SIZING.
6. ULTIMATE NUMBER OF METERED CONNECTIONS SUBJECT TO SUBDIVISION STRATEGY.
7. REVIEW SHEETS CI9141-9179 AND CI9171-9172 FOR UTILITY SIZING AND ALLOCATION.

CONSULTANT
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PROJECT
AEROTROPOLIS MASTER PLAN

CLIENT
NSW GOVERNMENT | Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR
0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION
ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

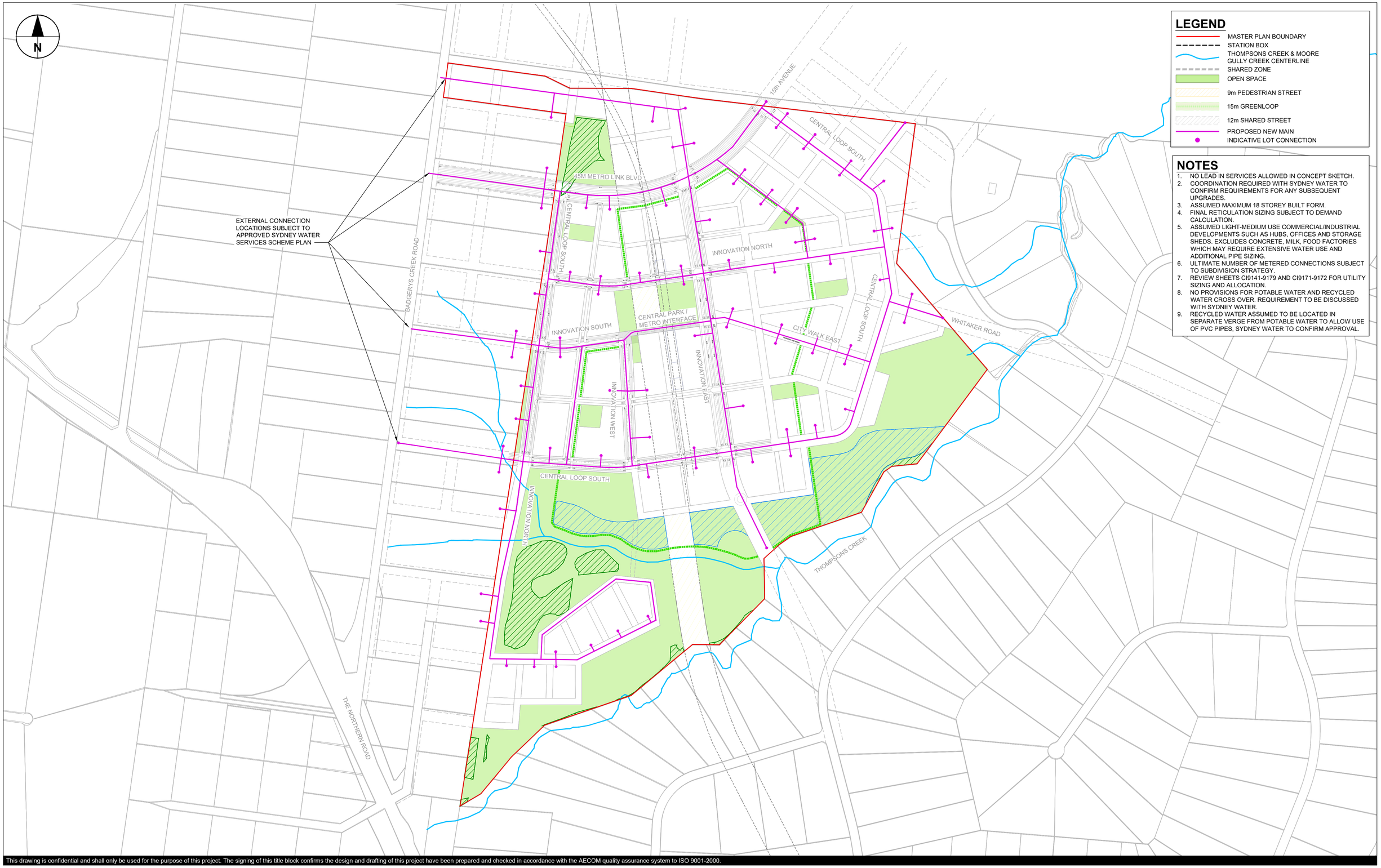
03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION
I/R	DATE	DESCRIPTION

FOR INFORMATION ONLY

PROJECT NUMBER
60649974

SHEET TITLE
SERVICING STRATEGY
PORTABLE WATER

SHEET NUMBER
60649974-SKE-00-1000-CI-0001



LEGEND

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- SHARED ZONE
- OPEN SPACE
- 9m PEDESTRIAN STREET
- 15m GREENLOOP
- 12m SHARED STREET
- PROPOSED NEW MAIN
- INDICATIVE LOT CONNECTION

NOTES

1. NO LEAD IN SERVICES ALLOWED IN CONCEPT SKETCH.
2. COORDINATION REQUIRED WITH SYDNEY WATER TO CONFIRM REQUIREMENTS FOR ANY SUBSEQUENT UPGRADES.
3. ASSUMED MAXIMUM 18 STOREY BUILT FORM.
4. FINAL RETICULATION SIZING SUBJECT TO DEMAND CALCULATION.
5. ASSUMED LIGHT-MEDIUM USE COMMERCIAL/INDUSTRIAL DEVELOPMENTS SUCH AS HUBS, OFFICES AND STORAGE SHEDS. EXCLUDES CONCRETE, MILK, FOOD FACTORIES WHICH MAY REQUIRE EXTENSIVE WATER USE AND ADDITIONAL PIPE SIZING.
6. ULTIMATE NUMBER OF METERED CONNECTIONS SUBJECT TO SUBDIVISION STRATEGY.
7. REVIEW SHEETS CI9141-9179 AND CI9171-9172 FOR UTILITY SIZING AND ALLOCATION.
8. NO PROVISIONS FOR POTABLE WATER AND RECYCLED WATER CROSS OVER. REQUIREMENT TO BE DISCUSSED WITH SYDNEY WATER.
9. RECYCLED WATER ASSUMED TO BE LOCATED IN SEPARATE VERGE FROM POTABLE WATER TO ALLOW USE OF PVC PIPES, SYDNEY WATER TO CONFIRM APPROVAL.

CONSULTANT

AECOM

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PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?

☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

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03	03.08.2023	FOR INFORMATION
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01	25.08.2022	FOR INFORMATION
I/R	DATE	DESCRIPTION

FOR INFORMATION ONLY

PROJECT NUMBER

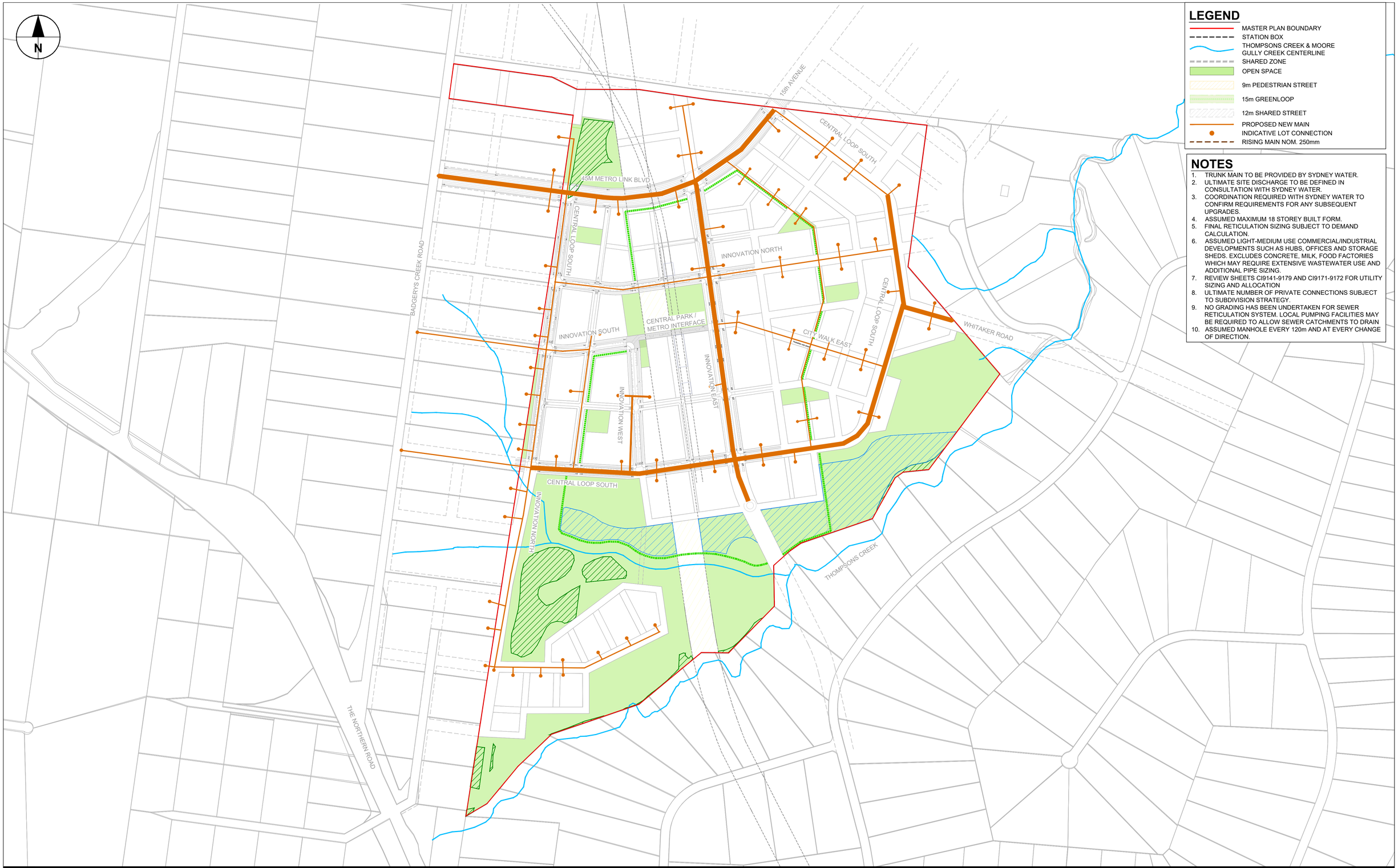
60649974

SHEET TITLE

SERVICING STRATEGY
RECYCLED WATER

SHEET NUMBER

60649974-SKE-00-1000-CI-0002



ISO A1 594mm x 841mm

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AECOM

CONSULTANT

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A.B.N 20 093 846 925
www.aecom.com

PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

I/R	DATE	DESCRIPTION
03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

SERVICING STRATEGY
WASTEWATER

SHEET NUMBER

60649974-SKE-00-1000-CI-0003

ISO A1 594mm x 841mm

Last saved by: MARJORIE CALDA(2023-08-03) Last Plotted: 2023-08-03
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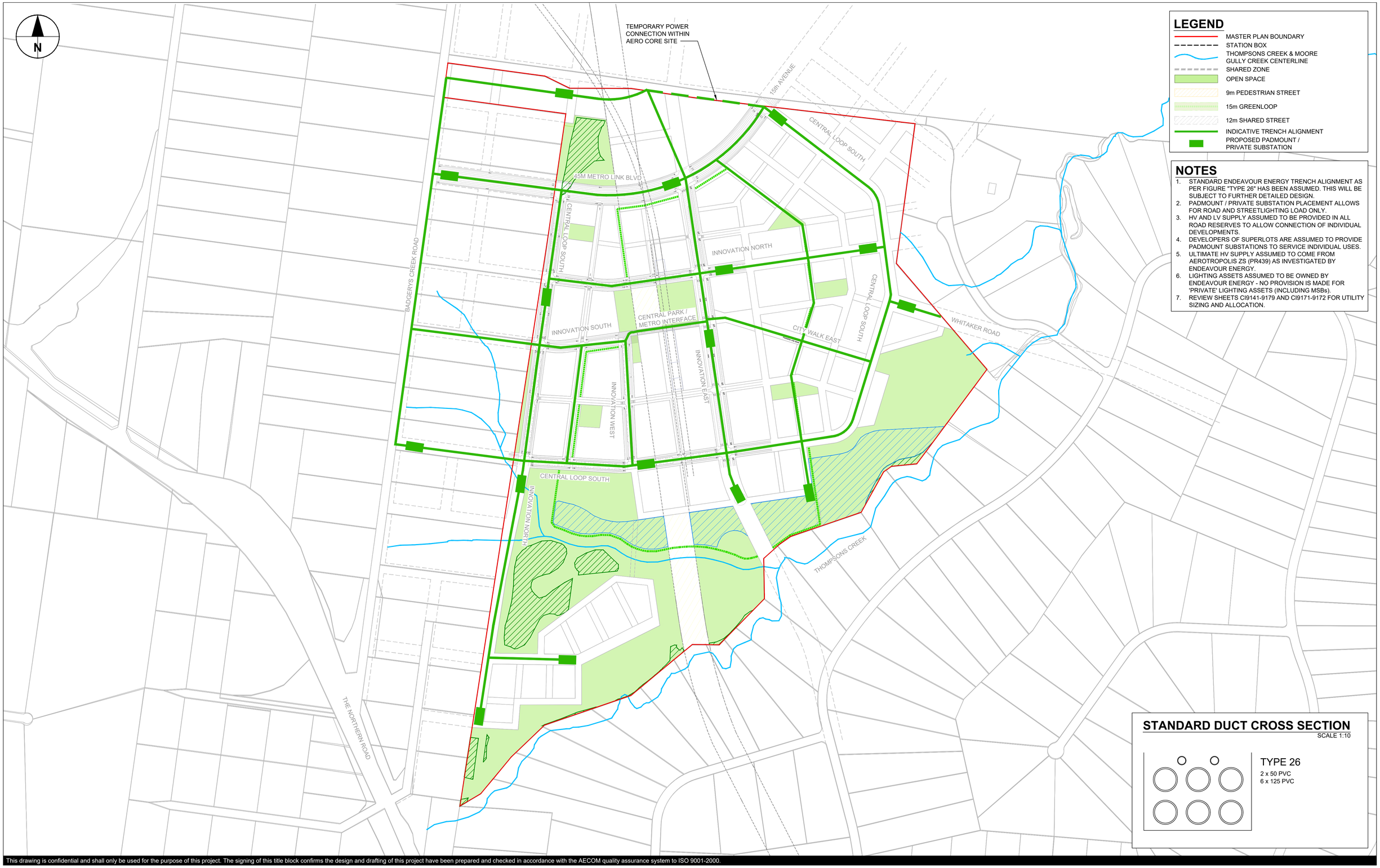

LEGEND

- MASTER PLAN BOUNDARY
- STATION BOX
- THOMPSONS CREEK & MOORE GULLY CREEK CENTERLINE
- SHARED ZONE
- OPEN SPACE
- 9m PEDESTRIAN STREET
- 15m GREENLOOP
- 12m SHARED STREET
- INDICATIVE TRENCH ALIGNMENT
- PROPOSED PADMOUNT / PRIVATE SUBSTATION

NOTES

1. STANDARD ENDEAVOUR ENERGY TRENCH ALIGNMENT AS PER FIGURE "TYPE 26" HAS BEEN ASSUMED. THIS WILL BE SUBJECT TO FURTHER DETAILED DESIGN.
2. PADMOUNT / PRIVATE SUBSTATION PLACEMENT ALLOWS FOR ROAD AND STREETLIGHTING LOAD ONLY.
3. HV AND LV SUPPLY ASSUMED TO BE PROVIDED IN ALL ROAD RESERVES TO ALLOW CONNECTION OF INDIVIDUAL DEVELOPMENTS.
4. DEVELOPERS OF SUPERLOTS ARE ASSUMED TO PROVIDE PADMOUNT SUBSTATIONS TO SERVICE INDIVIDUAL USES.
5. ULTIMATE HV SUPPLY ASSUMED TO COME FROM AEROTROPOLIS ZS (PR439) AS INVESTIGATED BY ENDEAVOUR ENERGY.
6. LIGHTING ASSETS ASSUMED TO BE OWNED BY ENDEAVOUR ENERGY - NO PROVISION IS MADE FOR 'PRIVATE' LIGHTING ASSETS (INCLUDING MSBs).
7. REVIEW SHEETS CI9141-9179 AND CI9171-9172 FOR UTILITY SIZING AND ALLOCATION.

STANDARD DUCT CROSS SECTION

SCALE 1:10

TYPE 26
2 x 50 PVC
6 x 125 PVC

AECOM

CONSULTANT

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www.aecom.com

PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000
0 0.25 0.5 m
1:10

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

I/R	DATE	DESCRIPTION
03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

SERVICING STRATEGY
ELECTRICAL

SHEET NUMBER

60649974-SKE-00-1000-CI-0004

ISO A1 594mm x 841mm

AECOM

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PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

I/R	DATE	DESCRIPTION
03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

SERVICING STRATEGY
HYDROGEN

SHEET NUMBER

60649974-SKE-00-1000-CI-0005

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Filename: \\NA.AECOMNET.COM\LFS\APAC\SYDNEY-AUSY01\SECURE\PROJECTS\607X\60649974_AEROTROPOLIS_UTILITY_CONT\900_CAD_GIS\910_CAD\25_SKETCHES\60649974-SKE-00-1000-CI-0005.DWG

ISO A1 594mm x 841mm

LEGEND

- MASTER PLAN BOUNDARY
- STATION BOX
- THOMPSONS CREEK & MOORE GULLY CREEK CENTERLINE
- SHARED ZONE
- OPEN SPACE
- 9m PEDESTRIAN STREET
- 15m GREENLOOP
- 12m SHARED STREET
- PROPOSED NEW 2x50mm CONDUIT
- INDICATIVE LOT CONNECTION

NOTES

1. ASSUMED LIGHT-MEDIUM USE COMMERCIAL/INDUSTRIAL DEVELOPMENTS SUCH AS HUBS, OFFICES AND STORAGE SHEDS.
2. NO ALLOWANCE HAS BEEN MADE FOR BACK-HAUL LINES FOR DATA CENTRES, CYBER SECURITY, DEFENCE USES OR OTHER.
3. NO PROVISION IS MADE FOR EMBEDDED SMART-CITIES CONDUITS.
4. LEAD-IN SERVICES TO BE IDENTIFIED IN CONSULTATION WITH NBN AND/OR TELSTRA.
5. REVIEW SHEETS CI9141-9179 AND CI9171-9172 FOR UTILITY SIZING AND ALLOCATION.

Last saved by: MARJORIE.CALDA(2023-08-03) Last Plotted: 2023-08-03
Filename: \\NA.AECOMNET.COM\LFS\APAC\SYDNEY-AUSYD1\SECURE\PROJECTS\607X\60649974_AEROTROPOLIS_UTILITY_CONT\900_CAD_GIS\910_CAD\25_SKETCHES\60649974-SKE-00-1000-CI-0006.DWG

CONSULTANT

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PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT | Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?

☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION
I/R	DATE	DESCRIPTION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

SERVICING STRATEGY
TELECOMMUNICATIONS

SHEET NUMBER

60649974-SKE-00-1000-CI-0006

ISO A1 594mm x 841mm

Last saved by: MARJORIE.CALDA(2023-08-03) Last Plotted: 2023-08-03
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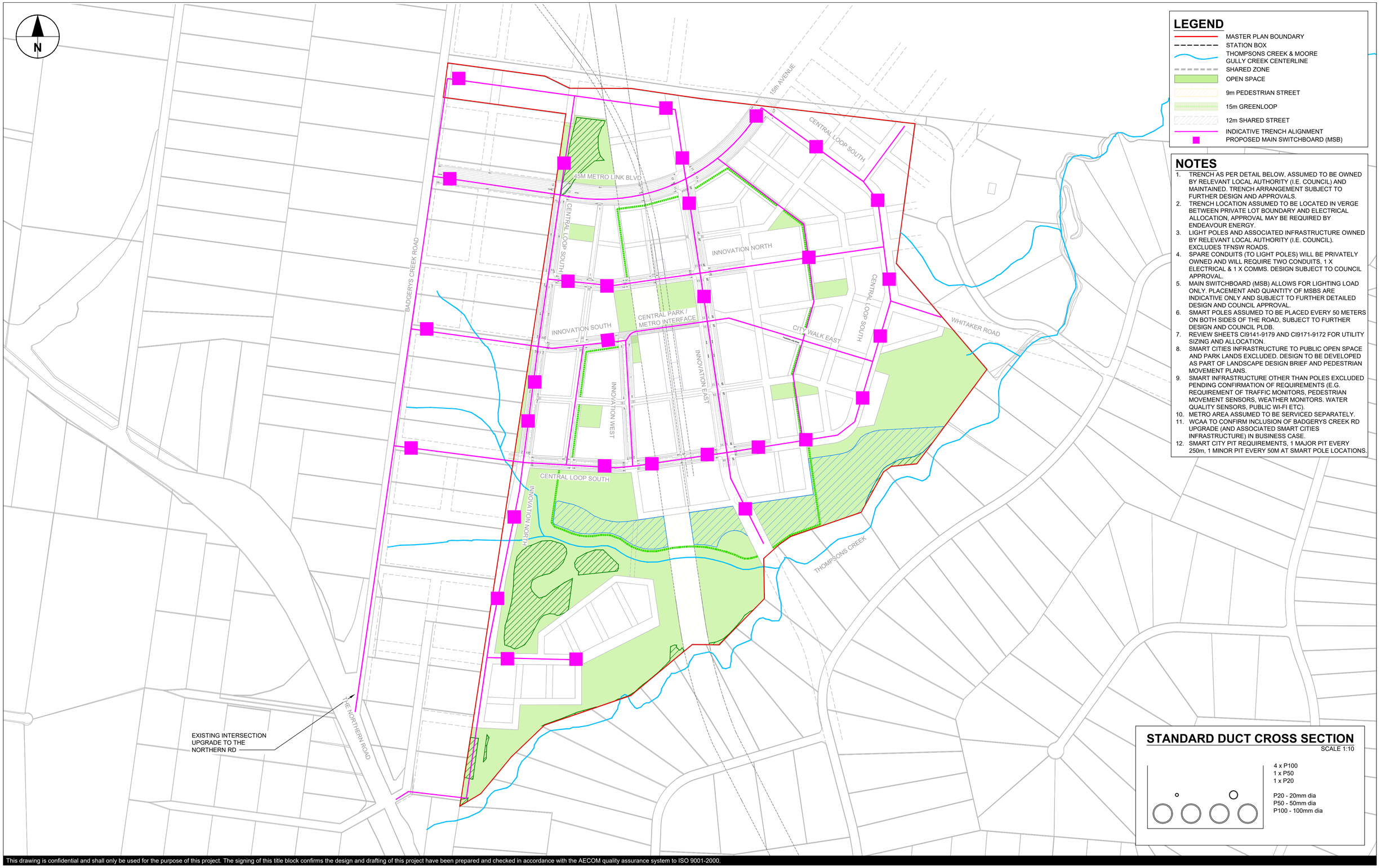

LEGEND

- MASTER PLAN BOUNDARY
- STATION BOX
- THOMPSONS CREEK & MOORE GULLY CREEK CENTERLINE
- SHARED ZONE
- OPEN SPACE
- 9m PEDESTRIAN STREET
- 15m GREENLOOP
- 12m SHARED STREET
- INDICATIVE TRENCH ALIGNMENT
- PROPOSED MAIN SWITCHBOARD (MSB)

NOTES

1. TRENCH AS PER DETAIL BELOW, ASSUMED TO BE OWNED BY RELEVANT LOCAL AUTHORITY (I.E. COUNCIL) AND MAINTAINED. TRENCH ARRANGEMENT SUBJECT TO FURTHER DESIGN AND APPROVALS.
2. TRENCH LOCATION ASSUMED TO BE LOCATED IN VERGE BETWEEN PRIVATE LOT BOUNDARY AND ELECTRICAL ALLOCATION, APPROVAL MAY BE REQUIRED BY ENDEAVOUR ENERGY.
3. LIGHT POLES AND ASSOCIATED INFRASTRUCTURE OWNED BY RELEVANT LOCAL AUTHORITY (I.E. COUNCIL). EXCLUDES TFNSW ROADS.
4. SPARE CONDUITS (TO LIGHT POLES) WILL BE PRIVATELY OWNED AND WILL REQUIRE TWO CONDUITS, 1 X ELECTRICAL & 1 X COMMS. DESIGN SUBJECT TO COUNCIL APPROVAL.
5. MAIN SWITCHBOARD (MSB) ALLOWS FOR LIGHTING LOAD ONLY. PLACEMENT AND QUANTITY OF MSBS ARE INDICATIVE ONLY AND SUBJECT TO FURTHER DETAILED DESIGN AND COUNCIL APPROVAL.
6. SMART POLES ASSUMED TO BE PLACED EVERY 50 METERS ON BOTH SIDES OF THE ROAD, SUBJECT TO FURTHER DESIGN AND COUNCIL PLDB.
7. REVIEW SHEETS CI9141-9179 AND CI9171-9172 FOR UTILITY SIZING AND ALLOCATION.
8. SMART CITIES INFRASTRUCTURE TO PUBLIC OPEN SPACE AND PARK LANDS EXCLUDED. DESIGN TO BE DEVELOPED AS PART OF LANDSCAPE DESIGN BRIEF AND PEDESTRIAN MOVEMENT PLANS.
9. SMART INFRASTRUCTURE OTHER THAN POLES EXCLUDED PENDING CONFIRMATION OF REQUIREMENTS (E.G. REQUIREMENT OF TRAFFIC MONITORS, PEDESTRIAN MOVEMENT SENSORS, WEATHER MONITORS. WATER QUALITY SENSORS, PUBLIC WI-FI ETC).
10. METRO AREA ASSUMED TO BE SERVICED SEPARATELY.
11. WCAA TO CONFIRM INCLUSION OF BADGERYS CREEK RD UPGRADE (AND ASSOCIATED SMART CITIES INFRASTRUCTURE) IN BUSINESS CASE.
12. SMART CITY PIT REQUIREMENTS, 1 MAJOR PIT EVERY 250m, 1 MINOR PIT EVERY 50M AT SMART POLE LOCATIONS.

STANDARD DUCT CROSS SECTION

SCALE 1:10

4 x P100
1 x P50
1 x P20

P20 - 20mm dia
P50 - 50mm dia
P100 - 100mm dia

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CONSULTANT

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PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

0 0.25 0.5 m
1:10

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?

☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

I/R	DATE	DESCRIPTION
03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

SERVICING STRATEGY
SMART CITIES

SHEET NUMBER

60649974-SKE-00-1000-CI-0007

ISO A1 594mm x 841mm

LEGEND

- MASTER PLAN BOUNDARY
- STATION BOX
- THOMPSONS CREEK & MOORE GULLY CREEK CENTERLINE
- SHARED ZONE
- OPEN SPACE
- 9m PEDESTRIAN STREET
- 15m GREENLOOP
- 12m SHARED STREET
- PROPOSED NEW 2mm CONDUIT
- INDICATIVE LOT CONNECTION

NOTES

1. ORGANIC FOOD WASTE ALLOCATION HAS BEEN INCLUDED IN CONSULTATION WITH WPCA. FURTHER DEVELOPMENT WILL BE NEEDED.
2. ORGANIC FOOD WASTE TO ALLOW FOR 1X100mm PVC PIPES
3. BUILDING CONNECTIONS ARE SPECULATIVE AND SUBJECT TO CHANGE.
4. REVIEW SHEETS CI9141-9179 AND CI9171-9172 FOR UTILITY SIZING AND ALLOCATION.

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PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT | Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?

☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION
I/R	DATE	DESCRIPTION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

SERVICING STRATEGY
DISTRICT COOLING

SHEET NUMBER

60649974-SKE-00-1000-CI-0008

ISO A1 594mm x 841mm

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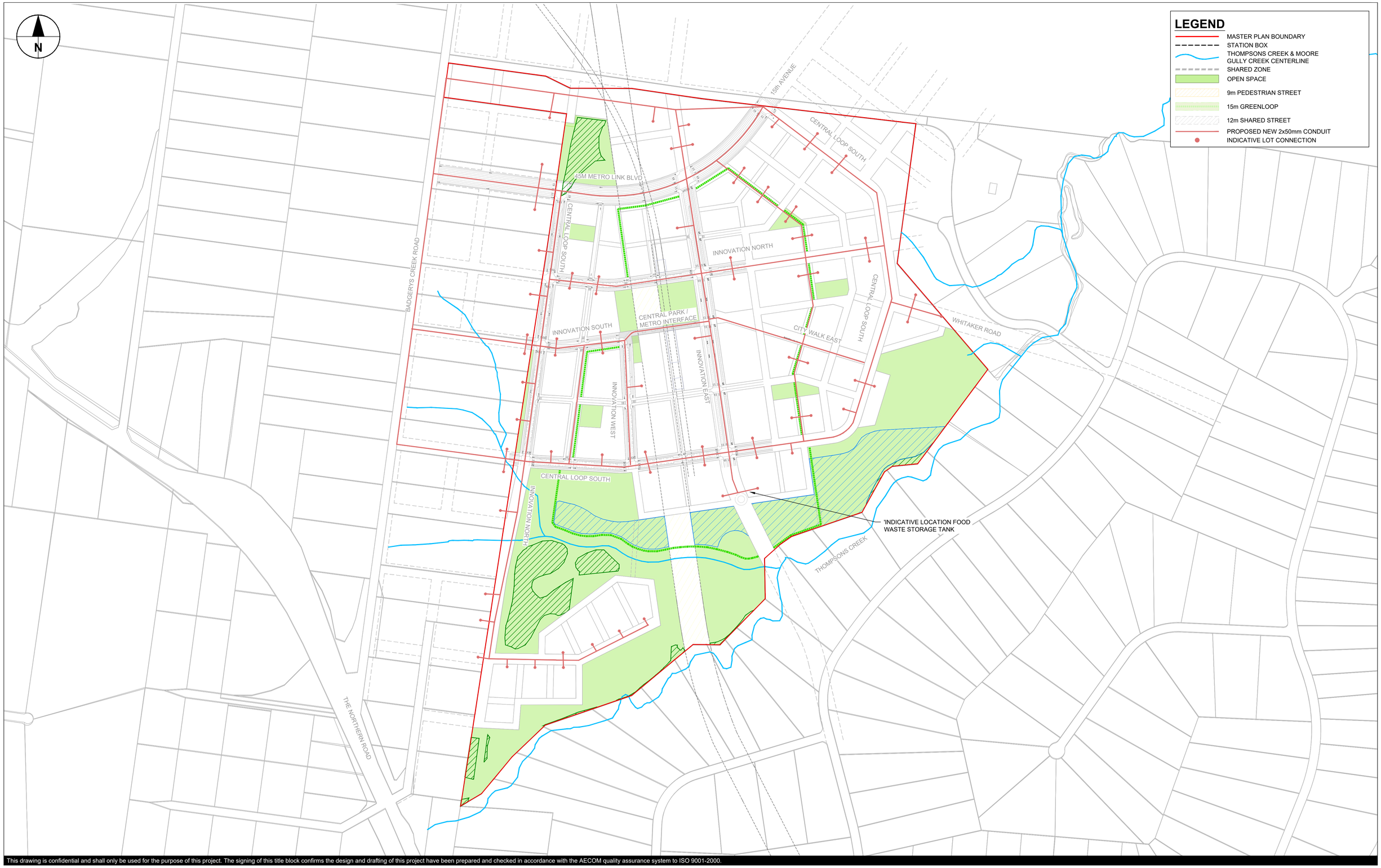

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www.aecom.com

PROJECT

AEROTROPOLIS
MASTER PLAN

CLIENT

NSW GOVERNMENT | Western City & Aerotropolis Authority

KEY PLAN

SCALE BAR

0 100 200 m
1:4000

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM		SURVEY	

ISSUE/REVISION

03	03.08.2023	FOR INFORMATION
02	09.09.2022	FOR INFORMATION
01	25.08.2022	FOR INFORMATION
I/R	DATE	DESCRIPTION

FOR INFORMATION ONLY

PROJECT NUMBER

60649974

SHEET TITLE

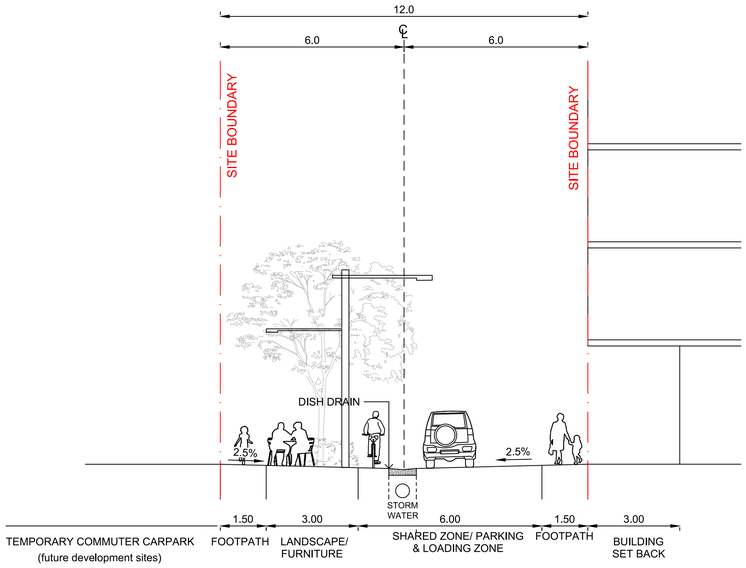
SERVICING STRATEGY
ORGANIC FOOD WASTE

SHEET NUMBER

60649974-SKE-00-1000-CI-0009

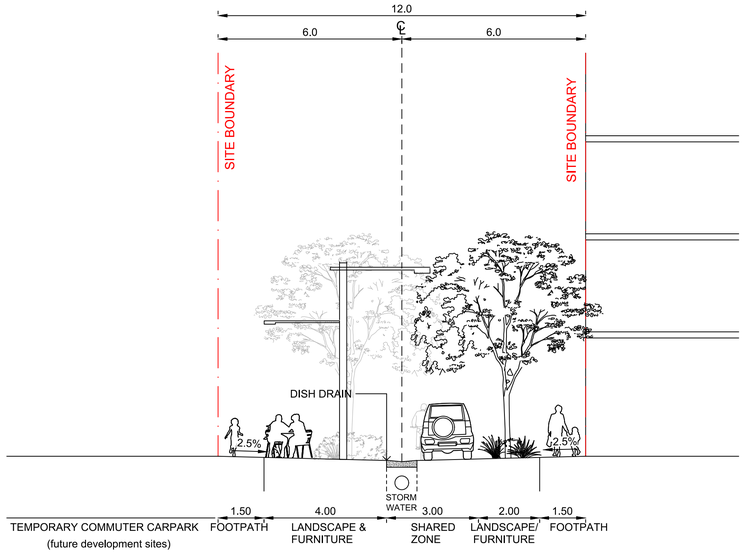
NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
2. SERVICE CROSSINGS HAVE NOT BEEN SHOWN - BUT SHOULD BE ALLOWED AT ALL INTERSECTIONS;
3. ALLOWANCE FOR PITS, VALVES, HYDRANTS HAS NOT BEEN SHOWN ON PLANS - THIS SHOULD BE DETAILED AS PART OF DETAILED DESIGN.
4. SERVICES CONDUIT ALLOWANCES HAVE NOT YET BEEN APPROVED WITH RELEVANT STATUTORY AUTHORITIES.
5. ALLOCATION OF DISTRICT COOLING TO BE FURTHER COORDINATED WITH OTHER SERVICES.
6. DISTRICT COOLING AND HYDROGEN ALLOCATION HAVE BEEN INCLUDED IN CONSULTATION WITH WPCA.
7. ALLOW FOR 2 X 600mm PRE-INSULATED MILD STEEL FOR DISTRICT COOLING.
8. SEE PLANS BY TURF TO CONFIRM LANDSCAPING AND MATERIAL PALETTE TREATMENTS.



1 | 12m SHARED STREET - 1

Scale 1:100

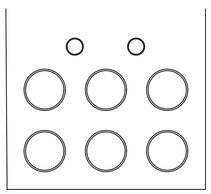


2 | 12m SHARED STREET - 2

Scale 1:100

TYP. ELECT DUCT CROSS SECTION

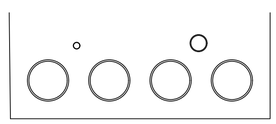
Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

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CONSULTANT

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www.aecom.com

PROJECT

AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT

NSW GOVERNMENT Western Parkland City Authority

KEY PLAN

SCALE BAR

0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	11.08.2022	FOR INFORMATION

PROJECT NUMBER

60646285

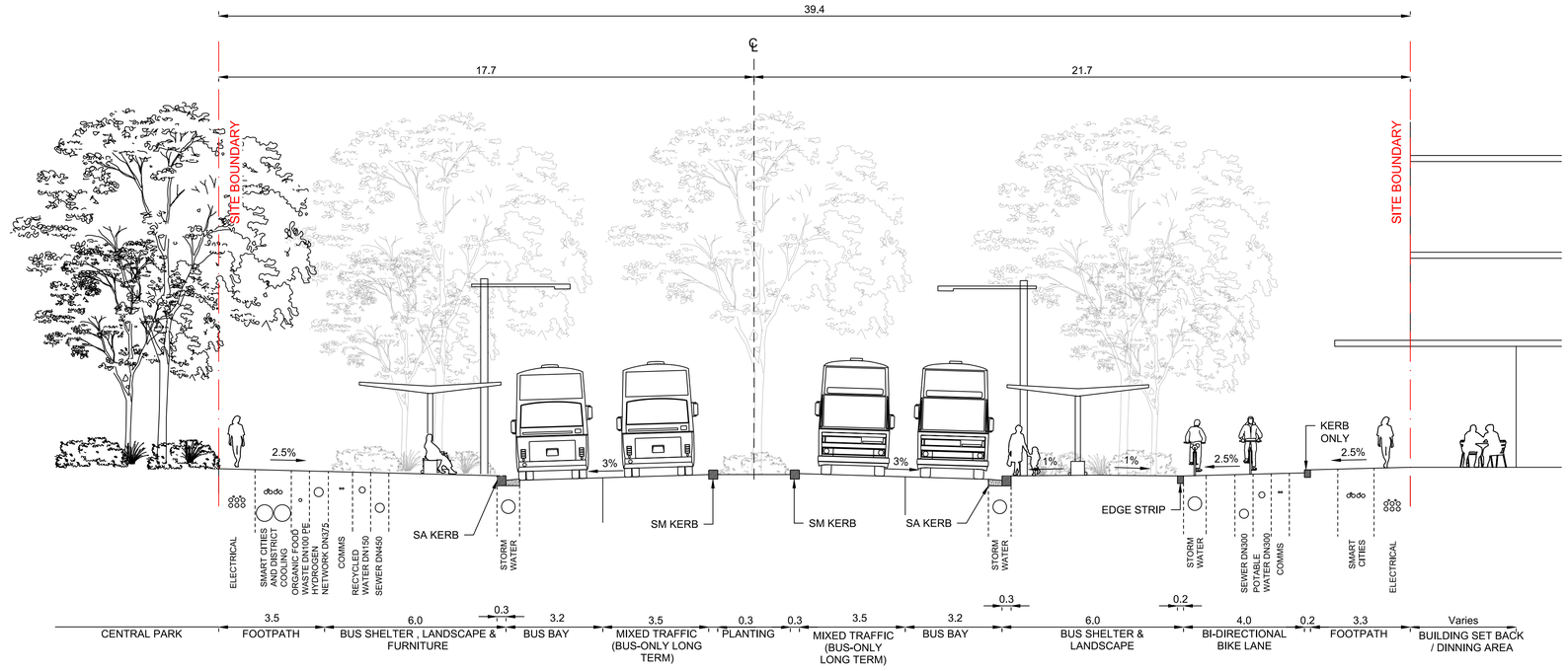
SHEET TITLE

TYPICAL SECTION
SHEET 01

SHEET NUMBER

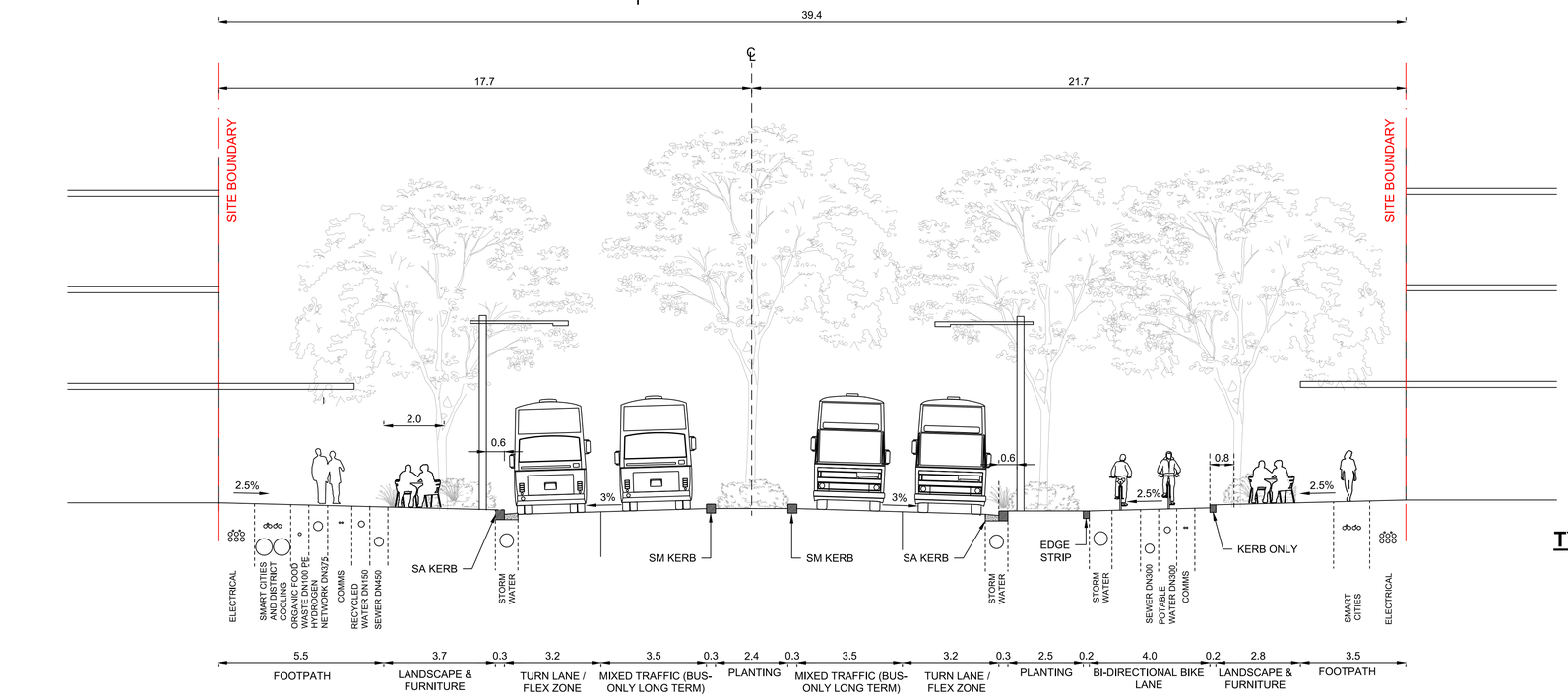
60646285-SKE-00-0000-CI-9141

ISO A1 594mm x 841mm



3 | INNOVATION EAST (BUS STOP ZONE)

Scale 1:100



4 | INNOVATION EAST (OUTSIDE BUS STOP ZONE)

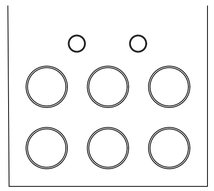
Scale 1:100

NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
2. SERVICE CROSSINGS HAVE NOT BEEN SHOWN - BUT SHOULD BE ALLOWED AT ALL INTERSECTIONS;
3. ALLOWANCE FOR PITS, VALVES, HYDRANTS HAS NOT BEEN SHOWN ON PLANS - THIS SHOULD BE DETAILED AS PART OF DETAILED DESIGN.
4. SERVICES CONDUIT ALLOWANCES HAVE NOT YET BEEN APPROVED WITH RELEVANT STATUTORY AUTHORITIES.
5. ALLOCATION OF DISTRICT COOLING TO BE FURTHER COORDINATED WITH OTHER SERVICES.
6. DISTRICT COOLING AND HYDROGEN ALLOCATION HAVE BEEN INCLUDED IN CONSULTATION WITH WPCA.
7. ALLOW FOR 2 X 600mm PRE-INSULATED MILD STEEL FOR DISTRICT COOLING.
8. SEE PLANS BY TURF TO CONFIRM LANDSCAPING AND MATERIAL PALETTE TREATMENTS.

TYP. ELECT DUCT CROSS SECTION

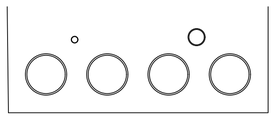
Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

CONSULTANT

AECOM Australia Pty Ltd
A.B.N 20 093 846 925
www.aecom.com

PROJECT

AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT

NSW GOVERNMENT | Western Parkland City Authority

KEY PLAN

SCALE BAR

0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
04	31.08.2022	FOR INFORMATION
03	24.08.2022	FOR INFORMATION
02	12.08.2022	FOR INFORMATION
01	11.08.2022	FOR INFORMATION

PROJECT NUMBER

60646285

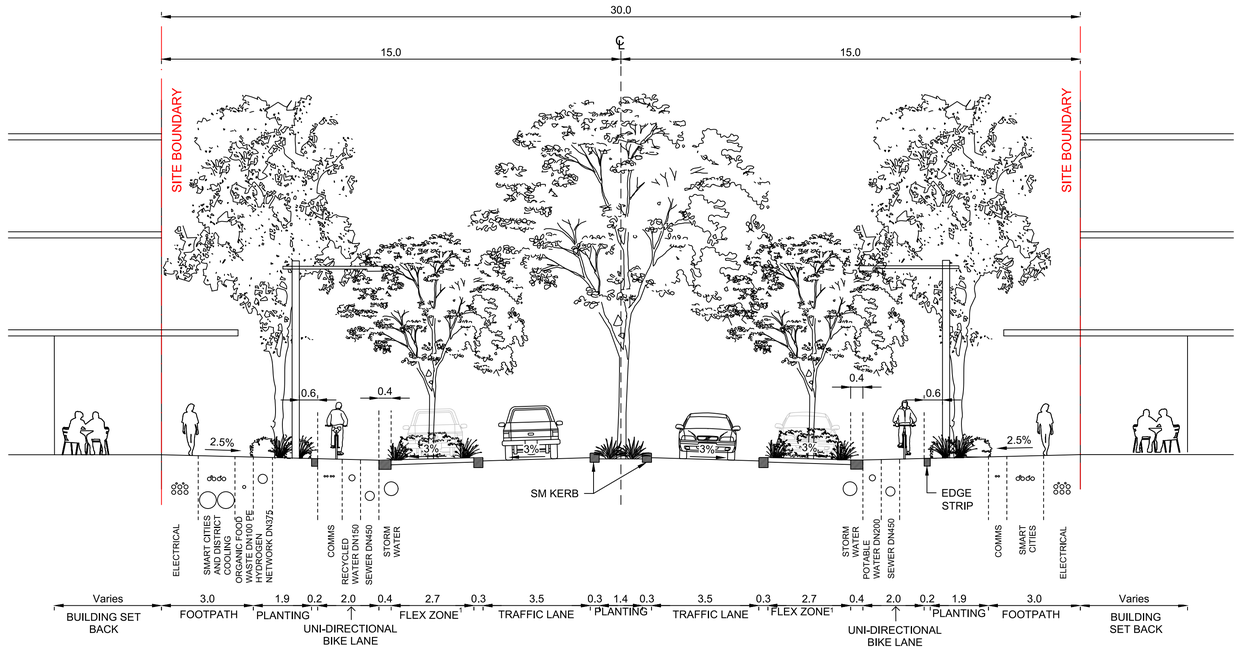
SHEET TITLE

TYPICAL SECTION
SHEET 02

SHEET NUMBER

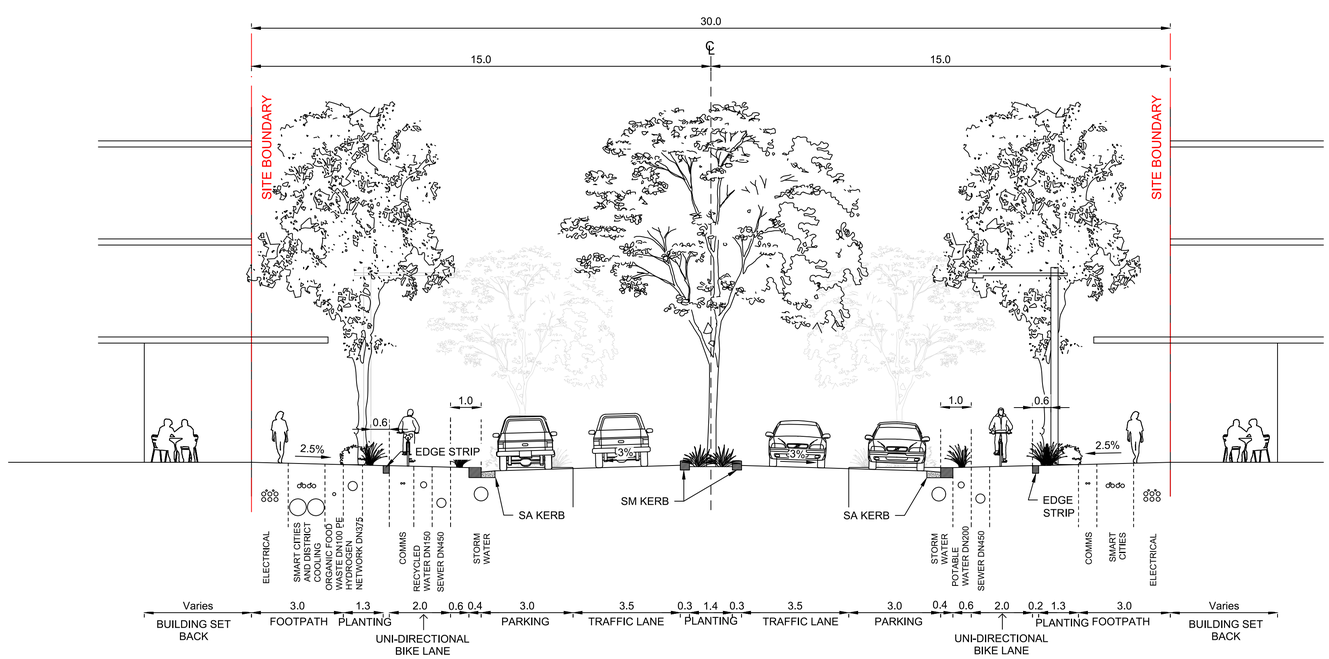
60646285-SKE-00-0000-CI-9142

ISO A1 594mm x 841mm



5 - CENTRE LOOP SOUTH (DAY ONE) - PLANTER ZONE

Scale 1:100



6 - CENTRE LOOP SOUTH (DAY ONE) - PARKING BAY

Scale 1:100

NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
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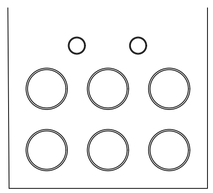
8. SEE PLANS BY TURF TO CONFIRM LANDSCAPING AND MATERIAL PALETTE TREATMENTS.

TYP. ELECT DUCT CROSS SECTION

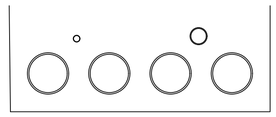
Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

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CONSULTANT

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PROJECT

AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT

NSW GOVERNMENT Western Parkland City Authority

KEY PLAN

SCALE BAR

0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

02	31.08.2022	FOR INFORMATION
01	11.08.2022	FOR INFORMATION
I/R	DATE	DESCRIPTION

PROJECT NUMBER

60646285

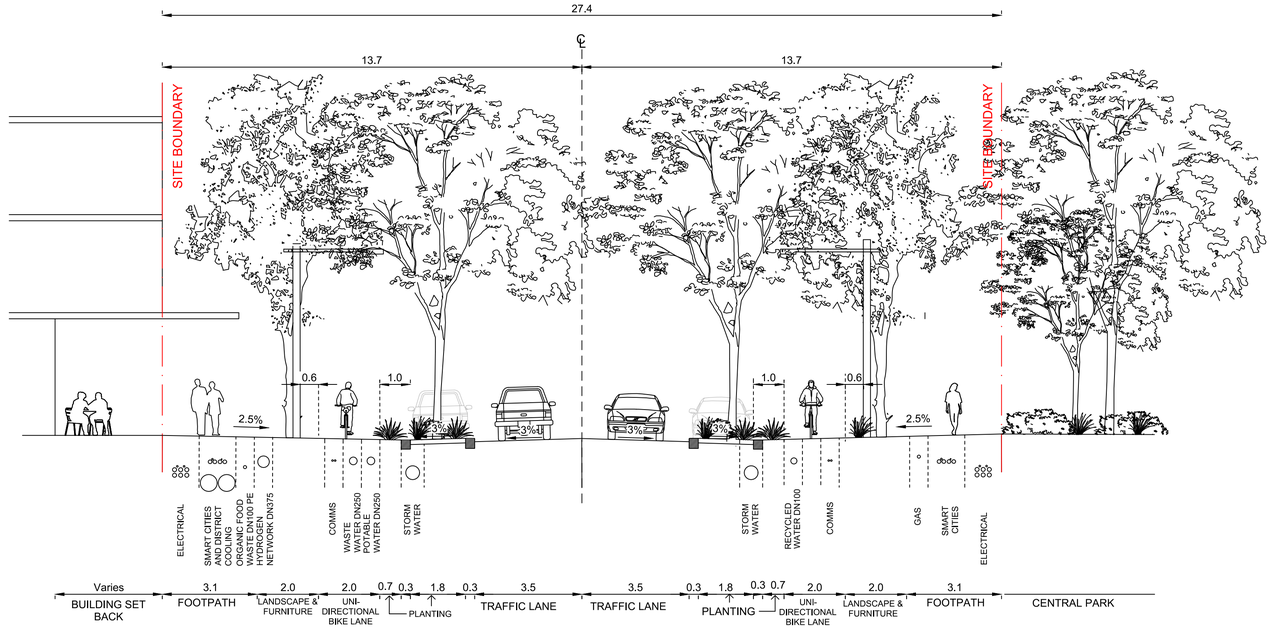
SHEET TITLE

TYPICAL SECTION
SHEET 03

SHEET NUMBER

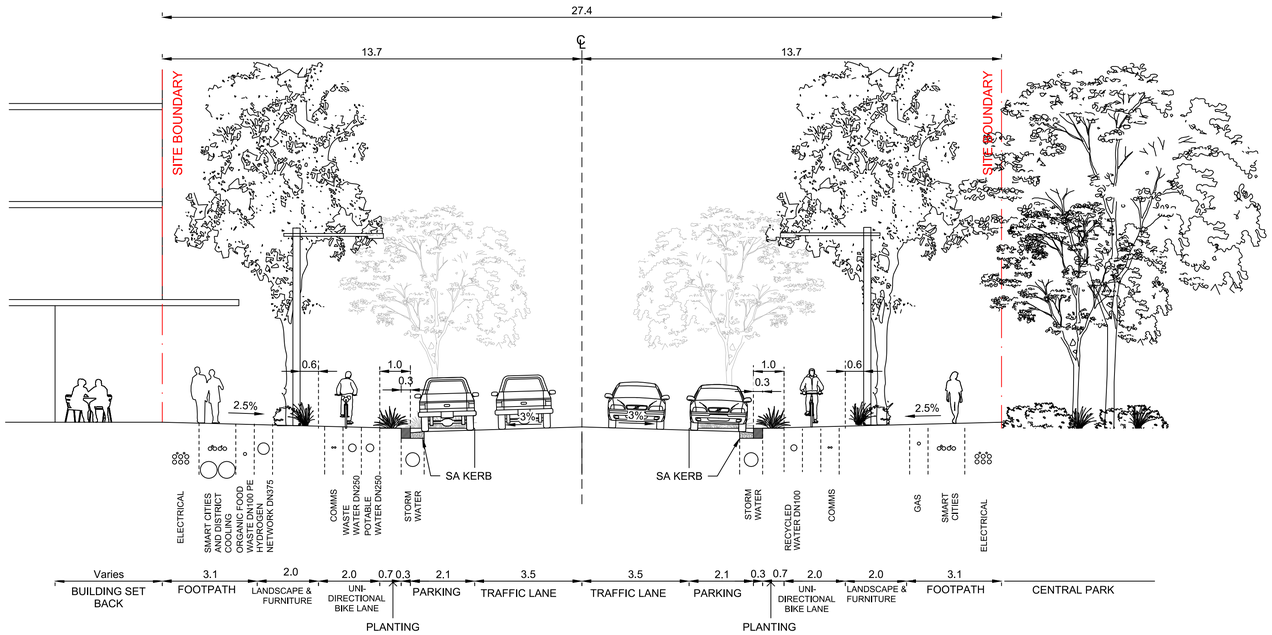
60646285-SKE-00-0000-CI-9143

ISO A1 594mm x 841mm



7 | INNOVATION NORTH - PLANTER ZONE

Scale 1:100



8 | INNOVATION NORTH - PARKING BAY

Scale 1:100

NOTES

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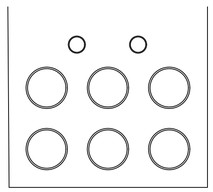
TYP. ELECT DUCT CROSS SECTION

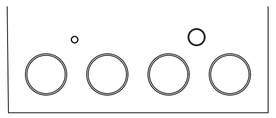
Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

AECOM

CONSULTANT

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PROJECT

AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT

NSW GOVERNMENT | Western Parkland City Authority

KEY PLAN

SCALE BAR

0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?

☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	11.08.2022	FOR INFORMATION

PROJECT NUMBER

60646285

SHEET TITLE

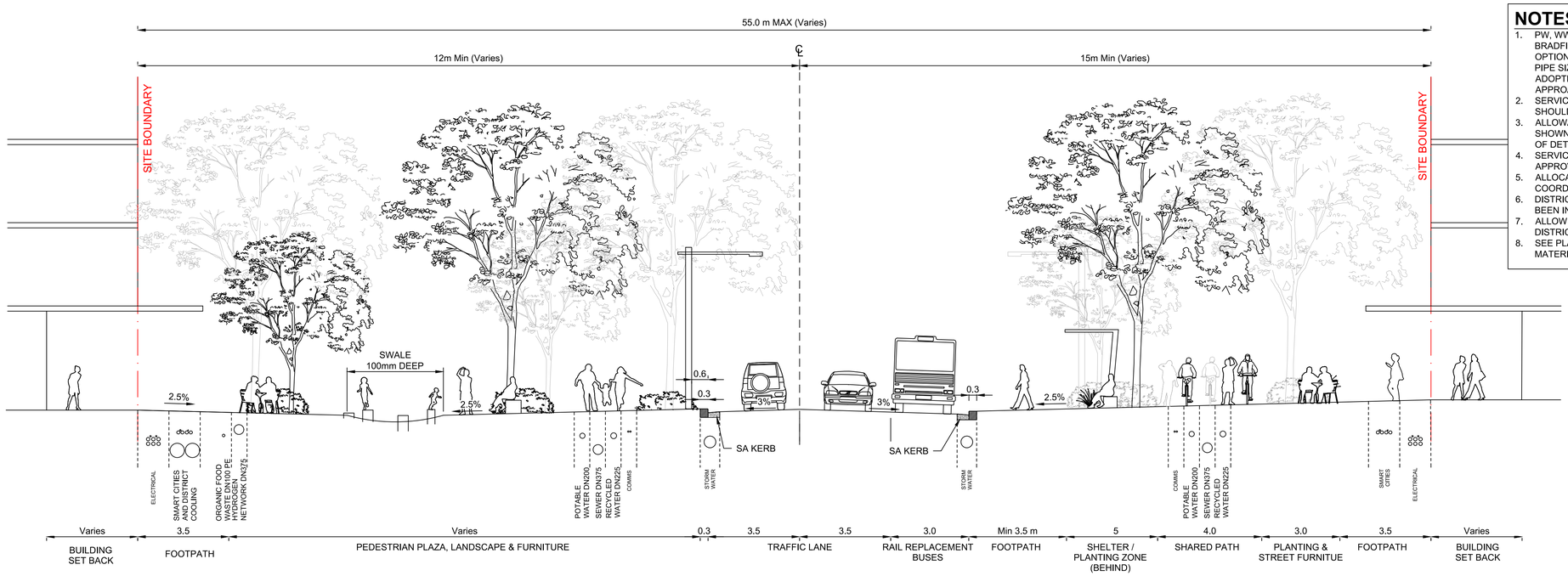
TYPICAL SECTION
SHEET 04

SHEET NUMBER

60646285-SKE-00-0000-CI-9144

Last saved by: JEFFLANG.YAN (2022-08-31) Last Plotted: 2022-08-31
Filename: C:\PWWORKING\AECOM_DS10_AU\JEFFLANG.YAN@AECOM.COM\D044808360646285-SKE-00-0000-CI-9144.DWG

ISO A1 594mm x 841mm



9 | INNOVATION SOUTH TYPICAL SECTION (EAST - WEST ALIGNMENT)

Scale 1:100

NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
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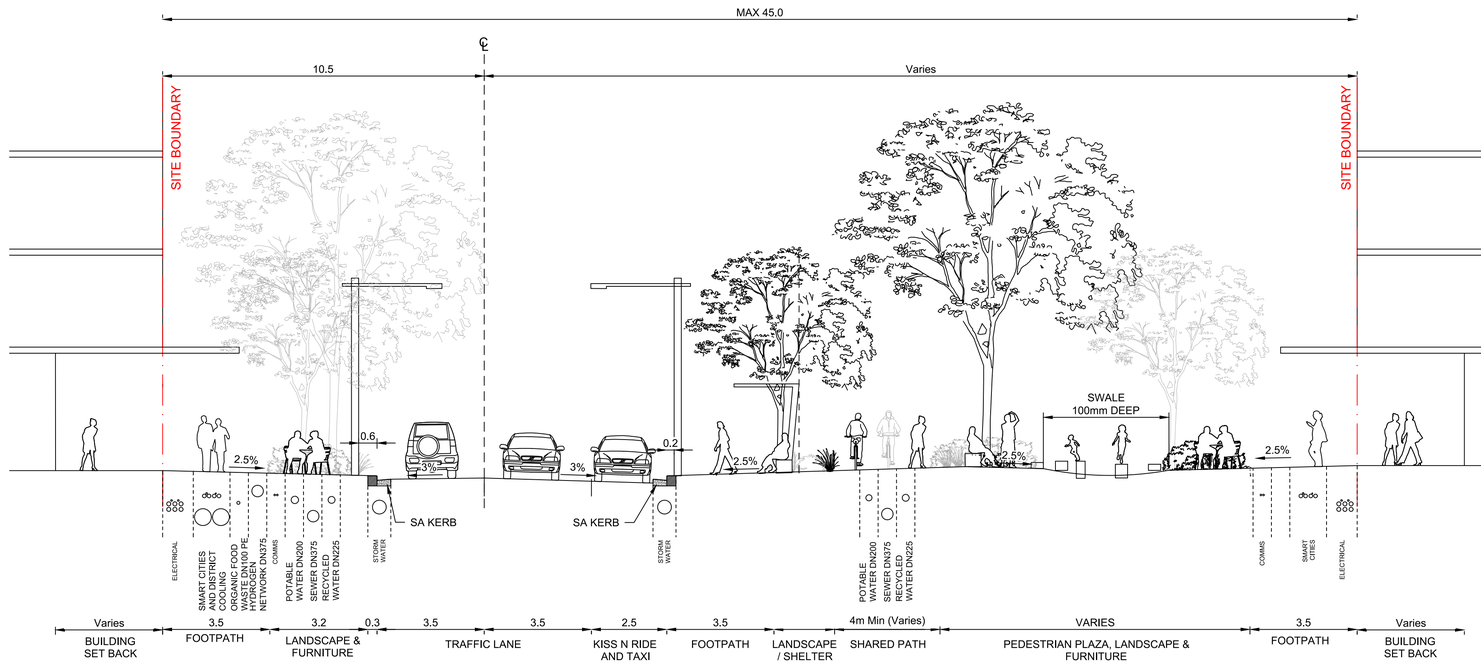
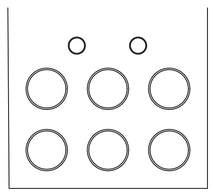


10 | INNOVATION WEST TYPICAL SECTION (NORTH - SOUTH ALIGNMENT)

Scale 1:100

TYP. ELECT DUCT CROSS SECTION

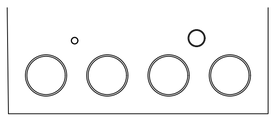
Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

CONSULTANT

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PROJECT

AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT

NSW GOVERNMENT | Western Parkland City Authority

KEY PLAN

SCALE BAR

0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION

ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?

☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	11.08.2022	FOR INFORMATION

PROJECT NUMBER

60646285

SHEET TITLE

TYPICAL SECTION
SHEET 05

SHEET NUMBER

60646285-SKE-00-0000-CI-9145

Last saved by: JEFFLANG.YAN(2022-08-31) Last Plotted: 2022-08-31
Filename: C:\PWWORKING\AECOM_DS10_AU\JEFFLANG.YAN@AECOM.COM\D0448083\60646285-SKE-00-0000-CI-9145.DWG

ISO A1 594mm x 841mm

NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
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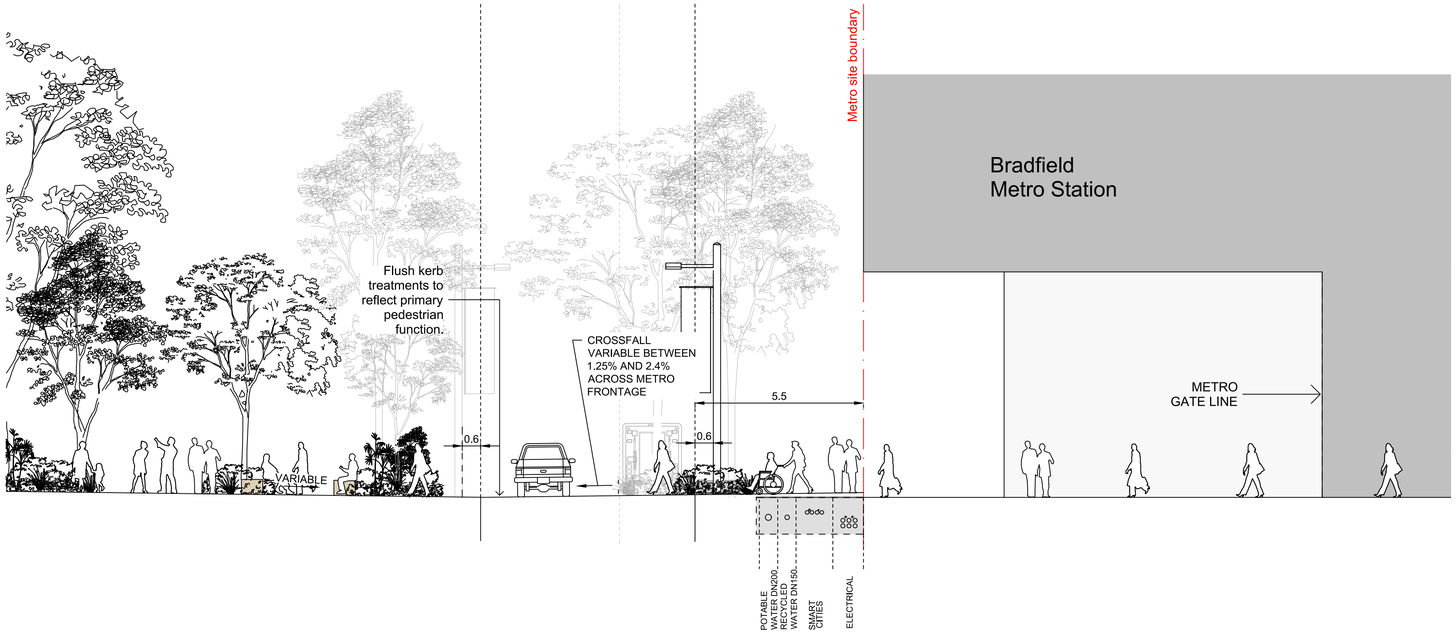
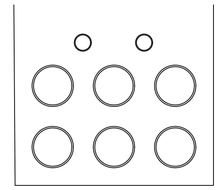


11 - CENTRAL PARK - METRO INTERFACE

Scale 1:100

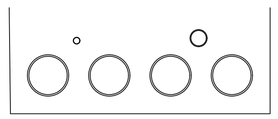
TYP. ELECT DUCT CROSS SECTION

Scale 1:10



TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



CONSULTANT
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A.B.N 20 093 846 925
www.aecom.com

PROJECT
AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT
NSW GOVERNMENT Western Parkland City Authority

KEY PLAN

SCALE BAR
0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION
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☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
03	31.08.2022	FOR INFORMATION
02	12.08.2022	FOR INFORMATION
01	11.08.2022	FOR INFORMATION

PROJECT NUMBER
60646285

SHEET TITLE
TYPICAL SECTION
SHEET 05

SHEET NUMBER
60646285-SKE-00-0000-CI-9146

Last saved by: CHENUH(2022-08-18) Last Plotted: 2022-08-31
Filename: C:\PW\WORKING\AECOM_DS10_AU\JEFFLANG.YAN@AECOM.COM\D0448083\60646285-SKE-00-0000-CI-9146.DWG

ISO A1 594mm x 841mm

NOTES

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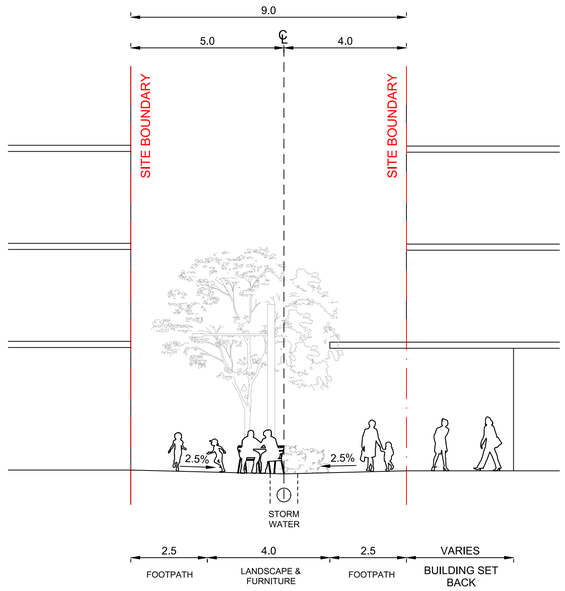
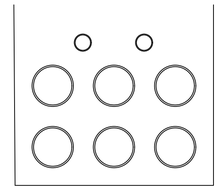


1 - 9m PEDESTRIAN STREET - SECTION
Scale 1:100

TYP. ELECT DUCT CROSS SECTION

Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10

4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

Last saved by: CHENJH(2022-08-18) Last Plotted: 2022-08-31
Filename: C:\PWWORKING\AECOM_DS10_AU\JEFFLANG.YAN@AECOM.COM\D0448083\60646285-SKE-00-0000-CI-9147.DWG

CONSULTANT
AECOM Australia Pty Ltd
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PROJECT
AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT
NSW GOVERNMENT Western Parkland City Authority

KEY PLAN

SCALE BAR
0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION
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☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	17.08.2022	FOR INFORMATION

PROJECT NUMBER
60646285

SHEET TITLE
TYPICAL SECTION
SHEET 07

SHEET NUMBER
60646285-SKE-00-0000-CI-9147

ISO A1 594mm x 841mm

NOTES

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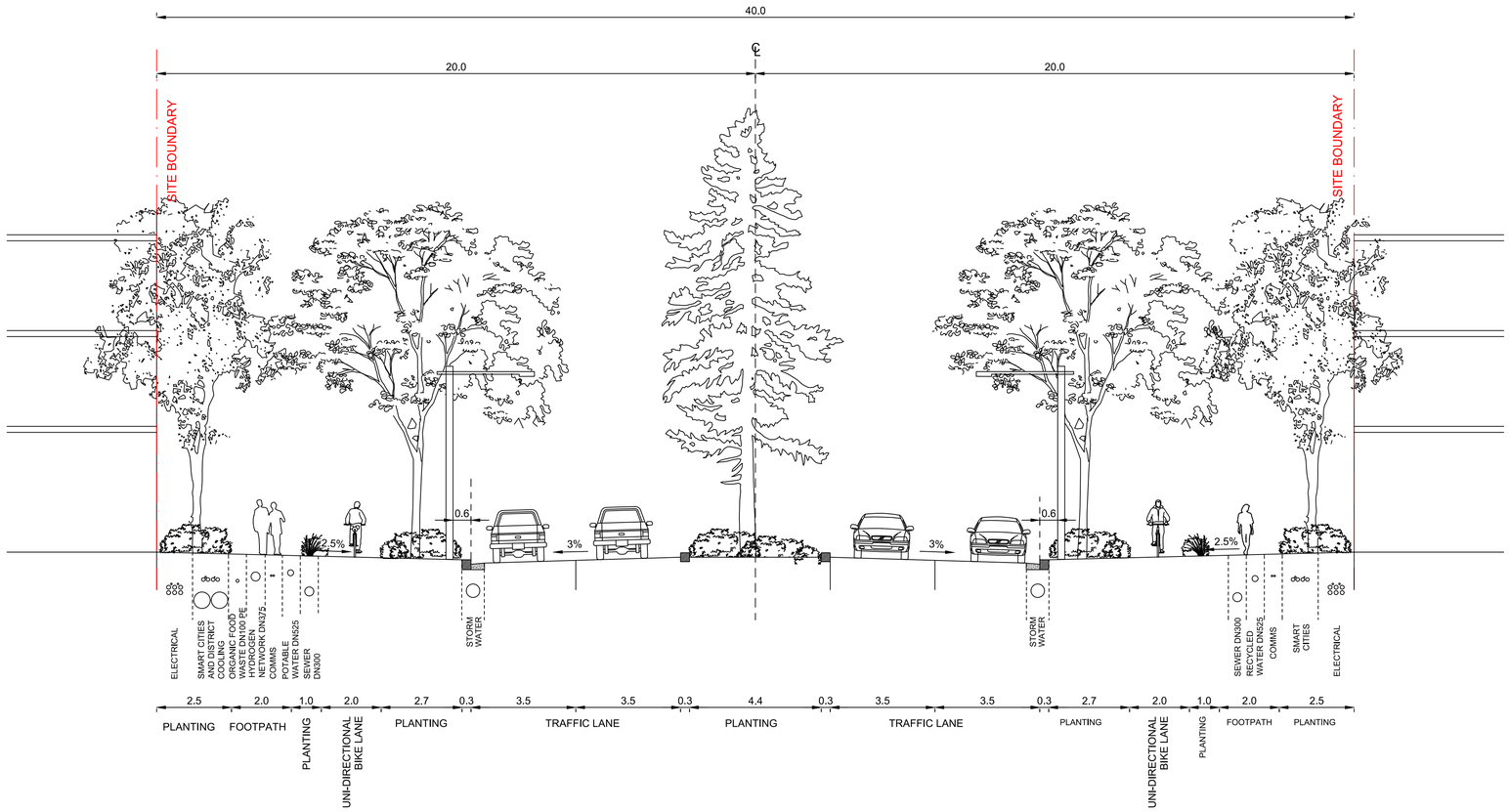
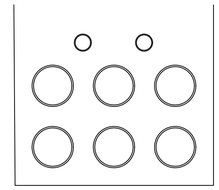


1 | 40m WHITAKER ROAD - SECTION
Scale 1:100

TYP. ELECT DUCT CROSS SECTION

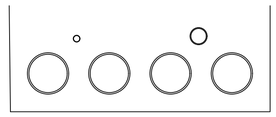
Scale 1:10



TYPE 26
2 x 50 PVC
6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10



4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

CONSULTANT
AECOM Australia Pty Ltd
A.B.N 20 093 846 925
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PROJECT
AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT
NSW GOVERNMENT | Western Parkland City Authority

KEY PLAN

SCALE BAR
0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION
ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	17.08.2022	FOR INFORMATION

PROJECT NUMBER
60646285

SHEET TITLE
TYPICAL SECTION
SHEET 08

SHEET NUMBER
60646285-SKE-00-0000-CI-9148

NOTES

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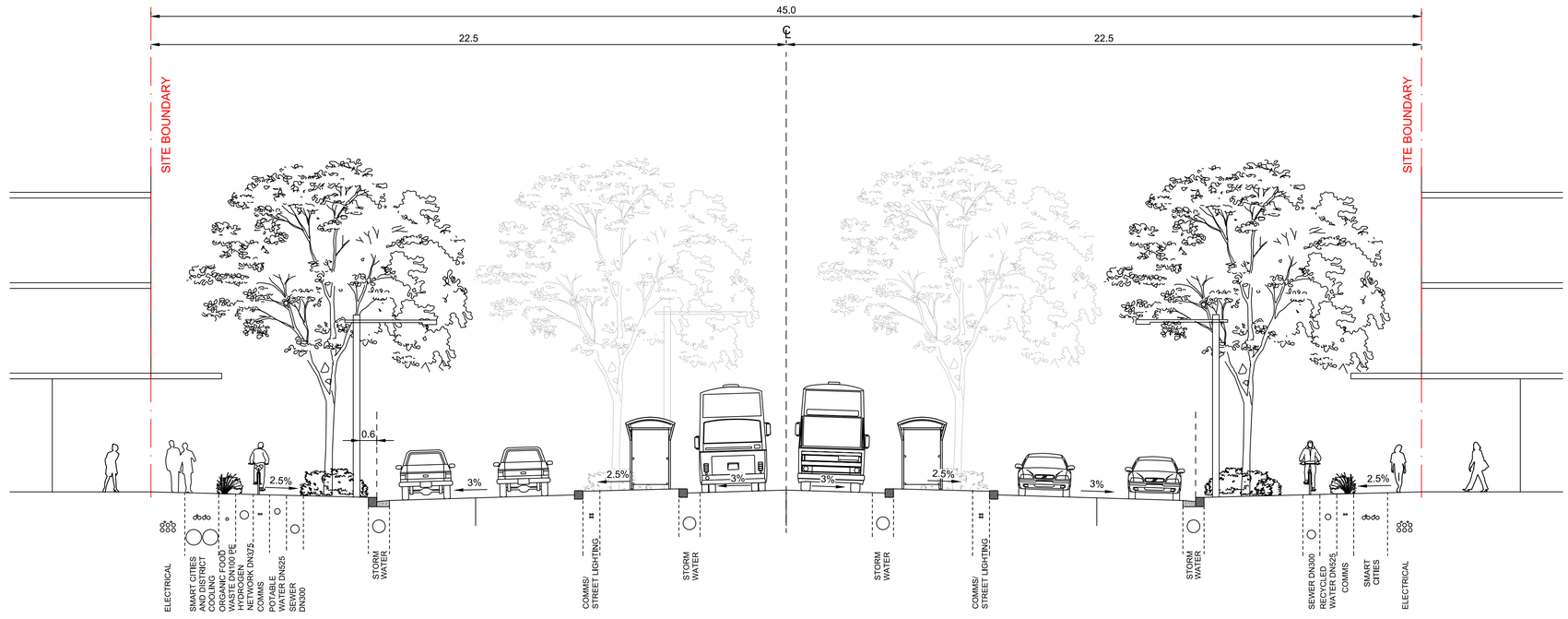
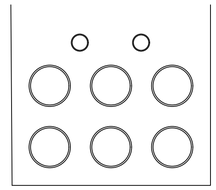


1 - 45m METRO LINK BOULEVARD - SECTION

Scale 1:100

TYP. ELECT DUCT CROSS SECTION

Scale 1:10



TYPE 26
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6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10

4 x P100
1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

CONSULTANT
AECOM Australia Pty Ltd
A.B.N 20 093 846 925
www.aecom.com

PROJECT
AEROTROPOLIS CORE PRECINCT BRINGELLY

CLIENT
NSW GOVERNMENT Western Parkland City Authority

KEY PLAN

SCALE BAR
0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION
ARE THERE ANY ADDITIONAL HAZARDS / RISKS NOT NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING?
☐ NO
☐ YES

PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

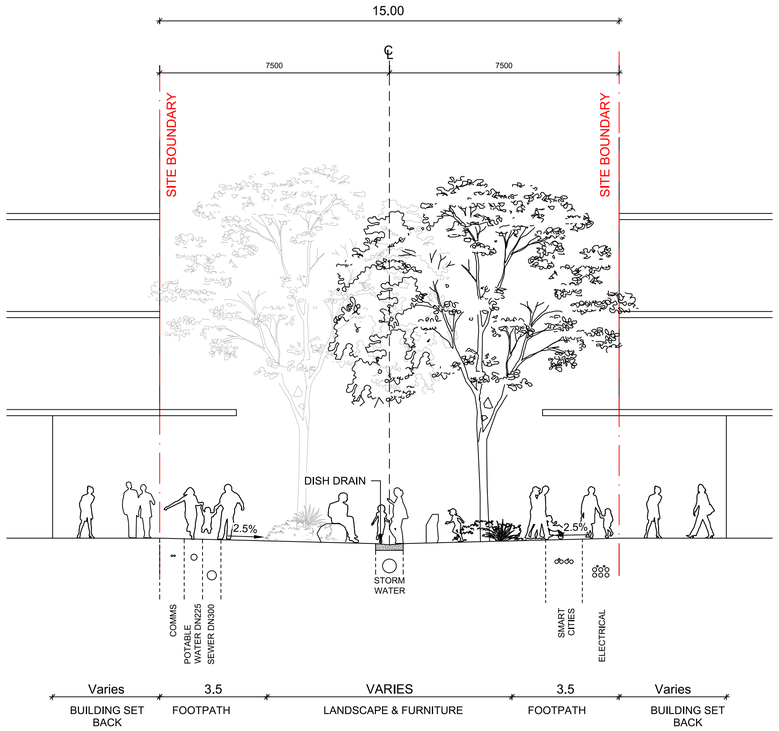
I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	17.08.2022	FOR INFORMATION

PROJECT NUMBER
60646285

SHEET TITLE
TYPICAL SECTION
SHEET 09

SHEET NUMBER
60646285-SKE-00-0000-CI-9149

ISO A1 594mm x 841mm



1 15m GREEN LOOP

-

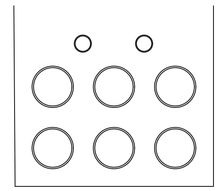
Scale 1:100

NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
2. SERVICE CROSSINGS HAVE NOT BEEN SHOWN - BUT SHOULD BE ALLOWED AT ALL INTERSECTIONS;
3. ALLOWANCE FOR PITS, VALVES, HYDRANTS HAS NOT BEEN SHOWN ON PLANS - THIS SHOULD BE DETAILED AS PART OF DETAILED DESIGN.
4. SERVICES CONDUIT ALLOWANCES HAVE NOT YET BEEN APPROVED WITH RELEVANT STATUTORY AUTHORITIES.
5. ALLOCATION OF DISTRICT COOLING TO BE FURTHER COORDINATED WITH OTHER SERVICES.
6. DISTRICT COOLING AND HYDROGEN ALLOCATION HAVE BEEN INCLUDED IN CONSULTATION WITH WPCA.
7. ALLOW FOR 2 X 600mm PRE-INSULATED MILD STEEL FOR DISTRICT COOLING.
8. SEE PLANS BY TURF TO CONFIRM LANDSCAPING AND MATERIAL PALETTE TREATMENTS.

TYP. ELECT DUCT CROSS SECTION

Scale 1:10



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6 x 125 PVC

TYP. SMART CITIES DUCT CROSS SECTION

Scale 1:10

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1 x P50
1 x P20

P20 - 20mm DIA
P50 - 50mm DIA
P100 - 100mm DIA

AECOM

CONSULTANT

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www.aecom.com

PROJECT

AEROTROPOLIS
CORE PRECINCT
BRINGELLY

CLIENT

NSW GOVERNMENT | Western Parkland City Authority

KEY PLAN

SCALE BAR

0 2.5 5 m
1:100

SAFETY IN DESIGN INFORMATION

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☐ NO
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PROJECT MANAGEMENT INITIALS

GR	GR	GR
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

ISSUE/REVISION

I/R	DATE	DESCRIPTION
02	31.08.2022	FOR INFORMATION
01	24.08.2022	FOR INFORMATION

PROJECT NUMBER

60646285

SHEET TITLE

TYPICAL SECTION
SHEET 01

SHEET NUMBER

60646285-SKE-00-0000-CI-9171

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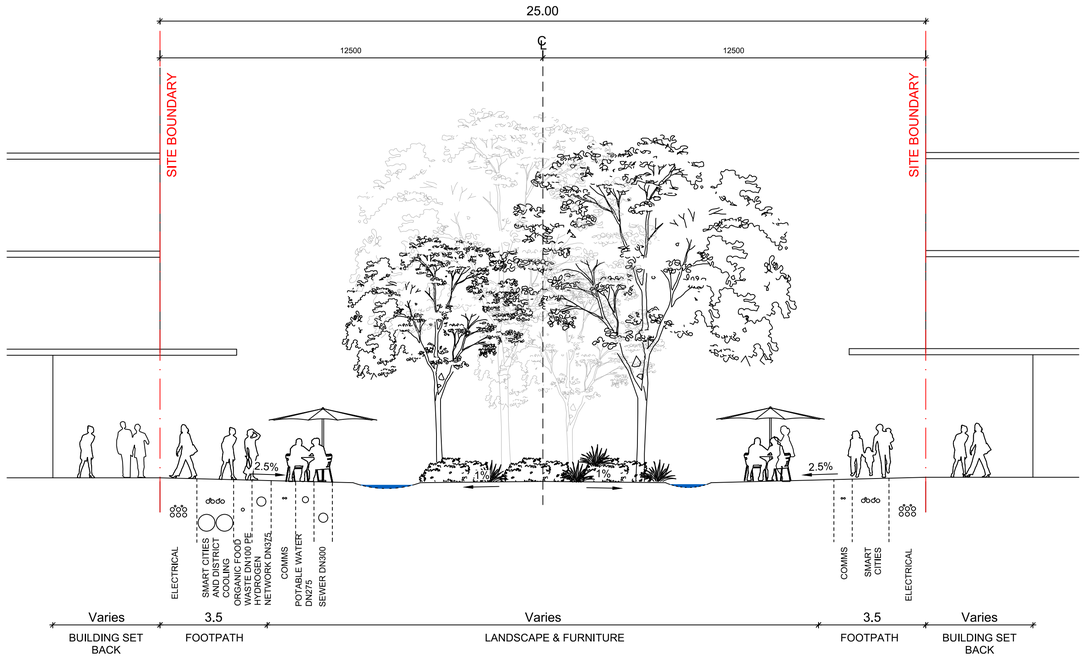
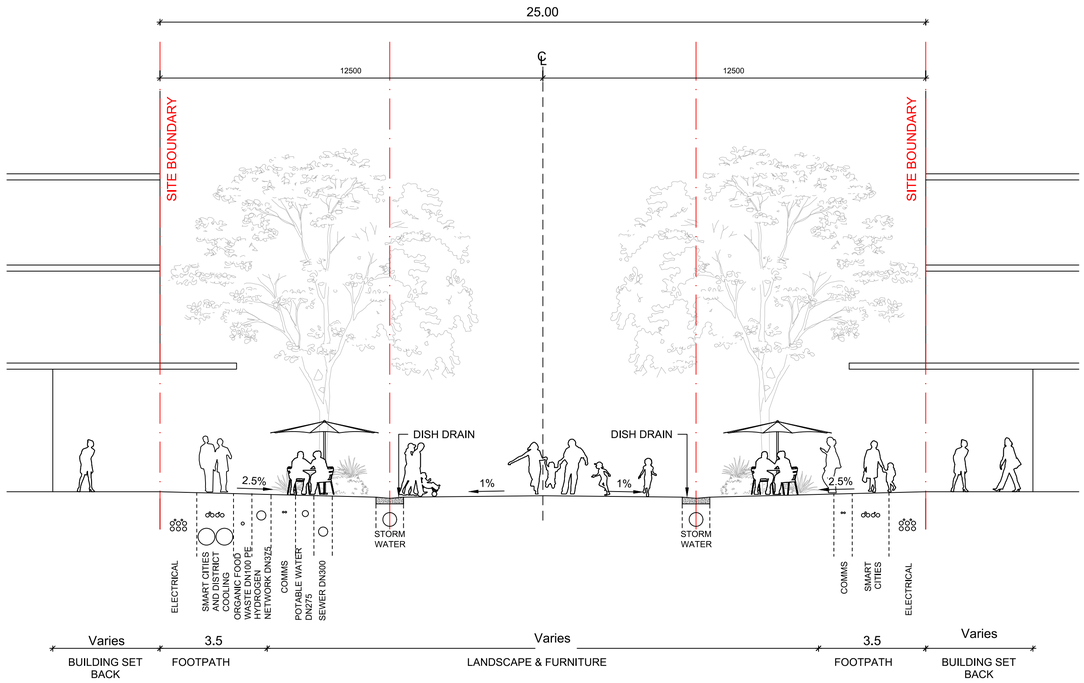


1 | CITY WALK EAST - SECTION

Scale 1:100



2 | CITY WALK EAST - 2

Scale 1:100

NOTES

1. PW, WW AND RW SIZING HAS BEEN TAKEN FROM BRADFIELD MULTI - UTILITIES SERVICES WATER SERVICING OPTIONS REPORT REV 3 DRAFTED BY JACOBS. WHERE PIPE SIZES VARY ALONG A ROAD CORRIDOR WE HAVE ADOPTED THE LARGER DIAMETER AS A CONSERVATIVE APPROACH;
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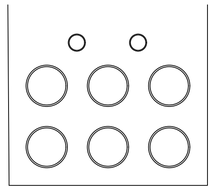

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PROJECT DATA

DATUM	AHD	SURVEY	GDA94/MGA56

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01	24.08.2022	FOR INFORMATION

PROJECT NUMBER
60646285

SHEET TITLE
TYPICAL SECTION
SHEET 02

SHEET NUMBER
60646285-SKE-00-0000-CI-9172

Appendix 2 – Authority Advice

Sent via email on 02/06/2021 to:
sean.porter@wpca.sydney
Gijs.Roeffen@aecom.com

01 June 2021

Sean Porter
Development Manager
Western Parkland City Authority
Level 2, 10 Valentine Ave, Parramatta NSW 2150

c/o Gijs Roeffen (AECOM Principal Engineer)

Re: Aerotropolis Core (Bradfield): Sydney Water Feasibility Application

Thank you for your enquiry about water servicing to meet the requirements for the proposed development of Bradfield in the Aerotropolis Core precinct.

Sydney Water proposes a collaborative partnership with the Western Parkland City Authority (WPCA) to develop an alternative strategy for delivering on-site integrated water cycle management services to Bradfield aligning with the Western Parkland City vision.

Sydney Water has partnered with both Western Sydney Airport and Sydney Science Park to deliver alternative water solutions for their developments. Working together to deliver services to Bradfield sends a clear message there is a whole of government approach to realising the objectives of the Western Parkland City.

The information below is based on our system and growth servicing plan as of the date of this letter. You have asked Sydney Water to provide responses to the following queries. Responses 1 to 6 are focused on conventional servicing within the context of a regional servicing strategy for the Aerotropolis growth area. Response 7 proposes alternative, in-precinct solutions, that can be developed in partnership with WPCA.

1. ***Confirmation on the accuracy of information regarding the existing Sydney Water infrastructure as shown in the attached plans, particularly future recycled water provision***
   and
2. ***Identification of the existing capacity of the water and sewer network to service the projected growth and any augmentations that may be required to Sydney Water's network****;*

   The figures included in your feasibility request show the existing water and wastewater network. Sydney Water recognises the existing network will not be able to support the expected growth in the Aerotropolis, and we have commenced our detailed planning and delivery of the network augmentations required to support the future Aerotropolis.

   Attached to this letter are Sydney Water's latest plans for servicing growth across the initial Aerotropolis precincts with drinking water, wastewater and recycled water services (**Attachment 1**). These plans show the proposed trunk supply network, indicative sizing of trunk infrastructure and indicative timing for delivery.

Detailed stormwater and recycled water options are also being investigated. We anticipate we will be in a position to share more information on these services by the end of 2021.

3. ***Details of any planned infrastructure works to support development within the catchment which could be expanded to support the development;***

Drinking Water

Sydney Water is currently delivering trunk network amplifications to service growth in the Aerotropolis Core and the wider Western Sydney Aerotropolis Growth Area (WSAGA). As shown in **Attachment 1**, Sydney Water plans to deliver trunk network amplifications on Badgerys Creek Rd by end of FY2022. This will provide sufficient network capacity to service initial development in Bradfield.

Sydney Water is also developing local area scheme plans for each of the initial precincts, based on information provided in DPIE's draft Precinct Plans. These scheme plans will identify sizing of internal drinking water infrastructure at a precinct level. This is expected to be available by September 2021.

Wastewater

Bradfield will be within the catchment of the Upper South Creek Advanced Water Recycling Centre (AWRC). Sydney Water is progressing the delivery of the AWRC with construction of stage 1 due to be completed by FY2026 in line with timing of operation of the new Western Sydney Airport. The AWRC will have capacity to treat the wastewater generated by Bradfield.

Planning for the trunk wastewater collection network that transfer wastewater from the Aerotropolis Core to the AWRC is complete. We are forecasting delivery of this trunk infrastructure by FY2026. Two sewage pumping stations are planned for the Aerotropolis Core to service the catchment.

Recycled Water

A key element of Western Sydney's circular economy, the AWRC will also produce recycled water for use within Bradfield.

4. ***Other major developments currently allowed for in the area as part of Sydney Water's infrastructure planning;***

Sydney Water's infrastructure planning relies on forecasts from DPIE as well as intelligence gathered from developers. We are currently engaging with major developers in the Aerotropolis Core and the initial Aerotropolis precincts to understand their development forecasts. Sydney Water cannot share specific details about information shared with us directly from other developers without their consent.

Sydney Water is eager to show leadership in the area of integrated water cycle management. We are happy to work collaboratively and in partnership with WPCA for engagement with surrounding developers to proactively explore integration among all

stakeholders within the local catchment servicing Aerotropolis Core. Where it is technically and commercially beneficial, nearby developments could be part of an integrated solution.

5. ***Funding arrangements for infrastructure upgrades to meet the increased water and sewer demand;***

Sydney Water is open to negotiation of funding arrangements with WPCA to accelerate the delivery of permanent water infrastructure to service Bradfield.

Under our current funding policies, accelerated trunk infrastructure funded by a developer to service a development that is on the NSW Government's land release program is eligible for reimbursement. The reimbursement amount is dependent on the type of asset(s) being delivered and the beneficiaries.

6. ***Guidance on timeframes for forward planning of infrastructure works; and***

Drinking Water
Permanent drinking water services are expected to be available to meet the initial servicing timeframe of 2026 for WPCA as detailed in response to question 3.

Wastewater
Accelerated roll out of trunk infrastructure and/or interim wastewater services can commence planning and design in the next 12 months to meet the initial servicing timeframe of 2026.

Sydney Water proposes the sewage pumping station planned for Aerotropolis Core, adjacent to Thompsons Creek, is moved into Bradfield to provide initial wastewater services. A temporary rising main can be built to transfer wastewater from Bradfield to the Badgerys Creek trunk sewer main. **Attachment 2** provides furthers details.

Recycled Water
Recycled water is planned for the Western Sydney Aerotropolis Growth Area including Aerotropolis Core. Sydney Water can provide Bradfield with recycled water for non-drinking water uses.

Trunk recycled water supply infrastructure will be staged and delivered in line with growth. A key dependency for the supply of recycled water is the delivery of the AWRC by FY2026.

Detailed planning and options studies for recycled water are currently underway and are aimed to be completed by late 2022. Once complete, Sydney Water can advise WPCA on recycled water asset sizing and asset locations to service Bradfield.

We are ready to work with WPCA on reticulation designs withing Bradfield to make the precinct ready for recycled water once the AWRC is in operation.

7. ***Advice on any alternative supply strategies that might be feasible for Sydney Water to implement for the proposed development.***

While we're able to support the development of Bradfield with conventional servicing as set out above; regional servicing, planning and design is not contingent upon Bradfield. It will progress whether or not alternative solutions are pursued at Bradfield.

Please note the below details are **Commercial in Confidence** as it contains confidential information and intellectual property of Sydney Water.

In order to support the Western Parkland City vision and best meet the unique needs and expectations of the future community of Bradfield, Sydney Water is exploring a range of alternative strategies to service the area with drinking water, recycled water, wastewater treatment and stormwater management.

The purpose of these strategies is to build innovation into the service offering in order to optimise liveability outcomes in the context of the unique climate and environmental challenges facing Western Sydney. These initiatives also respond to relevant NSW Government policy directions for the Western Parkland City:

1. Creating a cool, green Parkland City in Western Sydney, with Wianamatta-South Creek as a core element and central to the amenity of the City;
2. Increasing tree canopy across Greater Sydney, contributing to the Government's target of 5 million additional trees, resulting in 40% canopy cover across the City;
3. Promoting a circular economy where waste is minimised and resources are used sustainably to optimise economic, environmental and social benefits;
4. Creating a 'Smart' and resilient City which adopts the best available technology and adapts to global trends such as climate change to meet the lifestyle needs of the community; and
5. Sustainable energy generation and low-carbon precinct scale infrastructure.

Sydney Water proposes to partner with WPCA to develop alternate integrated water cycle solutions in the following key areas to meet the above policy directions:

- Decentralised wastewater treatment within Bradfield and stormwater harvesting connected to a third pipe recycled water reticulation system. This approach generates infrastructure efficiencies and allows for the capture and reuse of excess stormwater runoff to protect local waterways in line with NSW Government waterway health objectives. A shandy of recycled water and stormwater can then be used for non-potable supply including broad scale irrigation of green space and identified 'community cool zones', providing climate resilience and respite from extreme heat.
- Diversified recycled water products and supply of recycled water for a wider range of bespoke uses such as:
    - Customised water products, e.g. purified water for data centre cooling or glasshouse horticulture.

    - Providing water for primary contact amenity (eg lake, integrated with stormwater).
    - Potential for direct potable reuse – long term flexibility to supply purified recycled water for drinking.
- Contemporary water sensitive urban design bringing water management and urban form together to optimise waterway health and liveability outcomes. Sydney Water has developed a unique set of 'urban typologies', which demonstrate new approaches to urban development harnessing stormwater as a sustainable resource for greening and cooling. Coupled with an innovative street tree configuration connected to the stormwater and recycled water network, these typologies can deliver three times as much canopy cover and increased open space, while avoiding damaging urban runoff to surrounding local waterways. These concepts have also been shown to mitigate urban heat and are soon to be piloted in Western Sydney.
- Trunk drainage management: The Western Parkland City vision specifies a comprehensive drainage strategy that encourages water in the landscape, with features such as wetlands and ponds to provide a resource for irrigation, cooling, aesthetic benefits and passive recreation for the community in Bradfield. Sydney Water is an experienced drainage manager and could manage trunk drainage infrastructure for Bradfield (creek lines, drainage channels and constructed wetlands etc.) and fund the ongoing maintenance of this infrastructure through its customer base.
- Circular economy services associated with water treatment servicing. A small scale biomethane (anaerobic digestion) plant can be constructed alongside a decentralised water recycling plant. This would generate renewable energy, offsetting the energy and carbon required to operate the recycled water plant.
- Flexibility to connect into the regional wastewater and recycled water network in the long term

Sydney Water looks forward to partnering with WPCA to provide world class water services to Bradfield. Sydney Water requests a meeting with WPCA in July 2021 to discuss the next steps for planning and delivery of water services, with the view of entering into a Memorandum of Understanding to formalise each parties' intentions.

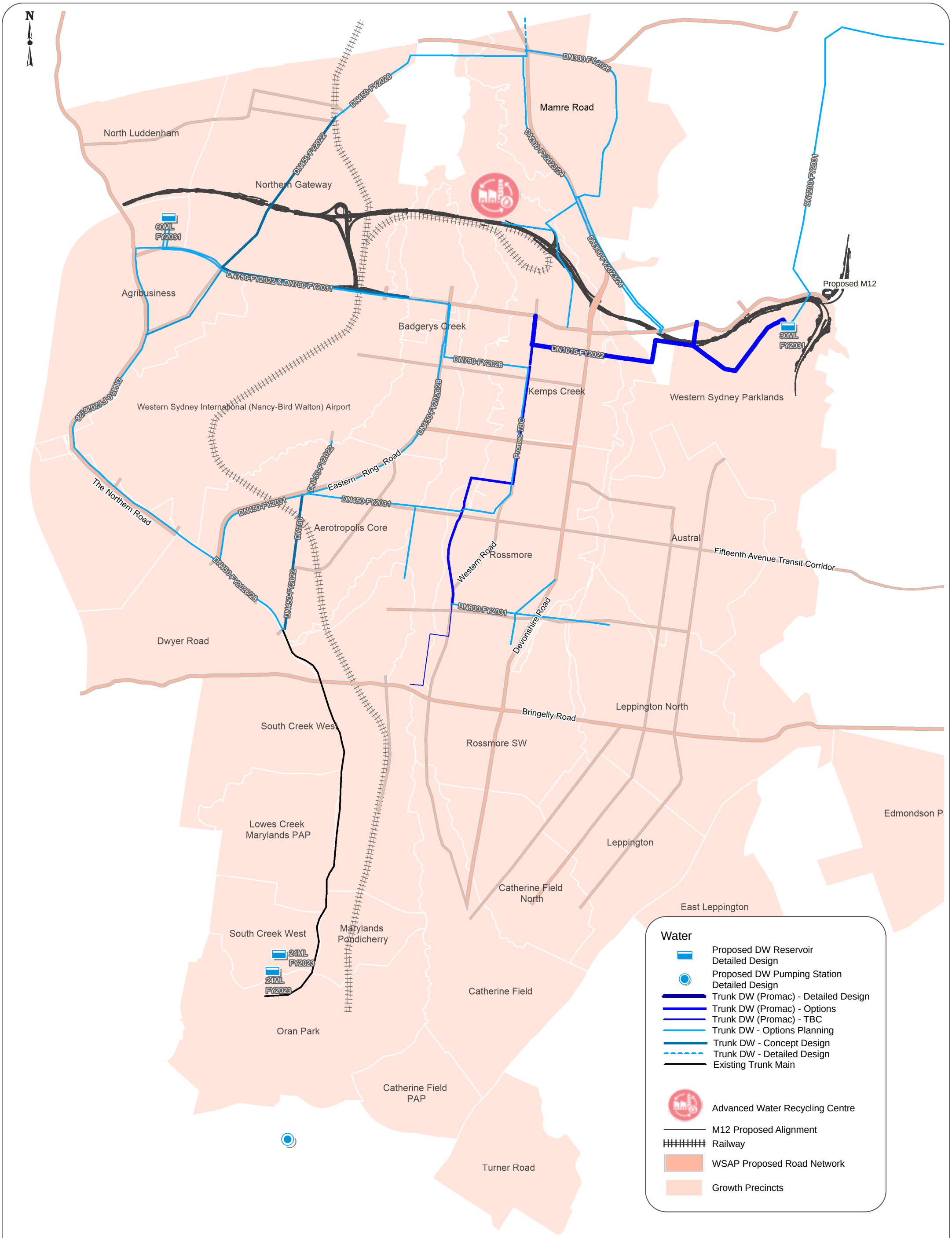
If you have any further enquiries please contact ourselves or Luke Camilleri, Commercial Partnerships Manager, on 0419 575 120 or Luke.Camilleri@sydneywater.com.au.

Yours sincerely

Chris Gantt
Head of City Growth and Development
E: Chris.Gantt@sydneywater.com.au
M: 0447 675 280

Renee Ingram
Head of Western Sydney Development
E: Renee.Ingram@sydneywater.com.au
M: 0421 181 646

Attachment 1 – Indicative Servicing Plans



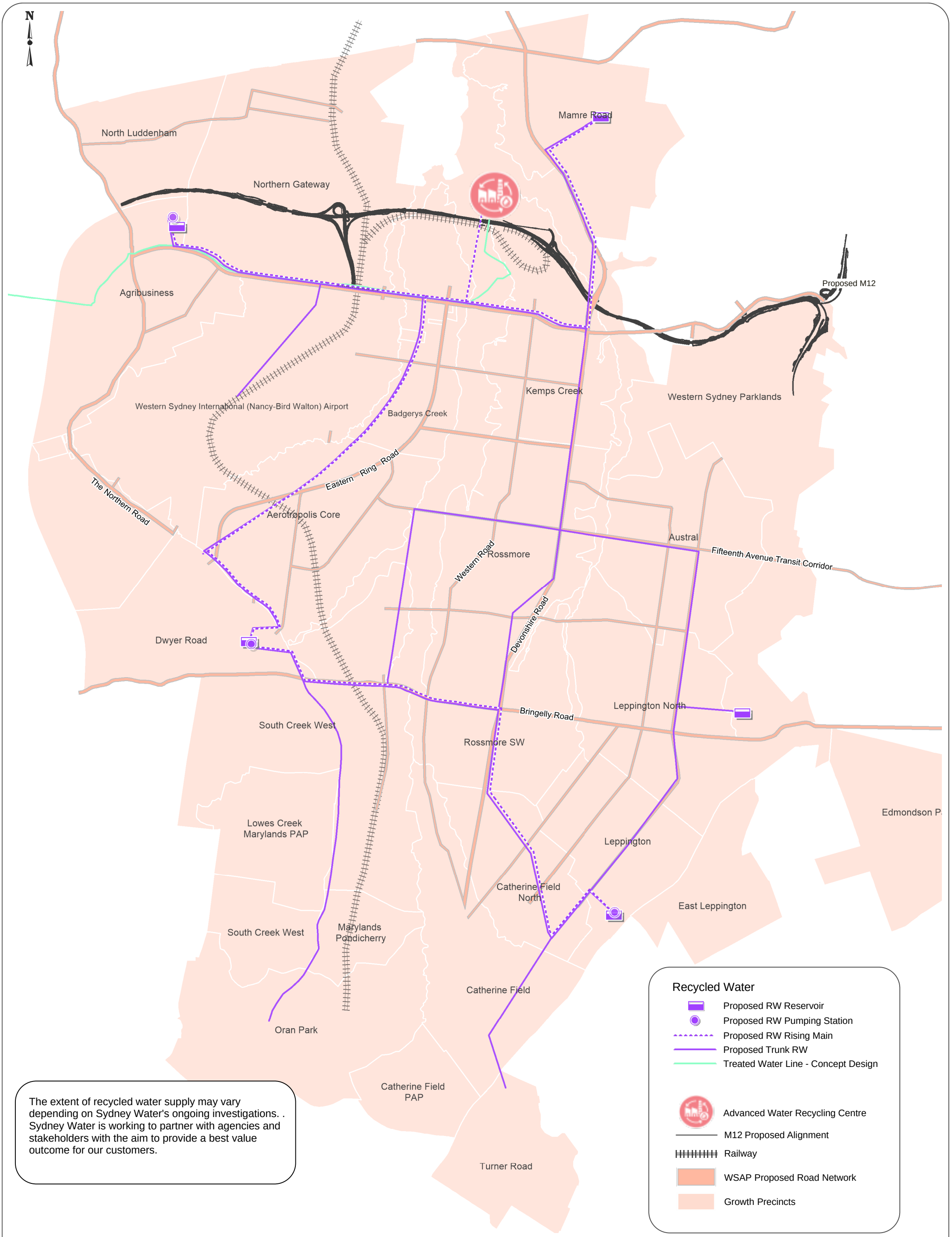
Sydney WATER

SW Sydney Indicative Servicing Infrastructure

Note: Planning works are currently underway.
All information provided here is indicative and subject to change.
Servicing timing will be as per the Growth Servicing Plan.

Date: 16 Feb 2021
Revision: DWR3D2
Drawn By: FT, Growth Planning, CG&D

Coordinate System: GDA 1994 MGA Zone 56



The extent of recycled water supply may vary depending on Sydney Water's ongoing investigations. . Sydney Water is working to partner with agencies and stakeholders with the aim to provide a best value outcome for our customers.

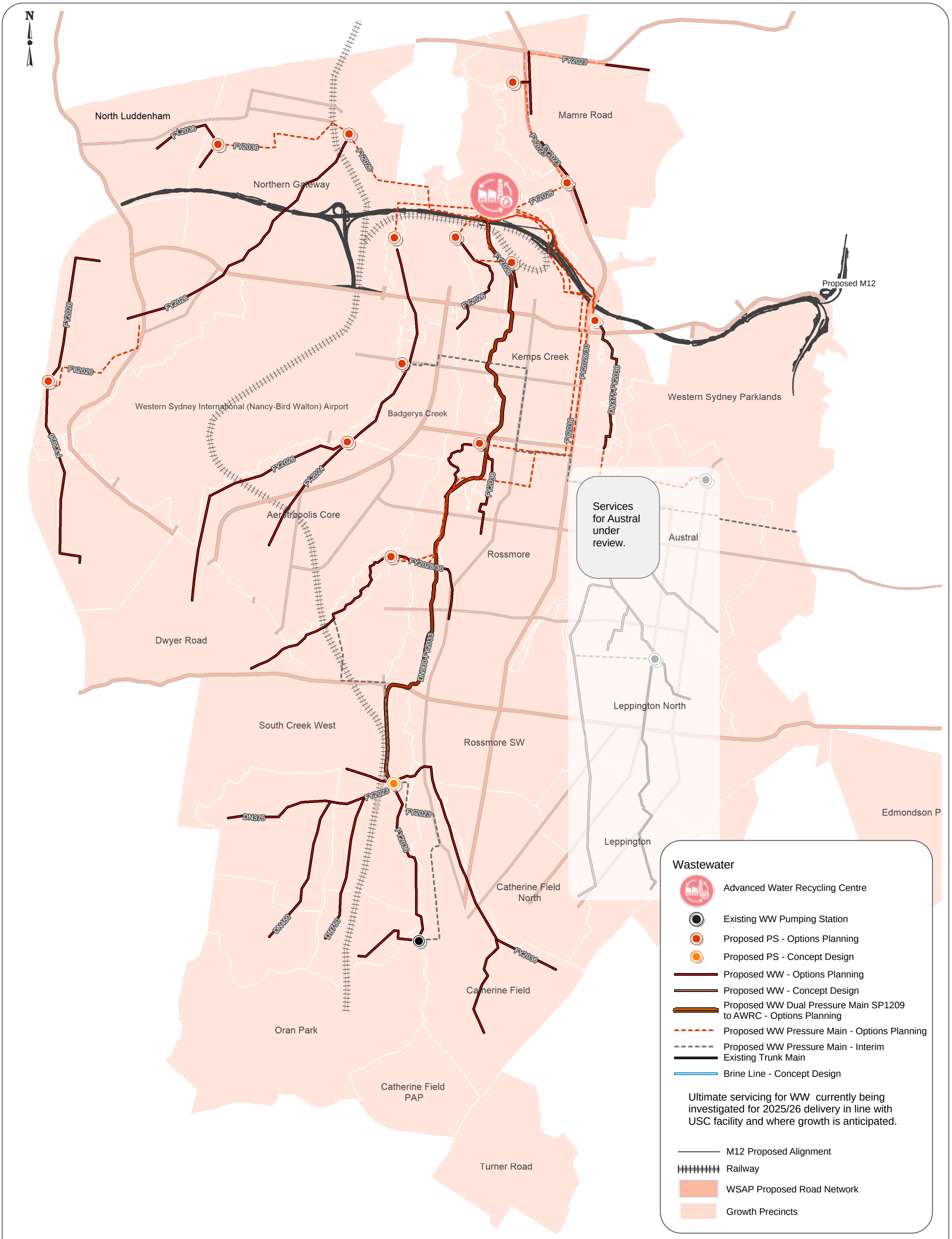
Sydney WATER

SW Sydney Indicative Servicing Infrastructure

Note: Planning works are currently underway.
All information provided here is indicative and subject to change.
Servicing timing will be as per the Growth Servicing Plan.

Date: 16 Feb 2021
Revision: RWR3D1
Drawn By: FT, Growth Planning, CG&D

Coordinate System: GDA 1994 MGA Zone 56



Sydney WATER

SW Sydney Indicative Servicing Infrastructure

Note: Planning works are currently underway.
All information provided here is indicative and subject to change.
Servicing timing will be as per the Growth Servicing Plan.

Date: 16 Feb 2021
Revision: WWR3D2
Drawn By: FT, Growth Planning, CG&D

Coordinate System: GDA 1994 MGA Zone 56

Attachment 2 – Interim Wastewater solution

Upper South Creek Advance Water Recycling Centre (USC AWRC)
- Trunk wastewater ultimate servicing scheme
Indicative and subject to route alignment confirmation.
Additional precinct trunk and reticulation mains required.

N

BC_SP02

Badgerys Creek
Package 02

BC_SP01

TC_SP02

TC_SP01 -
Alternative
Location

TC_SP01

CN191553

KELVIN PARK

THE NORTHERN

Thompson Creek
Package 07

BRINGELLY

0 1
kilometres
Scale: 1:18,580

Legend

- Proposed WW gravity mains Subject to staging
- Proposed WW Pressure Mains Subject to staging
- Interim WW Pressure Mains
- Existing Sewers
- Proposed WWPS - indicative location Subject to staging and not to scale
- Existing WWPS
- Proposed Metro - Indicative
- Precinct Boundary
- Pressure Main
- Mamre Road precinct catchment - Package 01
- Badgerys Creek catchment - Package 02
- South Creek catchment - Package 03
- Cosgrove Creek catchment - Package 04
- Agribusiness catchment - Package 05
- Lowes Creek catchment - Package 06
- Thompson Creek catchment - Package 07
- Kemps Creek catchment - Package 08
- North Luddenham catchment - Package 09
- Pressure Sewer catchment

11 August 2021

Endeavour Energy Ref: ENL4081

Western Parkland City Authority
10 Valentine Avenue
PARRAMATTA NSW 2124

Attention: William Wong

TECHNICAL REVIEW REQUEST

ENL4081 – Supply Enquiry for 215 Badgerys Creek Road, BRINGELLY

Thank you for your enquiry application and the payment of fees to facilitate the enquiry request at the above location. Your application has been registered under ENL4081. Please quote this reference number on all future correspondence.

Your enquiry wishes to determine the following;

- Servicing strategies and capacity for First Building and AMRF to be commissioned in 2023
- Detail on existing network capacity and commentary on potential requirements to service load over and above existing capacity
- Commentary on Endeavour Energy major projects in the area
- Consideration of impact on existing Endeavour Energy assets in the area

This development is currently situated in a rural but developing area due to the new Badgerys Creek Airport development. Endeavour Energy have an 11kV distribution main X881 adjacent to the site. The nearest available sub-transmission main is a 33kV feeder 512 south of site approximately 1km away along The Northern Rd.

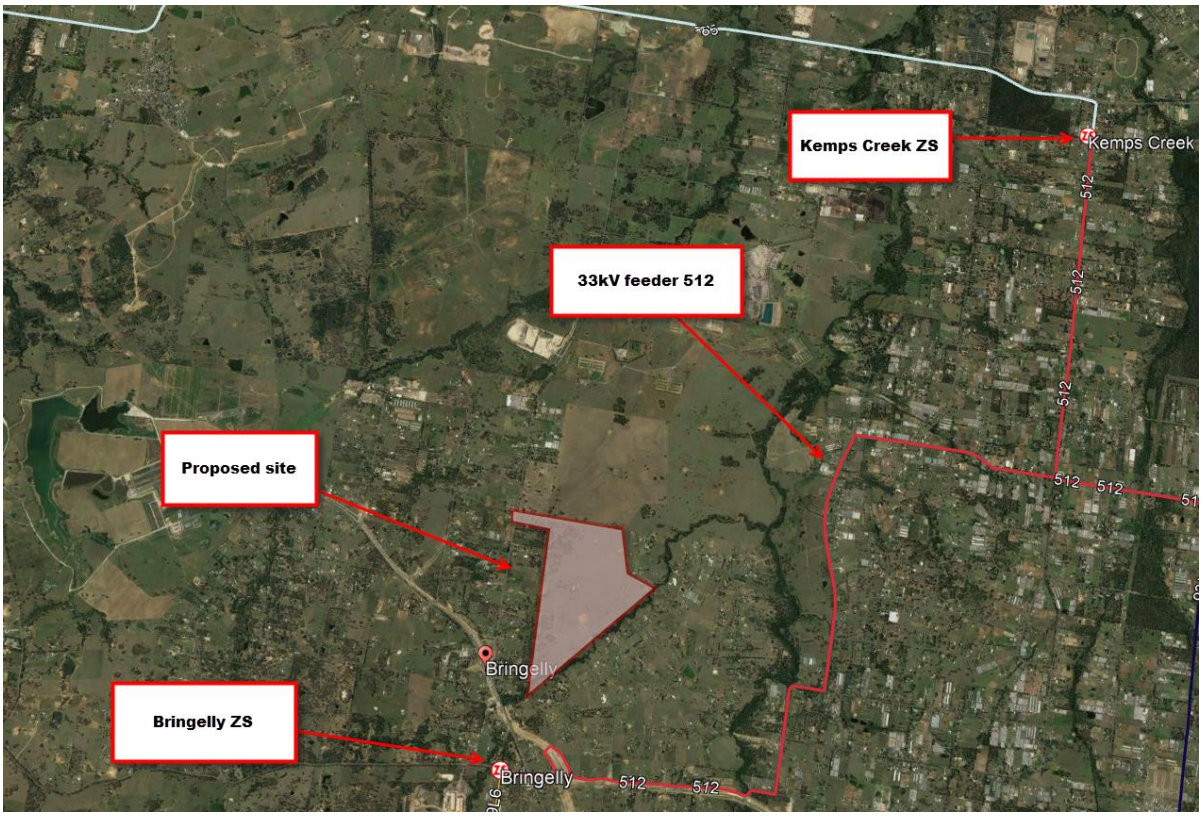
The estimated electrical maximum demand provided of 90MVA is to cater for 3536 residents and industrial/commercial land area of 1,144,293sqm. Endeavour Energy has calculated the total load based on a general demand of 100VA/sqm for commercial areas, 40VA/sqm for industrial areas and an ADMD of 3.5kVA for residential dwellings to be at 70MVA. Exact clarification of loads will need to be assessed once an application is submitted to Endeavour Energy.

	Milestone Year (GFA - m²)							
Land Use Category	**2026**	**2030**	**2035**	**2041**	**2046**	**2051**	**2056**	**2061**
Residential								
Residential dwellings	-	-	589	1,179	1,768	2,947	353	3,536
Residential GFA			83,275	166,550	249,825	333,100	416,375	499,649
Commercial								
Mixed Use – High	47,360	94,720	142,081	189,441	236,801	284,161	331,522	378,882
Mixed Use - Low	18,943	37,885	56,828	75,770	94,713	113,655	132,598	151,540
Industrial								
Enterprise	14,278	28,556	42,833	57,111	71,389	85,667	99,944	114,222
Total	**80,581**	**161,161**	**325,017**	**488,872**	**652,728**	**816,583**	**980,439**	**1,144,293**

Total Maximum Electrical Demand by 2061

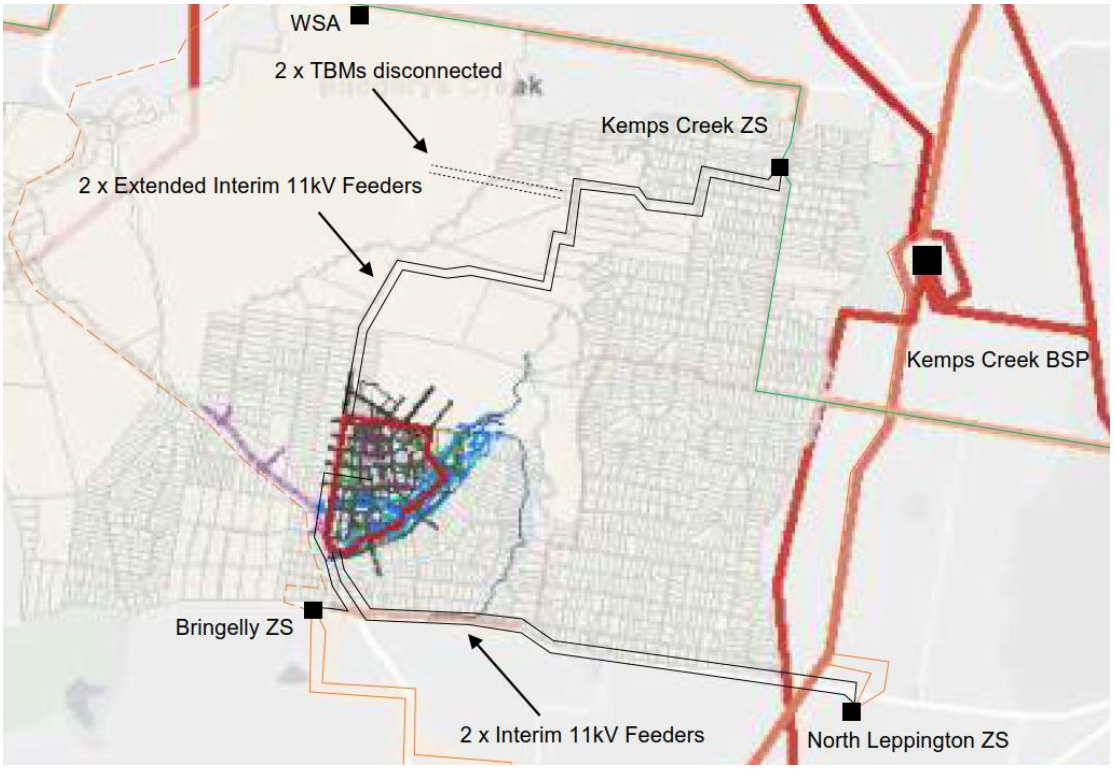
	Milestone Year Demand Creation (MVA)							
Land Use Category	2026	2030	2035	2041	2046	2051	2056	2061
Residential	-	-	1.2	2.5	3.7	5.0	6.2	7.4
Commercial	11.1	22.3	31.2	40.1	49.0	57.9	66.8	74.3
Industrial	1.2	2.4	3.4	4.3	5.3	6.2	7.2	8.0
Total	**12**	**25**	**36**	**47**	**58**	**69**	**80**	**90**
Low Range (-15%)	10	21	30	40	49	59	68	76
High Range (+15%)	14	28	41	54	67	79	92	103

Initial supply for “First Building” and AMRF has a total load requirement of 0.84MVA. Supply is available and can be taken from Bringelly Zone Substation. Existing 11kV feeder X881 is available across frontage of development however this feeder will also supply various loads for WSA Co and may be at capacity. Available connectivity to 11kV feeder X881 will be determined once an Application for Connection of Load is submitted. Sydney Metro will be installing an 11kV feeder from Bringelly Zone Substation to Bradfield site with a requirement of 3.5MVA. Negotiations between Sydney Metro and WPCA would need to be done to consider if connection can be made from this feeder.



Existing transmission network in immediate area

The existing 11kV network may be able to supply load up to 2026. 11kV feeder connection points utilised by Sydney Metro construction supplies will likely be available from Kemps Creek ZS, Bringelly ZS once Sydney Metro construction supplies are no longer required which is anticipated end of 2025. Some of these will simply require extension to the proposed site(please refer diagram below). Two new 11kV feeders can also be provided from North Leppington ZS. These feeders can provide a combined total of 12MVA with allowance for contingency should one feeder fail to be able to maintain full supply.

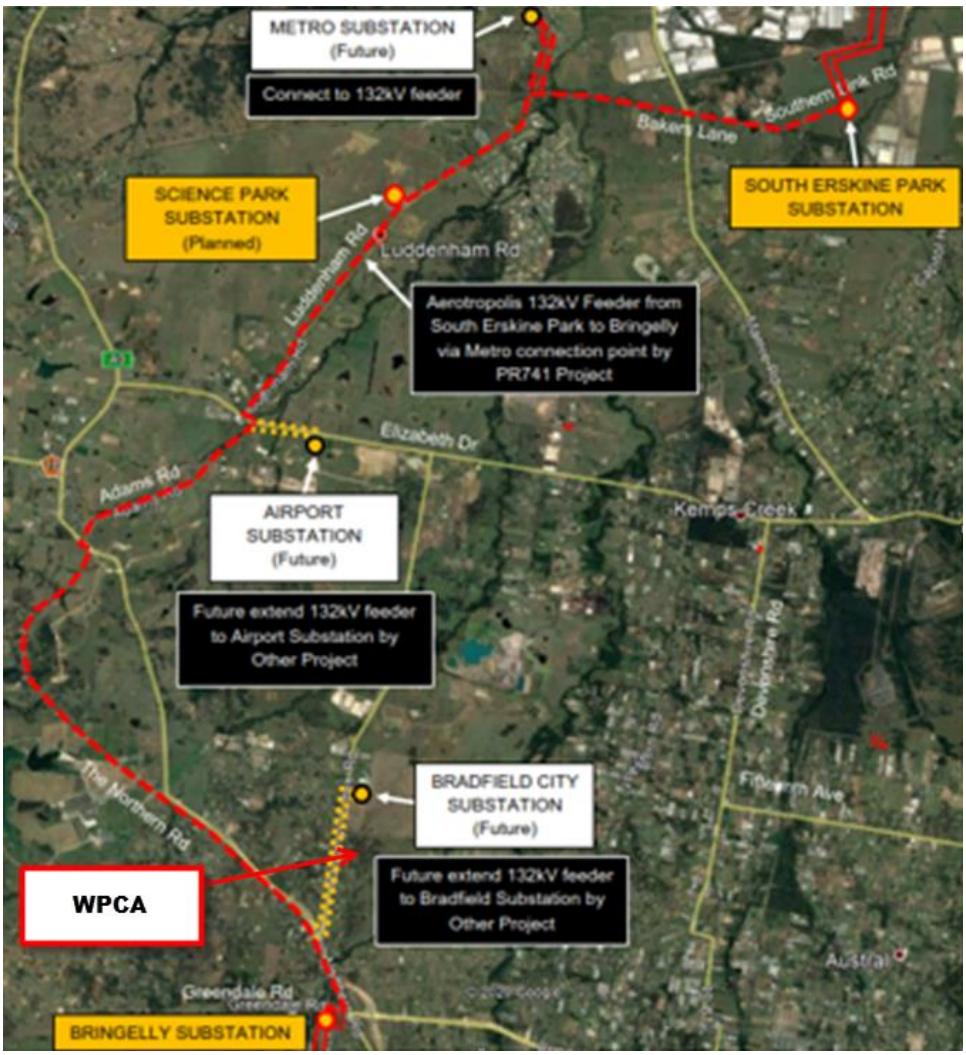


Proposed supply map showing indicative connections to site by 2026 for 12MVA

To supply load beyond 2026, depending on the timing and actual network load demands for major developments such as Western Sydney Airport(WSA) development, agribusiness precincts and BHL logistics and employment hub in Bringelly and WPCA site, Endeavour Energy will either establish a new Bradfield Zone Substation and/or upgrade existing Bringelly Zone Substation depending on the load demands at the time. These works will be Endeavour Energy funded and constructed. In anticipation of upgrading the network from 11kV to 22kV, new 22kV feeders will be required from either zone substation as the load is required. It is anticipated that the load required will ultimately be split between the two zone substations.

Proposed supply map showing proposed ZS sites and 22kV connections beyond 12MVA

A proposed Aerotropolis 132kV feeder between South Erskine Park Zone Substation and Bringelly Zone Substation is planned to be commissioned by Q1 2025 in time for the Bradfield City Zone Substation, Science Park Zone Substation and the Metro Zone Substation to be connected. This will precede the connection of the Western Sydney Airport Substation (Nancy Bird Walton Airport) which Endeavour Energy plans to implement between 2025 and 2030.



Area map showing proposed network development near WPCA site

Please note all works to establish feeders for the initial 0.84MVA, 12MV and 90MVA supplies will be customer funded and constructed.

Please note this enquiry is only a preliminary assessment and does not guarantee supply availability or final conditions of supply.

Should you have any enquiries regarding your application please contact me.

Yours faithfully,

M Grimwood

Matthew Grimwood
Contestable Works Project Manager
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Email: matthew.grimwood@endeavourenergy.com.au

5 August 2021

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William Wong

AECOM
Level 21, 420 George Street
Sydney
NSW 2000

Dear William,

Aerotropolis Core (Bradfield): Jemena Feasibility

Jemena Gas Networks (NSW) Ltd is the authorised reticulator for its gas distribution networks in NSW as defined in the Gas Supply Act 1996. The Reticulator's Authorisation granted to Jemena Gas Networks (NSW) Ltd (JGN) under the Gas Supply Act 1996 authorises JGN to operate a distribution system for the purpose of conveying natural gas within a number of NSW distribution districts including the Aerotropolis Precinct Plan area.

The gas distribution network comprises the greater metropolitan network that supplies gas to residential, commercial and industrial premises in Sydney. Future expansion of the gas network is anticipated within the Aerotropolis Precinct and will be delivered by demand from customers requiring gas connections. Capacity development planning have identified Projects within the precinct to support the on-going load growth on the JGN gas distribution network. The projects are identified through the network validation and planning process with a risk assessment approach used to determine the scheduling of projects.

Jemena has been actively engaging with DPIE, the Greater Sydney Commission, Western Parkland City, Western Sydney Airport, Councils, TfNSW, Sydney Water, Endeavour Energy to ensure that there is coordination of utilities required to service the Aerotropolis Core, Agribusiness and Northern Gateway as the precinct plans have been released for comment.

In order to supply gas to the Bradfield Precinct an extension and augmentation of the existing secondary high pressure steel network would be required. The main that is located in Bringelly Road would need to be interconnected with the main which is currently located in Badgerys Creek Road. This augmentation may not be required for the initial stages of the development pending confirmation of loads and road layouts. It is anticipated that a contribution would be required to fund this augmentation. Ideally Jemena would require a

minimum of 2 years to allow for the design and construction of the system augmentation and would require confirmation of road layouts.

If you require any additional information please feel free to contact me.

Yours sincerely

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NSW GOVERNMENT