

# **Appendix Z**

## **Utilities Report**

# Utilities Report

Cudgegong Road Station Precinct South



## Utilities Report

### Cudgegong Road Station Precinct South

Client: Landcom

ABN: 79 268 260 688

#### Prepared by

**AECOM Australia Pty Ltd**

Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia  
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com  
ABN 20 093 846 925

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## Executive Summary

The NSW Government is currently building the Sydney Metro Northwest (SMNW) that is due to start operations in 2019. The SMNW is Stage 1 of the overall Sydney Metro project and involves the construction of eight new metro stations supporting infrastructure between Cudgegong Road and Epping and converting five existing stations between Epping and Chatswood. Stage 2 will deliver a new metro rail line from Chatswood through Sydney's CBD to Sydenham (Sydney Metro City and Southwest).

Landcom and the Sydney Metro Delivery Office (SMDO), part of Transport for NSW (TfNSW), are working in collaboration to develop walkable, attractive, mixed use places around the SMNW stations. This includes using the surplus government owned land located around the Cudgegong Road Station.

The subject site, the Cudgegong Road Station Precinct South, is located between Cudgegong Road, Tallawong Road, Schofields Road and the Metro corridor and comprises around 7.8ha of government owned land. It is within the southern part of the broader Cudgegong Road Station Precinct (Area 20) of the North West Priority Growth Area, a substantial land release area for homes and jobs in Sydney's northwest.

AECOM is engaged to carry out an Infrastructure Servicing Strategy to support the State Significant Development Application (SSDA) for the Station Precinct South concept proposal. The concept proposal allows for approximately 1,100 dwellings and 9,000 sqm of retail, commercial and community uses. It also includes a central park, new streets and supporting public domain.

This report demonstrates that public infrastructure (including the supply of potable water, wastewater, electricity, gas and telecommunications) have been considered within the proposal and will be made available to adequately service the future precinct development.

## 1.0 Introduction

Landcom has engaged AECOM to develop an infrastructure servicing strategy for the Cudgegong Road Station Precinct South development. The purpose of this report is to identify existing utility infrastructure, providing consideration for layout, assessing the capacity of new utilities and presenting further detail on potential utility connection points for the new precinct.

More specifically, this report:

- Summarises the existing services infrastructure located within the Cudgegong Road Station Precinct;
- Identifies scope of potential diversions removal of existing services infrastructure required to support the proposed development;
- Considers potential internal services reticulation layouts and key design perimeters;
- Considers potential external utility connections and lead-in infrastructure requirements based on advice from the relevant authorities; and
- Summarises next steps including site investigations to confirm the assumptions included in this report.

The intent of this report is to provide concept layouts for costing and infrastructure capacity testing further detailed design will be required to confirm the final layouts of each utility service including lead-in requirements.

The Infrastructure Delivery Plan considers the following services infrastructure:

- Potable Water;
- Wastewater;
- Electrical;
- Gas; and
- Data and Telecommunications.

It is noted that this report is based on details of existing infrastructure provided through record drawings and liaison with the relevant authorities. This information will need additional confirmation through site investigations prior to commencement of detailed design.

## 2.0 Site Overview

The Cudgegong Road Station Precinct South is located within the Blacktown City Council Local Government Area (LGA) and is approximately 2km west of Rouse Hill Town Centre and 45km northwest of the Sydney CBD. The site is approximately 7.8ha in size. It is bounded by commuter carparks to the West, Cudgegong Road to the East, Schofields Road to the South and Cudgegong Metro Station to the north. Entrance to the site is can be obtained via either Tallawong Road or Cudgegong Road. The current site can be characterised as having semi-rural lots to the north and low density residential to the south. The concept proposal is illustrated below in Figure 1.





Nearmap imagery 7 September 2017



**Cudgegong Town  
Centre South**

Sydney Metro Northwest alignment

— Surface

— Viaduct

Site boundary

Scale: 1:2250 @ A3  
0 160  
metres

**Figure 1 - Concept Proposal**



## 2.1 Background

Precinct enabling and augmentation works have been provided by Northwest Rapid Transit (NRT) to appropriately service the adjoining superlots in the Cudgegong Road Station Precinct South. These include delivery of infrastructure and public domain to include; the station and station plaza, Themeda Avenue, Conferta Avenue, Aristida Street and a commuter carpark as shown in Figure 1.

This report is primarily focused on the feasibility of servicing the ultimate development relating to the concept proposal from an infrastructure capacity approach.

## 2.2 Proposed Development

Potential development staging and dwelling and commercial development quantities are summarised in Table 1 below.

**Table 1 Potential Development Scenario**

Site	Development Timeframe (yrs)	Apartments (No.)	Non-Residential GFA (m <sup>2</sup> )
1	2020-2022	360	9,000
2	2022-2026	740	0

## 3.0 Study Methodology

### 3.1 Information Gathering

The information gathering methodology undertaken is summarised below:

- Procurement of all available existing information regarding the existing services. This included existing drawings, condition reports and master planning schemes to inform the importance of existing infrastructure and any potential gaps in the existing system performance;
- Identification of other developments planned within the services catchments which may influence servicing arrangements;
- A summary of utility services infrastructure implications and constraints based on existing data and reports;
- Assessment of the existing infrastructure capacities against the service authority's criterion and industry best practice; and
- Advice on further investigations required.

### 3.2 Demand Assessment

The demand assessment methodology undertaken is summarised below:

- Development of forecasting and profiles of the study area and individual project areas based on the development potential for residential, retail, commercial and community uses.
- Development of a sensitivity analysis on the service demand profiles by considering a demand range;
- Consideration of a range of unit rates, applicable diversity rates and impacts of alternative supply sources/sustainability initiatives on demand; and
- Assessment of the impact of building sustainability initiatives on demand and the demand arising from similar Precincts (such as Green Square Urban Renewal Area) as opposed to standard authority rates.

### 3.3 Stakeholder Engagement

The infrastructure assessment methodology undertaken is summarised below:

- Contact with Sydney Water, Endeavour Energy, Jemena, Telstra and NBN.Co to ascertain their current capacity, planned upgrades and potential supply constraints, based on base estimation of the demand generated by the proposed increase in density;
- Consultation with strategic planners within each of these organisations, responsible for overall planning of infrastructure delivery to this area being conscious of the overall extent of development planned within the catchment;
- Submission of feasibility applications/requests to each utility service provider; and
- Updates to the high-level servicing strategy based on feasibility investigations and presentations to key stakeholders to engage discussion and reach agreement prior to detailed planning/feasibility of individual projects.

### 3.4 Infrastructure Assessment

The infrastructure assessment methodology undertaken is summarised below:

- Mapping the strategic infrastructure servicing the study area, including key external supply points;

- Examination of the existing system capacities to identify the optimal infrastructure connections;
- Identification of constraints and potential “show stoppers”; and
- Feedback to urban planners and service authorities to understand potential future infrastructure requirements.

### **3.5 Identifying Constraints and Potential Upgrades**

The constraint and potential upgrades methodology undertaken is summarised below:

- Development of a robust plan for delivery of the infrastructure to the precincts, considering regulatory requirements, physical constructability (rail corridor constraints) and delivery timeframes;
- Determination of infrastructure upgrades. These are population based augmentation triggers that take into account variable development production rates;
- Identification of alternative strategies that may be applicable for the study area; and

### **3.6 Alternative Demand and Supply Opportunities**

The alternative demand and supply opportunities methodology undertaken is summarised below:

- Review of relevant energy and water Green Infrastructure Master Plans to identify potential application in study area;
- Review of status of current pilot areas (e.g. Green Square, Central Park, Rouse Hill) to understand costs, benefits and lessons learned relevant to Cudgegong Station Precinct;
- Review of relevant building sustainability initiatives (Basix, Green Star, NABERS) which may influence demand on services infrastructure; and
- Identification of potential cost effective opportunities in the study area, particularly in line with staging and trunk infrastructure trigger points.

## 4.0 Information Gathering

### 4.1 Gathering Existing Utility Information

The preliminary information gathering considered data from a range of sources. These include Dial Before You Dig (DBYD) requests, master plans, existing drawings, previous experience with the area and condition reports.

### 4.2 Dial Before You Dig Plans

A Dial Before You Dig request was undertaken for the site area which identified a range of services present within the study area. These are summarised in Table 2.

Table 2: Summary of Existing Services

Authority Name	Phone	Utility Type
Optus and/or Uecomm, Nsw	1800505777	Data and Telecommunications
PIPE Networks, Nsw	1800201100	Data and Telecommunications
Telstra NSW, Central	1800653935	Data and Telecommunications
Endeavour Energy	0249510899	Electricity
Jemena Gas	1300880906	Gas
The Hills Shire Council	0292659819	Other
Roads and Maritime Services	0294227792	Other
Sydney Water	0132092	Potable and Recycled Water / Wastewater
Sydney Metro	0291119083	Road & Rail
NBN Co, NswAct	1800626762	Communications

The plans provided from the DBYD requests were assessed as a part of the condition and capacity review.

### 4.3 Utilities Reports

A number of annual reports and master plans that have been prepared by stakeholders provide information relevant to the study area. A list of the reports used in the infrastructure strategy assessment is shown below:

- Northwest Rapid Transit Project Integrated Management System, 2015
- Area 20 Primary Utilities Report, Cardno 2015
- Blacktown City Council Growth Centre Precincts, Development Control Plan, NSW Government, 2016
- Cudgegong Road Station, (Area 20 Precinct) Finalisation Report, NSW Government, 2015
- North West Rail Link, Cudgegong Road Station Structure Plan, NSW Government, 2013
- Development Servicing Plan (Rouse Hill Recycled Water System), Sydney Water, 2016
- Draft Metropolitan Strategy for Sydney To 2031, NSW Government, 2014
- A Plan for Growing Sydney, NSW Government, 2014
- NSW Long Term Transport Master Plan, NSW Government, 2014
- Decentralised Water - Master Plan, City of Sydney, 2012
- Growth Servicing Plan July 2014 to June 2019, Sydney Water, 2014

- Wastewater Systems, Sydney Water, 2014
- Distribution Annual Planning Report, Endeavour Energy, 2016
- BASIX Water Savings Monitoring – Sydney Water, 2009
- BASIX Monitoring Report - Electricity Consumptions for 2007-2009, NSW Department of Planning, 2010

#### 4.4 Development Context

Sydney Metro Delivery Office (SMDO) has acquired parcels of land to support the delivery and operation of the Sydney Metro Northwest project, which is due to be open by mid-2019. Approximately 69 hectares of surplus Developable Government owned Land (DGL) around these new stations will become available for precinct wide development. The Cudgegong Road Station precinct development is one of eight (8) urban transformation projects under the Sydney Metro Northwest Urban Transformation Program. An overall plan of the Cudgegong Road Station Precinct relative to the Sydney Metro Northwest Urban Transformation Program is provided in Figure 2 below.

The Cudgegong Road Station Precinct South is located within the broader Area 20 development area. A *Services and Infrastructure Strategic Investigation* (2014) was produced by AECOM for NWRL which included a preliminary gap analysis of the services within the Cudgegong Road Precinct (Area 20). This analysis identified that there is some overall capacity in adjacent systems (inclusive of potable and recycled water, wastewater, electricity and gas) to support the initial development within the Cudgegong Road Precinct.

Major increases in capacity will be required across the precincts services to service new infrastructure. It is recommended that in order facilitate adequate service provision and lead in connections to the precinct, new developments should be staged so that initial development occurs adjacent to existing infrastructure as is occurring within the Cudgegong Road Station Precinct South project.

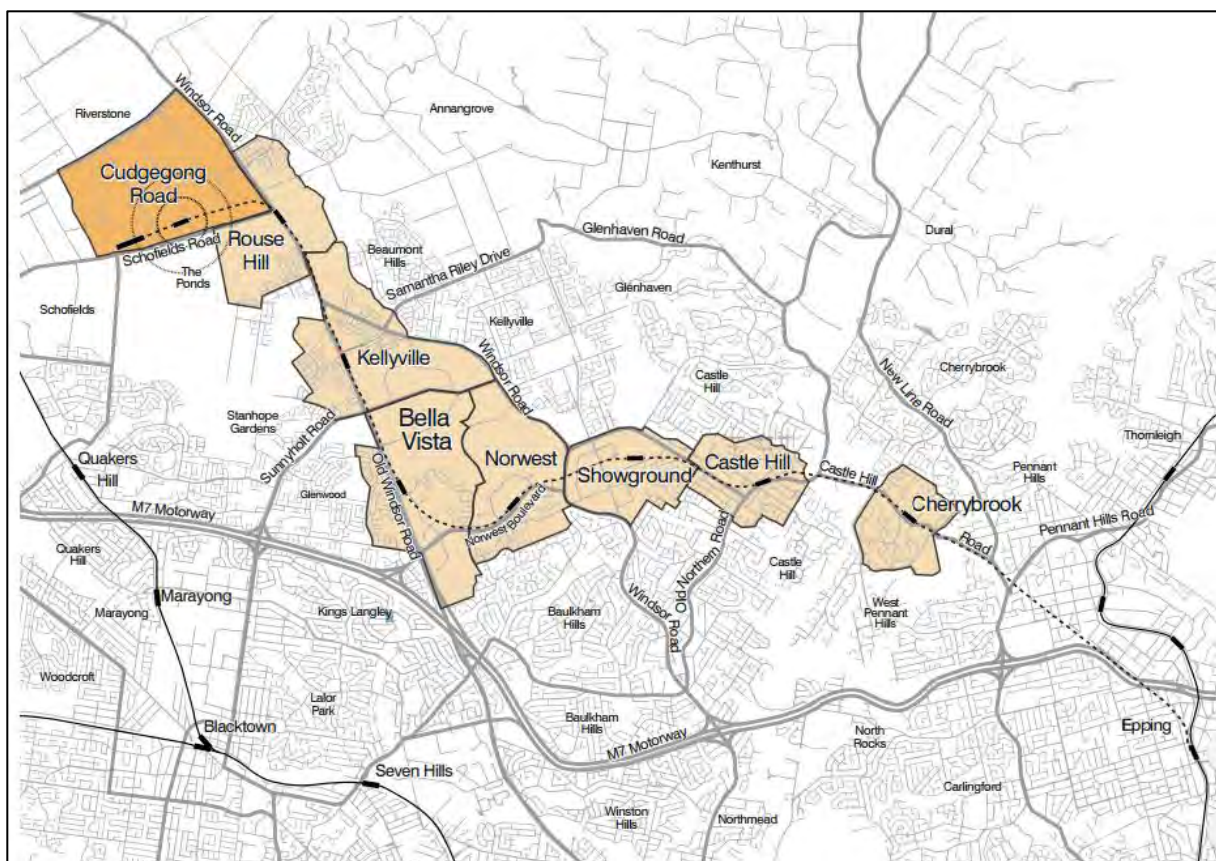


Figure 2 Development Context (Planning NSW, 2013)



## 4.5 Combined Services Plan

A combined services plan has been developed for the Cudgegong Road Station Precinct South site, presenting utility service routes throughout the precinct and considering the following:

- Connection to existing utility infrastructure;
- Potential development lot connection points;
- Coordination between services; and
- Provision of water, wastewater, electrical and gas supply.

All services are shown schematically, and are subject to changes during further design stages and input from the relevant utility authorities. Schematic layouts for each utility service are presented in the individual sections within this report.

The Combined Services Plan sheets are shown in Figure 3.

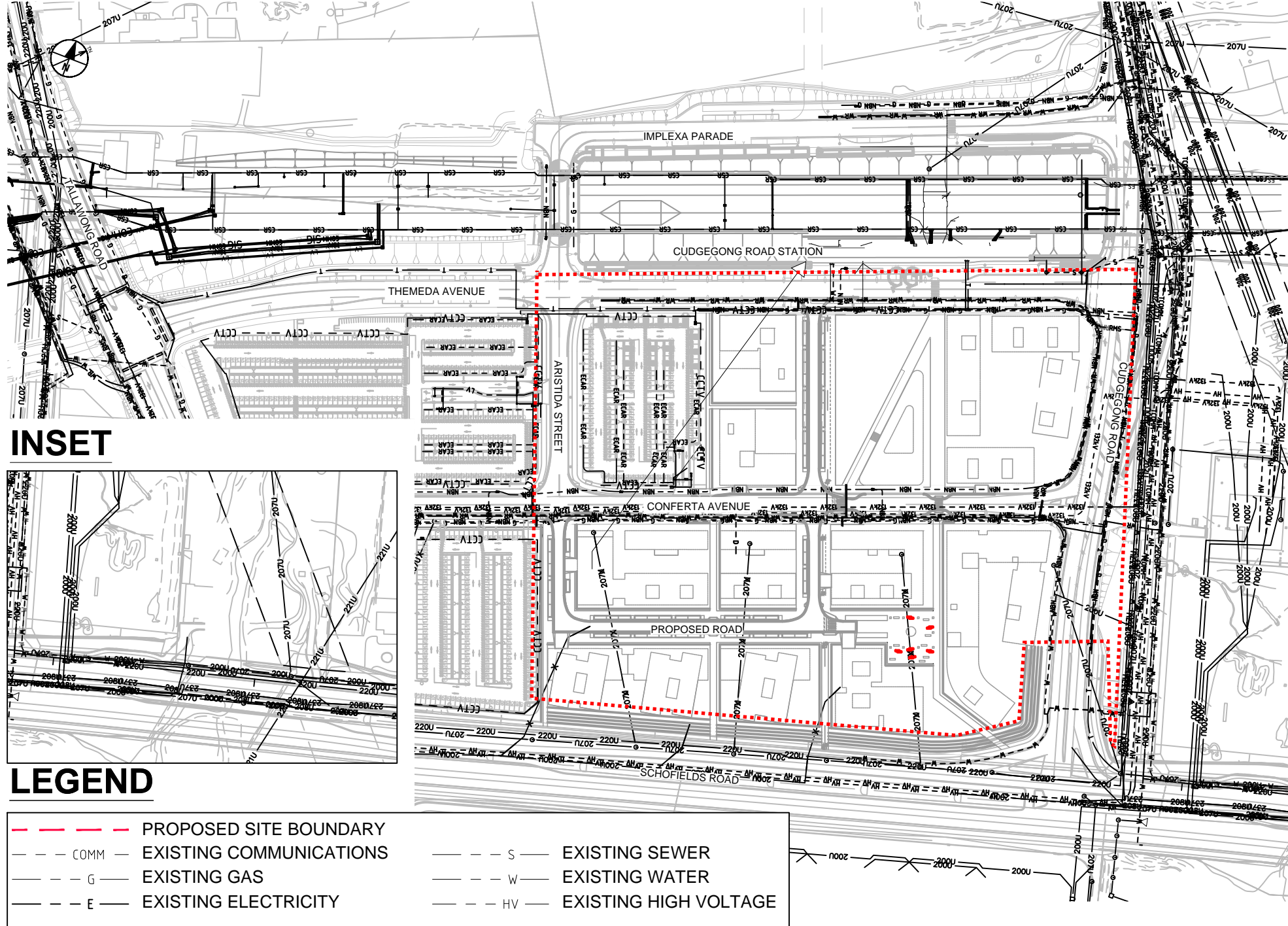


Figure 3 - Combined Services Plan (Existing)

## 5.0 Potable Water

### 5.1 Background

Sydney Water supplies potable water to the Cudgegong Road Station Precinct from the prospect supply system as shown below in Figure 4.

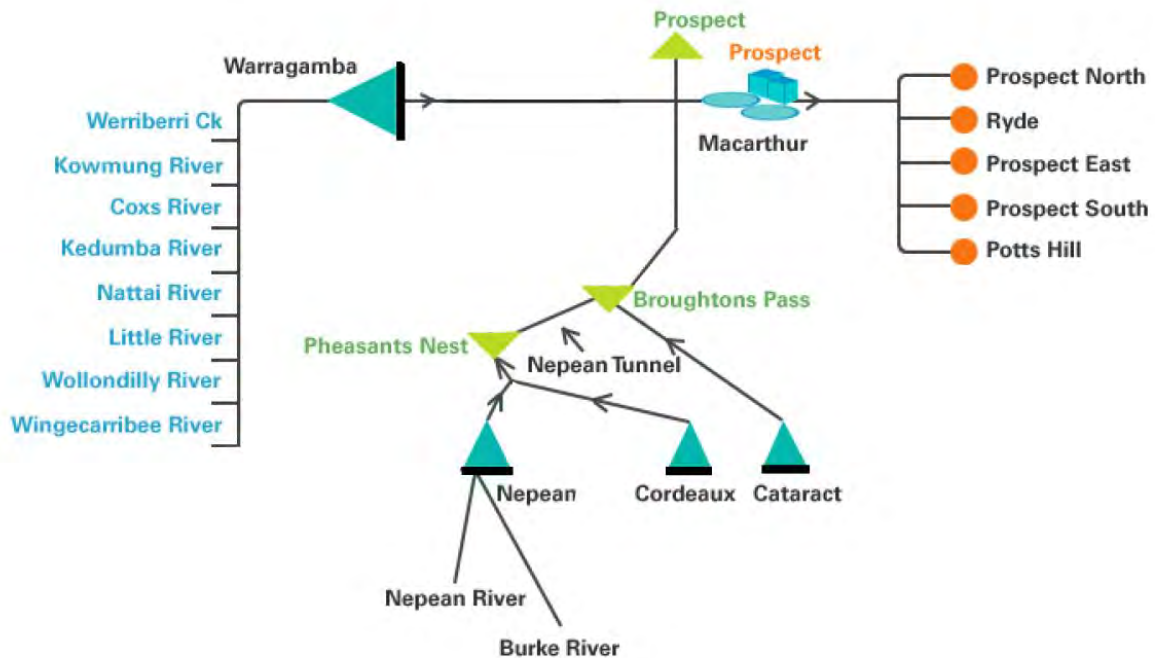


Figure 4 Potable Water Supply (Sydney Water Corporation, 2017)

The Rouse Hill Supply Area is supplied via the Potts Hill Trunk Delivery System and incorporates the Rouse Hill WWTP/WRP, Parklea North Reservoir, Kellyville Reservoir and Parklea Reservoir. There are also three potable water pumping stations within the system:

- Parklea North WP0308;
- Kellyville WP0307; and
- Parklea WP0309.

### 5.2 Demand Assessment

An assessment of the estimated increase in potable water demand resulting from the Cudgegong Station Precinct development has been undertaken to assist in determining the required infrastructure upgrades associated with each precinct.

Demand forecasting and profiles were developed for the study area. Individual project areas have been based on the average number of dwellings and proposed gross floor area (GFA) for retail and commercial development. 4

Demand estimates for potable water have been calculated using the *Design Criteria Guidelines Supplement for Single Reticulation System (Sydney Water, 2014)* and is based on maximum daily demand. The BASIX reduction has been taken from the Building Sustainability Index targets.

A summary of the water demand unit rates is presented in Table 3.

Table 3 Potable Water Demand Unit Rates

Land Use	Design Criteria	Units	Potable Water Demand	Sources
Multi- Unit (>140 unit/net/ha) 6-12 storey apartment	Max Day Demand	kL/unit/day	0.8	Water Supply Code of Australia WSA 03-2011 - 3.1 (Sydney Water)
Suburban Commercial	Max Day Demand	kL/Ha/day	41	Water Supply Code of Australia WSA 03-2011 - 3.1 (Sydney Water 2014 Edition)
BASIX Reduction		%	40	Building Sustainability Index Targets

### 5.2.1 Forecast Demand

An estimate of the future potable water demand for the Cudgegong Road Station Precinct South has been calculated on the average of the potential range of dwellings for residential units and GFA for retail and commercial developments.

The proposed precinct has been classified as 'multi-unit >140 units/net ha development based on housing density with an equivalent potable water demand rate of 0.80 kL/net/day. The commercial density has been estimated on an equivalent potable water demand rate of 41 kL/Ha/day.

Under BASIX requirements, new residential developments are required to reduce mains-supplied potable water consumption by 40% (since the BASIX amendment was introduced in 2006) compared to the average NSW dwelling. Commercial demands have not had a BASIX reduction applied. The estimated cumulative electrical demand assessment for each option is summarised in Table 4 and below.

For the proposed development scenario presented in Table 1 and including BASIX reduction, the total Maximum Daily Demand (MDD) is approximately **565 kL/day**. Considering the  $\pm 25\%$  range in development yields, the MDD could vary between approximately **425-705 kL/day** (inc BASIX).

Based on the SWC Area *Planning Design Criteria Guide* (Sydney Water, 2010) it is anticipated that the provision of recycled non-potable water for domestic use within the Cudgegong Road Station Precinct South, including toilet flushing, washing machine usage and external uses, could see a potential reduction in the proposed potable water demand by up to 50% of the maximum day demand.

The exact reduction in potable water demand would be subject to further investigation considering the extent of the usage required and density of the development.

Table 4 Estimated Cumulative Maximum Daily Potable Water Demand (Based on Bennett and Trimble development profile)

Potable Water Demand - kL/Day - Cumulative (incl. BASIX)					Total Peak kL/Day
Cudgegong Precinct	0 to 2 yrs		2 to 4 yrs		
	App.	Com.	App.	Com.	
Site 1	96	18	173	37	210
Site 2 (Phase 1 + 2)	178	0	355	0	355
Total Site	274	18	528	37	565

\* App = Apartments, Com = Commercial

### 5.3 Existing On-Site Utility Infrastructure

The existing Sydney Water potable water network on the Cudgegong Road Station Precinct South site has been identified based on Dial Before You Dig (DBYD) records. These records indicate the presence of numerous potable water mains within and adjacent to the precinct boundaries.

The existing potable network in the immediate surrounding vicinity consists of the following:

- External DN250 DICL main running along Schofields Road South of the site;
- External DN750 DICL main running along the eastern side of Cudgegong Road;
- External DN250 DICL main running along the western side of Cudgegong Road; and
- External DN450 DICL main running along Tallawong Road west of the site.

The depths and position of the existing reticulation mains are unknown, further investigation is required to determine the exact existing layout. Additionally while Sydney Water have confirmed that the trunk mains should have sufficient capacity to service the projected demand, smaller reticulation mains may require amplification.

It should be noted that the above discussion only considers Sydney Water infrastructure, it is likely that private or other authority water infrastructure is present on the site (particularly on NRT land) however no records of this infrastructure has been made available for this study.

### 5.4 Potential On-Site Infrastructure Layouts

As noted previously, the scope of external infrastructure upgrades and lead-in works is to be confirmed based on hydraulic modelling to be undertaken. In advance of this detail, it is assumed that the proposed development would ultimately be supplied from the existing DN750 DICL or DN250 DICL external main along Cudgegong Road.

The proposed internal water reticulation layout assumes connections to the existing Sydney Water network to be made in two locations. A new potable water main is to extend from Cudgegong Road running westbound underneath Precinct Street D to supply new buildings within the southern site. Connections will also be made to newly constructed water mains beneath Precinct Street A for buildings adjacent.

It has been assumed that one point of connection is required per lot, these points of connection have been located adjacent to the assumed driveway locations of each building and are proposed to be co-located with other services connections.

The proposed potable water network is provided below in Figure 6. The potable water reticulation network will also likely require new hydrants within the streets however these will be confirmed during detailed design.

It is noted that Sydney Water will generally not provide a lot connection until an application is made by that developer for a service and Sub-division of lots is required prior to submitting applications to Sydney Water. A feasibility application has been submitted to Sydney Water as shown in Appendix A.

### 5.5 Coordination of Potable Water Infrastructure with Other Services

Coordination of the proposed potable water infrastructure with other services in the proposed street network would generally be based on the Streets Opening Conference standards, these details are attached in Section 10.0.

In addition, Section 5.12.5.2 of the Water Services Association of Australia codes (WSA 03-2011-3.1, Sydney Water Edition – 2012) states that the clearance requirements for water mains from other service utility assets shall not be less than the minimum vertical and horizontal clearances as summarised in Figure 5.



Utility (Existing or proposed service)	Minimum horizontal clearance		Minimum vertical clearance <sup>1</sup> mm
	mm		
	New main size		
	≤DN 200	>DN 200	
Water mains <sup>2</sup> >DN 375	600	600	300
Water mains ≤DN 375	300 <sup>3</sup>	600	150
Gas mains	300 <sup>3</sup>	600	150
Telecommunication conduits and cables	300 <sup>3</sup>	600	150
Electricity conduits and cables	500	1000	225 <sup>7</sup>
Stormwater drains	300 <sup>3</sup>	600	150 <sup>4</sup>
Sewers – gravity	1000 <sup>5</sup> /600	1000 <sup>5</sup> /600	500 <sup>4</sup>
Sewers – pressure and vacuum	600	600	300
Kerbs	150	600 <sup>6</sup>	150 (where possible)
NOTES – see over			

## NOTES:

- Vertical clearances apply where water mains cross one another and other utility services, except in the case of sewers where a vertical separation shall always be maintained, even when the main and sewer are parallel. *The main should always be located above the sewer to minimise the possibility of backflow contamination in the event of a main break.*
- Water mains includes mains supplying drinking water and non-drinking water.
- Clearances can be further reduced to 150 mm for distances up to 2 m where mains are to be laid past installations such as concrete bases for poles, pits and small structures, providing the structure will not be destabilised in the process. *The clearance from timber poles should be at least 200 mm and preferably 300 mm..*
- Water mains should always cross over sewers and stormwater drains. For cases where there is no alternative and the main must cross under the sewer, the design shall nominate an appropriate trenchless construction technique in accordance with Clause 5.5 or other water main construction and protection treatment, effectively joint-free in the vicinity of the sewer. Refer to Standard Drawings WAT-1211-V and WAT-1255-S.
- Where a parallel sewer is at the minimum vertical clearance lower than the water main (500 mm), maintain a minimum horizontal clearance of 1000 mm. *This minimum horizontal clearance can be progressively reduced to 600 mm as the vertical clearance is increased to 750 mm.*
- Clearance from kerbs shall be measured from the nearest point of the kerb. *For water mains ≤DN 375 clearances from kerbs can be progressively reduced until the minimum of 150 mm is reached for mains ≤DN 200.*
- An additional clearance from high voltage electrical installations should be maintained above the conduits or cables to allow for a protective barrier and marking to be provided.

**Figure 5: Sydney Water Clearances between Water Mains and Underground Services (WSA 03-2011-3.1, Sydney Water Edition – 2012)**

## 5.6 Approvals and Next Steps

Sydney Water formal approvals are typically provided as a part of a Section 73 process, these will likely be required for each lot. However, site wide strategy drawings can be submitted to Sydney Water as a part of the applications to establish a Head Deed.

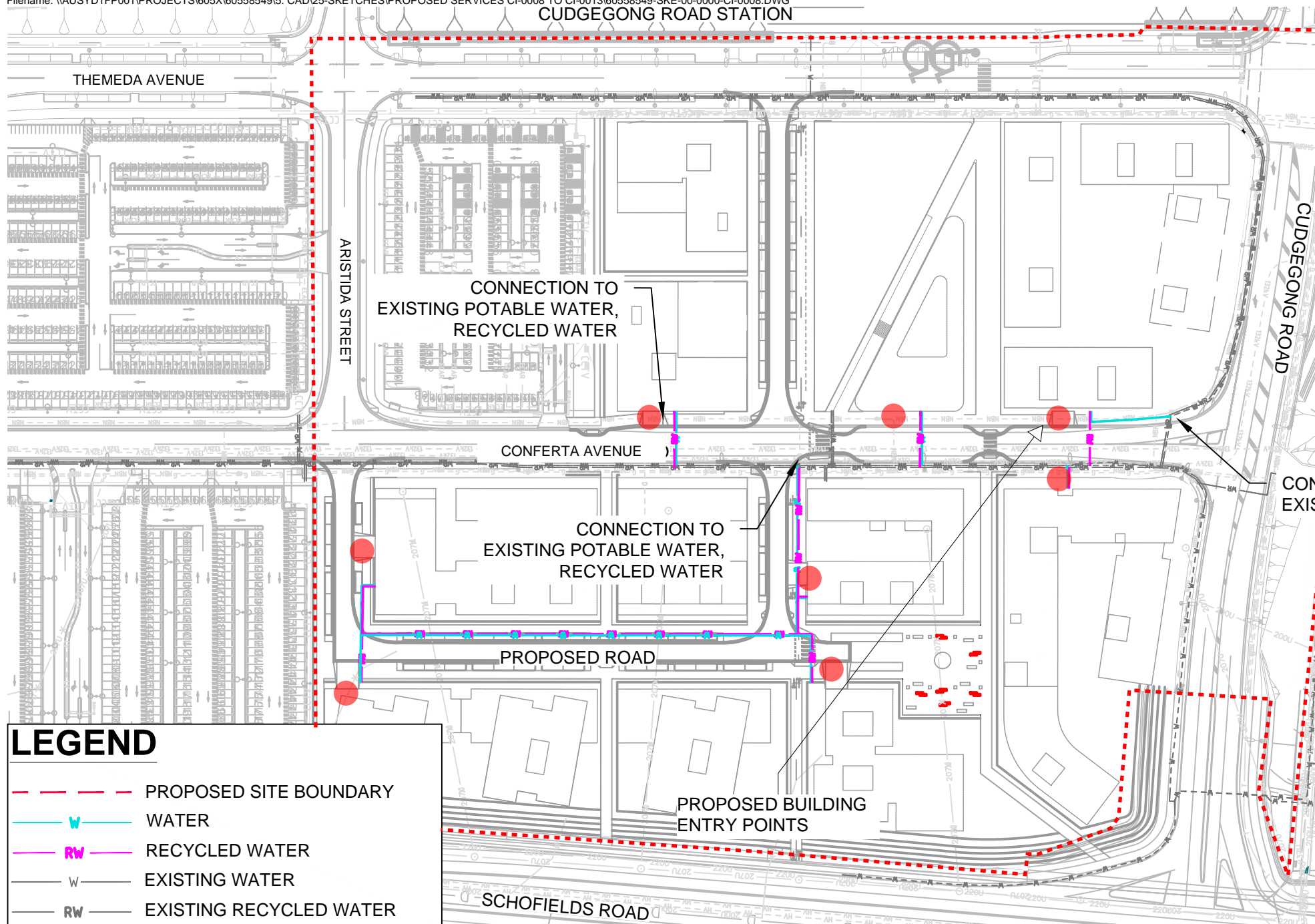
As described in Section 5.4, the potable water strategy is to be confirmed through hydraulic modelling, with separate reports outlining the modelling outcomes to be submitted to Sydney Water.

The key next steps in progressing the delivery of potable water infrastructure through detailed design, including the formal approval process for Sydney Water infrastructure consists of the following:

1. Undertake hydraulic modelling (if required) to confirm the extent of any lead-in infrastructure upgrades required;
2. Undertake site investigations to confirm the layout and extent of existing on site infrastructure (including non-Sydney Water infrastructure);
3. Develop an overall water master plan for the Precinct including staging considerations and agree this with Sydney Water (contained within this report);
4. Update the Integrated Water Management Strategy to suit the detailed design and provide protection/build-over requirements for infrastructure that cannot be diverted;
5. Establish a Head Deed to be signed by required parties (Sydney Water, Designer, WSC, Developer, Constructor);
6. Submit application/s for individual detailed design packages to be submitted to SWC with drawing of proposed works in stages, Section 73. Refer to Appendix A for the feasibility application for potable water submitted to Sydney Water;
7. SWC to issue of Notice of Requirements (NOR) with their requirements for water main layout, sizing and funding matters confirmed; and
8. Detailed design to be progressed based on the NOR and submitted to Sydney Water for approval.

It is noted that the above is for delivery of the water network through the new street network, it is expected that the buildings will still need to make separate applications for connection.

# CUDGEGONG ROAD STATION



## LEGEND

- PROPOSED SITE BOUNDARY
- W WATER
- RW RECYCLED WATER
- W EXISTING WATER
- RW EXISTING RECYCLED WATER

Figure 6 - Potable Water Plan

60558549 Cudgong

CUDGEGONG ROAD STATION-TOWN CENTRE

LANDCOM

Project No.: 60558549 Date: 2018-02-08

PROPOSED UTILITIES

WATER AND RECYCLED WATER

AECOM

60558549-SKE-00-0000-CI-0008

## 6.0 Wastewater

### 6.1 Background

Sydney Water currently services the Cudgegong Road Station Precinct South site precinct through the Rouse Hill Water Recycling Plant. The facility is Australia's largest residential recycling scheme which treats wastewater to tertiary standards which then recycles back to customers for non-drinking purposes. It has a capacity of 20ML/day and services approximately 32,000 properties. Flow is transferred to treatment plants via a series of sewer pumping stations and any excess recycled water is released into wetlands in Second Ponds Creek.

AECOM's *Services and Infrastructure Strategic Investigation* (2014) for NWRL identified that within the overall Cudgegong Road Precinct (Area 20) is located within two wastewater catchments, with the adjacent Riverstone catchment requiring major amplifications to the trunk system. For the Rouse Hill catchment specifically, the need for system amplification is still under assessment for the period after 2016.

The sewer catchments for the development are shown below in Figure 7.

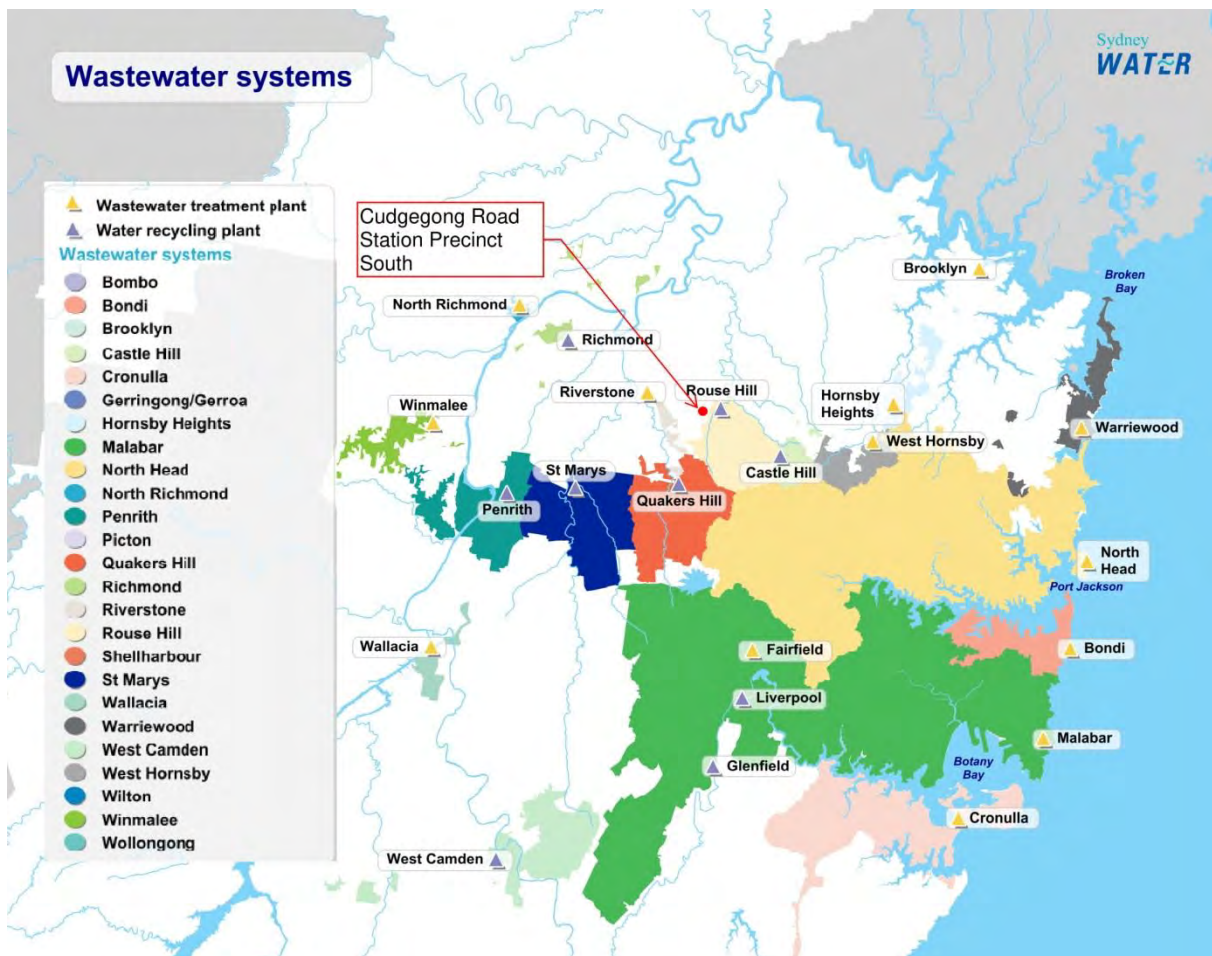


Figure 7 Sydney Water Wastewater Systems

### 6.2 Demand Assessment

An assessment of estimated sewer loading from the development has been undertaken to assist in determining the required infrastructure upgrades.

Demand forecasting and profiles have been based on the average number of residential dwellings, and Gross Floor Area for retail and commercial development.

The design criteria used to forecast future sewer loading are taken from the Sydney Water Area *Planning Design Criteria Guide: WSA 02-2002-3.0 (Sewer Code of Australia)* and is expressed as an Equivalent Population for a particular land use. The BASIX reduction has been taken from the Building Sustainability Index targets.

A summary of the sewer load unit rates is presented in Table 5.

Table 5: Sewer Design loading Criteria

Land Use	Units	Wastewater Demand	Sources
High Density Residential	EP/dwelling	2.5	SWC Area Planning Design Criteria Guide: WSA 02-2002- 3.0 (Sewer Code of Australia)
Local Commercial	EP/ha	75	SWC Area Planning Design Criteria Guide: WSA 02-2002- 3.0 (Sewer Code of Australia)
BASIX Reduction	%	40	Building Sustainability Index Targets

## 6.2.1 Forecast Demand

The Cudgegong Station Precinct South has been classified as comprising of “high-density dwelling” and ‘local commercial’ development.

In accordance with the Sydney Water criteria guide, the Average Dry Weather Flow (ADWF) per Equivalent Population (EP) has been taken as 150L/day or 0.0017L/s ( $ADWF(L/s) = 0.0017 \times EP$ ).

Under BASIX requirements, proposed residential developments are required to reduce their loading by 40%. Estimated overall demands for both development scenarios are summarised below and in Table 6.

Under the proposed development scenario the mean ADWF under BASIX requirements has been estimated to be approximately **3L/s**. Considering the  $\pm 25\%$  range in development yields, the ADWF could vary from approximately **2.25 - 3.75L/s** allowing for BASIX.

As per AECOM's Cudgegong Town Centre Targets that have been adapted from Landcom's *Sustainable Places Strategy*, it is anticipated that a minimum BASIX targeted reduction of 40% of wastewater usage will be achieved. Some proposed ESD initiatives include the provision of a recycled water network, and community education on the methods and impacts of resource saving. It is anticipated that recycled water supply will be available upon the completion of construction of the town centre in 2021. The use of recycled water is anticipated to make up 26% of water use in toilets, 23% of water use in the laundry, and 40% of outdoor use.

Aspirational targets of achieving a 5 Star Energy and Water NABERS rating are not reflected in the following demand assessment.

Table 6 Estimated Average Dry Weather Flow (ADWF) including BASIX (L/s)

Waste Water ADWF (L/s) - Cumulative (incl. BASIX)					Total ADWF L/s
Cudgegong Precinct	0 to 2 yrs		2 to 4 yrs		
	App.	Com.	App.	Com.	
Site 1	0.5	0.1	0.9	0.1	1.0
Site 2 (Phase 1 + 2)	0.9	0.0	1.9	0.0	1.9
Total Site	1.5	0.1	2.8	0.1	2.9

\* App = Apartments, Com = Commercial



### 6.3 Existing On-Site Utility Infrastructure

The existing Sydney Water wastewater network has been identified based on Dial Before You Dig (DBYD) records. These indicate the presence of a number of existing wastewater mains throughout the Cudgegong Station Precinct.

The Cudgegong Station Precinct is located within the Rouse Hill wastewater system, with wastewater being treated at the Rouse Hill Recycling plant and transferred via a series of sewer pumping stations. Rouse Hill Recycling plant is located on Mile End Road, Rouse Hill approximately 3km from the site.

The existing wastewater network within the vicinity of the development primarily consists of the following:

- DN600 GRP pipe running through property east of the Precinct.

While this assessment only considers Sydney Water infrastructure, it should be noted that there may be existing wastewater lines adjacent to the site that have not been dedicated to Sydney Water. Furthermore, it is understood that existing lots may be serviced by on-site systems with waste water treated and disposed of on-site or collected and removed by tanker.

### 6.4 Potential On-Site Infrastructure Layouts

The scope of external infrastructure upgrades are to be confirmed based on hydraulic modelling to be undertaken during detailed design. In advance of this detail, it is assumed that the proposed internal gravity reticulation network splits the site into two sub-catchments to generally staging of the proposed development:

- New DN300 main at 1% grade connecting the site to existing external DN600 GRP main parallel to Second Ponds Creek.

The proposed upgrades and building wastewater connection points are shown below in

Each lot is required to be serviced with a single sewer connection with detailed requirements nominated in the Sydney Water Notice of Requirements. Sub-division of lots is required prior to submitting applications to Sydney Water.

It is noted that sewer connections are usually provided at the lowest point on a lot; hence final connection points will require review when final site grading have been developed. A feasibility application has been submitted to Sydney Water as shown in Appendix A.

### 6.5 Coordination of Wastewater Infrastructure with Other Services

Coordination of the proposed wastewater infrastructure with other services in the proposed street network would generally be based on the Streets Opening Conference standards. These details are attached in Section 10.0.

In addition, Section 4.4.5.2 of Water Services Association of Australia codes (WSA 02-2002-2.2, Sydney Water Edition – Version 3) states the clearance requirements for sewers in Table 4.2, as summarised below in Figure 8.

Utility (Existing service)	Minimum horizontal clearance mm		Minimum vertical clearance <sup>1</sup> mm
	New sewer size		
	≤DN 300	>DN 300	
Sewers ≤DN 300	300	600	150 <sup>2</sup> /300
Sewers >DN 300	600	600	300
Gas mains	300 <sup>3</sup>	600	150 <sup>2</sup> /300
Telecommunication conduits and cables	300 <sup>3</sup>	600	150 <sup>2</sup> /300
Electricity conduits and cables	500	1000	225 <sup>2</sup> /300
Drains <sup>7</sup>	300 <sup>3</sup>	600	150 <sup>2</sup> and <sup>4</sup> /300 <sup>4</sup>
Water mains	1000 <sup>5</sup> /600	1000 <sup>5</sup> /600	500 <sup>4</sup>
Kerbs	150	600 <sup>6</sup>	150 (where practicable)

## NOTES:

- Vertical clearances apply when sewers cross one another, except in the case of water mains when a vertical separation shall always be maintained, even when the sewer and main are parallel. *The sewer should always be located below the main to minimise the possibility of backflow contamination in the event of a main break.*
- A minimum vertical clearance of 300 mm applies if the size of either the existing service or proposed sewer is >DN 300.
- Clearances can be further reduced to 150 mm for distances up to 2 m when passing installations such as poles, pits and small structures, providing the structure is not destabilised in the process.*
- Sewers should always cross under water mains and stormwater drains.* If this requirement cannot be met, consult Sydney Water in respect of alternatives such as adjusting the water main or stormwater drain. Where a sewer crosses a water main at or close to 90 degrees, the vertical clearance may be reduced to not less than 200 mm provided that the sewer is concrete encased and a 50 mm compressible material is placed over the encasement. The encasement shall not have any joints within 1000 mm either side of the water main and shall conform to Drawing SEW-1205-V.
- When the sewer is at the minimum vertical clearance below the water main (500 mm) maintain a minimum horizontal clearance of 1000 mm. *This minimum horizontal clearance can be progressively reduced to 600 mm as the vertical clearance increases to 750 mm.*
- Clearance from kerbs shall be measured from the nearest point of the kerb.
- A sewer to be constructed under an existing or proposed stormwater pipe or channel ≥DN 375 shall be concrete encased. The concrete encasement shall extend at least one metre each side of the stormwater pipe or channel. Clearances between the sewer and other services shall be measured from the outer surface of the concrete encasement.

**Figure 8: Sydney Water Clearance between Sewers and Other Underground Services (WSA 02-2002-2.2, Sydney Water Edition – V3)**

## 6.6 Approvals and Next Steps

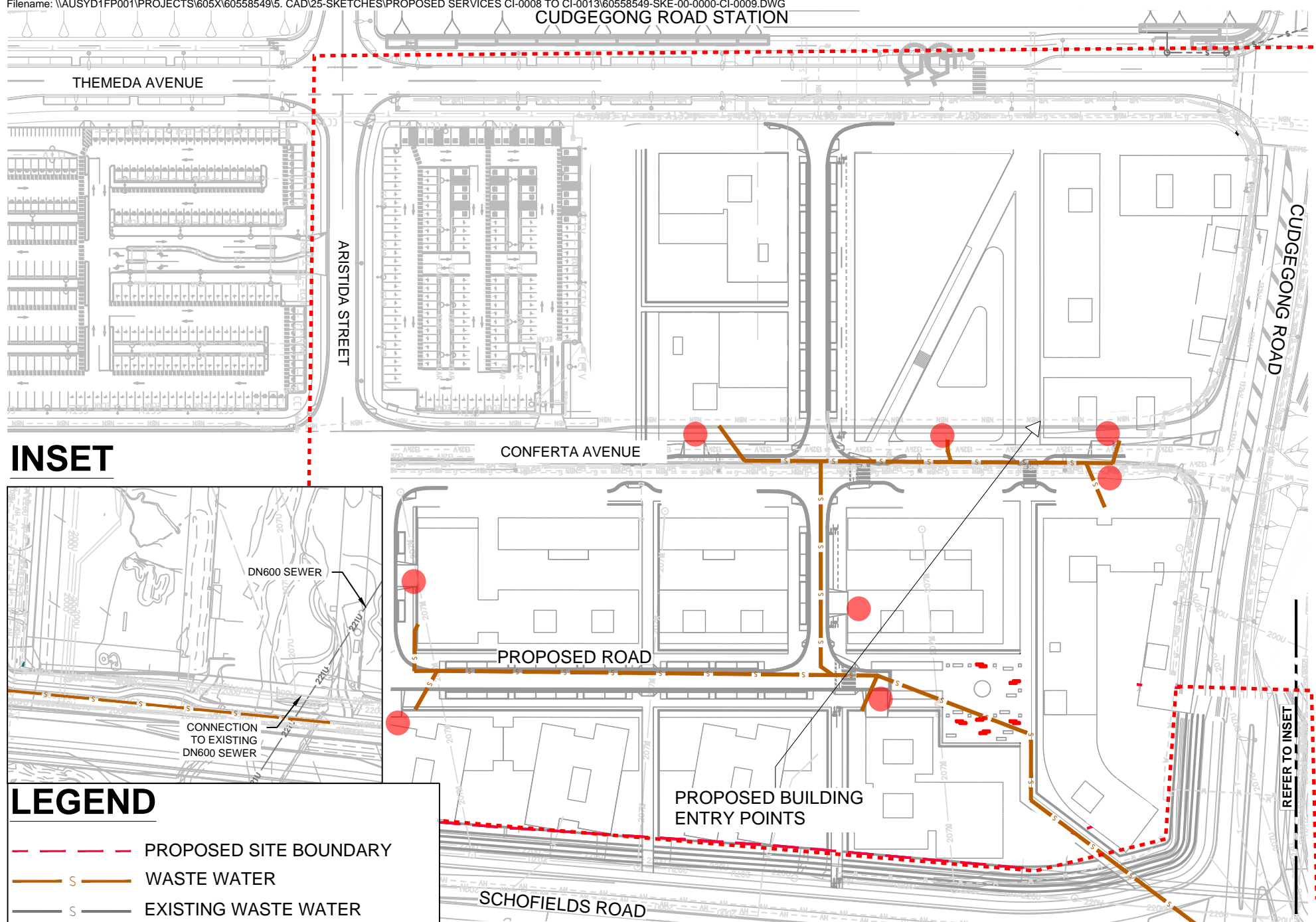
Sydney Water formal approvals are typically provided as a part of a Section 73 process, these will likely be required for each building lot. However, site wide strategy drawings can be submitted to Sydney Water as a part of the applications to establish a Head Deed.

The sewer strategy is to be confirmed through hydraulic modelling, with separate reports outlining the modelling outcomes to be submitted to Sydney Water.

The key next steps in progressing the delivery of sewer infrastructure through detailed design including the formal approval process for Sydney Water infrastructure consists of the following:

1. Undertake hydraulic modelling to confirm extent of any lead-in infrastructure upgrades required;
2. Undertake site investigations to confirm the layout and extent of existing on site infrastructure (including non-Sydney Water infrastructure);
3. Develop an overall wastewater master plan for the Precinct including staging considerations and agree these with Sydney Water. Being a gravity service this will need to include consideration of the depth of the existing sewer infrastructure to be maintained and/or connected to (based on manhole survey) and proposed grading of the site;
4. Update the Integrated Water Management Strategy to suit the detailed design and provide protection/build-over requirements for infrastructure that cannot be diverted;
5. Establish a Head Deed to be signed by required parties (Sydney Water, Designer, WSC, Developer, Constructor);
6. Submit application/s for individual detailed design packages to be submitted to SWC with drawing of proposed works in stages, Section 73. Refer to Appendix A for the feasibility application for wastewater submitted to Sydney Water;
7. SWC to issue of Notice of Requirements (NOR) with their requirements for water main layout, sizing and funding matters confirmed; and
8. Detailed design to be progressed based on the NOR and submitted to Sydney Water for approval.

It is noted that the above is for delivery of the wastewater network through the new street network, it is expected that the buildings will need to make separate applications for connection.



**AECOM**

60558549-SKE-00-0000-CI-0009

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Project No.: 60558549

**Figure 9 - Wastewater Plan**



## 7.0 Electrical

### 7.1 Background

Endeavour energy is the main supplier of the study area as shown below in Figure 10.



**Figure 10 Endeavour Energy Supply Network**

Projections indicate that there will be a substantial increase in electrical demand from the Cudgegong Station Precinct South. It is expected that there will be sufficient capacity within the local zone substation to supply the proposed demand for the site. AECOM's *Services and Infrastructure Strategic Investigation* (2014) for NWRL identified that within the overall Cudgegong Road Precinct, while there is capacity to service initial development, major additional subtransmission capacity (zone substation or subtransmission lines) will be required to service ultimate development. The delivery of new transmission lines and new zone substations can take between 3 to 5 years of planning respectively.

The precinct is predominantly serviced via 22kV reticulation feeders from the Mungerie Park Zone Substation located 2km east of the site along Commercial Road.

Detailed lead-in infrastructure upgrades will need to be confirmed with Endeavour Energy as part of formal applications made as a part of detailed design. In addition, street lighting supply may comprise a separate Blacktown City Council network (with the supply taken from the local Endeavour Energy (LV) network). This will need to be confirmed with Blacktown City Council through detailed design, however if this is the case, a separate Blacktown City Council infrastructure study will also be required.

### 7.2 Demand Assessment

An assessment of the estimated electrical demand for the precinct has been undertaken to assist in determining the required infrastructure upgrades.

Demand forecasting and profiles were developed for the study area based on the average number of residential dwellings, and gross floor area (GFA) for retail and commercial development respectively.

Demand estimates for electricity have been calculated by applying a peak demand rate of 3.5kVA per dwelling and 0.1 kVA per m<sup>2</sup> for commercial and retail buildings (Endeavour Energy: Distribution and Transmission Annual Planning Report, 2014) as typically adopted by Endeavour Energy for planning purposes. These rates are generally considered to be conservative but are appropriate for preliminary estimation purposes. These rates are applied to proposed dwellings, commercial and retail spaces to provide an indication of the magnitude of the demand increase.

A further scenario is also considered where the electricity rate is reduced by 25% as required by BASIX for residential development and a diversity factor of 0.8 applied to the resultant sum (after the BASIX reduction). The BASIX reduction has only been applied to the residential dwellings while the diversity factor has been applied to both commercial and residential areas.

The diversity factor is applied to give a reasonable estimate of the cumulative demand for large sites. It is applied to make allowance for the variation in timing of electrical usage across the large developments. This is particularly important where the load is being reviewed against the capacity of trunk infrastructure which may serve other developments outside the study area.

Table 7 shows the electricity demand unit rates adopted.

Table 7: Electricity Demand Unit Rates

Building Type	Peak Demand Rate	Unit
Residential BASIX compliant dwellings (incl. Single Detached; Townhouse; Apartment)	2.5	kVA/dwelling
Residential non-BASIX compliant dwellings (incl. Single Detached; Townhouse; Apartment)	3.5	kVA/dwelling
Commercial	0.1	kVA/m <sup>2</sup>
BASIX Reduction	25	%
Diversity Factor	0.8	

### 7.2.1 Forecast Demand

Expected peak demand for the proposed development scenario is summarised below and in Table 8.

Considering the proposed development yields, the average total cumulative peak electricity load increase has been estimated to be approximately **3 MVA** when including BASIX and diversity requirements.

Considering the ±25% range in development yields used for the purposes of analysis, the peak electrical load could vary from approximately **2.5-4 MVA** allowing for BASIX.

As per AECOM's Cudgegong Town Centre Targets that have been adapted from Landcom's *Sustainable Places Strategy* it is anticipated that a minimum BASIX targeted reduction 25% will be achieved with a reduction in Greenhouse Gas (GHG) emissions of 50% at a precinct level. Methods of incorporating ESD and achieving the proposed base targets include investigation of opportunities to install PV systems on rooftops, the provision of decentralised and the investigation of distributed energy saving technologies including central thermal plants.

**Table 8 Estimated Cumulative Electrical Demand Assessment (incl. Basix and Diversity Factor)**

Electrical Demand - Peak kVA - Cumulative (inc BASIX + DIVERSIFICATION)					Total Peak kVA
Cudgegong Precinct	0 to 2 yrs		2 to 4 yrs		
	App.	Com.	App.	Com.	
Site 1	420	360	756	720	1476
Site 2 (Phase 1 + 2)	777	0	1554	0	1554
Total Site	1197	360	2310	720	3030

\* App = Apartments, Com = Commercial

### 7.3 Existing On-Site Utility Infrastructure

The existing Endeavour Energy electrical infrastructure on the site has been identified based on Dial Before You Dig (DBYD) records.

There are existing underground electrical assets adjacent to the site boundary. These include electrical conduits running underneath Schofields Road and Cudgegong Road and while additional underground cables have been proposed to run along Tallawong Road.

The existing and proposed Endeavour Energy infrastructure are outlined below in Figure 11 Electrical, this plan only considers Endeavour Energy infrastructure and does not include private electrical infrastructure which may be present within the site.

### 7.4 Potential On-Site Infrastructure Layouts

As noted previously the scope of external infrastructure upgrades and lead-in works will be confirmed when formal Endeavour Energy applications are made as part of detailed design.

Upgrades to the existing Endeavour Energy underground electrical network are proposed to service each lot. This proposed network is shown below in Figure 11.

The proposed potential electrical layout consists of a single connection point to the existing service on Stores Street. It is assumed that each proposed building would be supplied by an internal chamber substation as to avoid external kiosk substations.

Similar to the water and wastewater networks, it has been assumed that internal building chamber substations will be placed adjacent to building driveway entrances. The exact locations are to be determined in detailed design and through coordination with the building lots where possible.

It has been assumed that internal road layouts will be dedicated to Blacktown City Council and that easements will not be required where the electrical assets pass through public land or roads.

As noted previously, ownership of the street lighting will need to be confirmed as part of detailed design. If Endeavour Energy assets within the precinct are to be fed by the local Endeavour Energy LV network it may require the proposed network shown in Figure 11 to be expanded to ensure that all road network are covered. A feasibility application has been submitted to Endeavour Energy as shown in Appendix B.

### 7.5 Coordination of Electrical Infrastructure with Other Services

Coordination of the proposed electrical infrastructure with other services in the proposed street network would generally be based on the Streets Opening Conference standards (these details are attached in section 10.0).

Endeavour Energy's specification "MDI 0028 – Underground distribution network design" does not provide specific information on clearances from other services. If the electrical services are installed within the standard allocation, the separations given by the other services provider should apply for all crossings. Where a reduced allocation is proposed, separations should be determined in consultation with Endeavour Energy.

## 7.6 Approvals and Next Steps

Endeavour Energy formal approvals are usually provided for individual detailed design packages. It is possible to submit precinct wide drawings to establish a Case for the entire area with Endeavour Energy. Refer to Appendix B for the feasibility application that has been submitted to Endeavour Energy for the proposed Cudgegong Road South Precinct development.

The key next steps in progressing the delivery of electrical infrastructure through detailed design including the formal Endeavour Energy approval process consists of the following:

1. Undertake site investigations to confirm the layout and extent of existing services (including non-Endeavour assets);
2. Confirm arrangements for supply and ownership of street lighting;
3. Confirm extent of existing infrastructure that can be abandoned and/or requires diversion;
4. Develop duct masterplan and make submission to set up case with Endeavour Energy;
5. Develop staged designs for delivery of the new infrastructure;
6. Liaise with Blacktown City Council to confirm requirements for undergrounding of existing infrastructure;
7. Endeavour Energy to provide detailed requirements;
8. Endeavour Energy to issue Design Information Pack (DIP), Design Contract and Deed of Agreement; and
9. Submit detailed design of individual packages for approval.

It is noted that the above is for delivery of the duct network through the new street network, it is expected that the buildings will need to make separate applications for connection, including installation of new feeders.



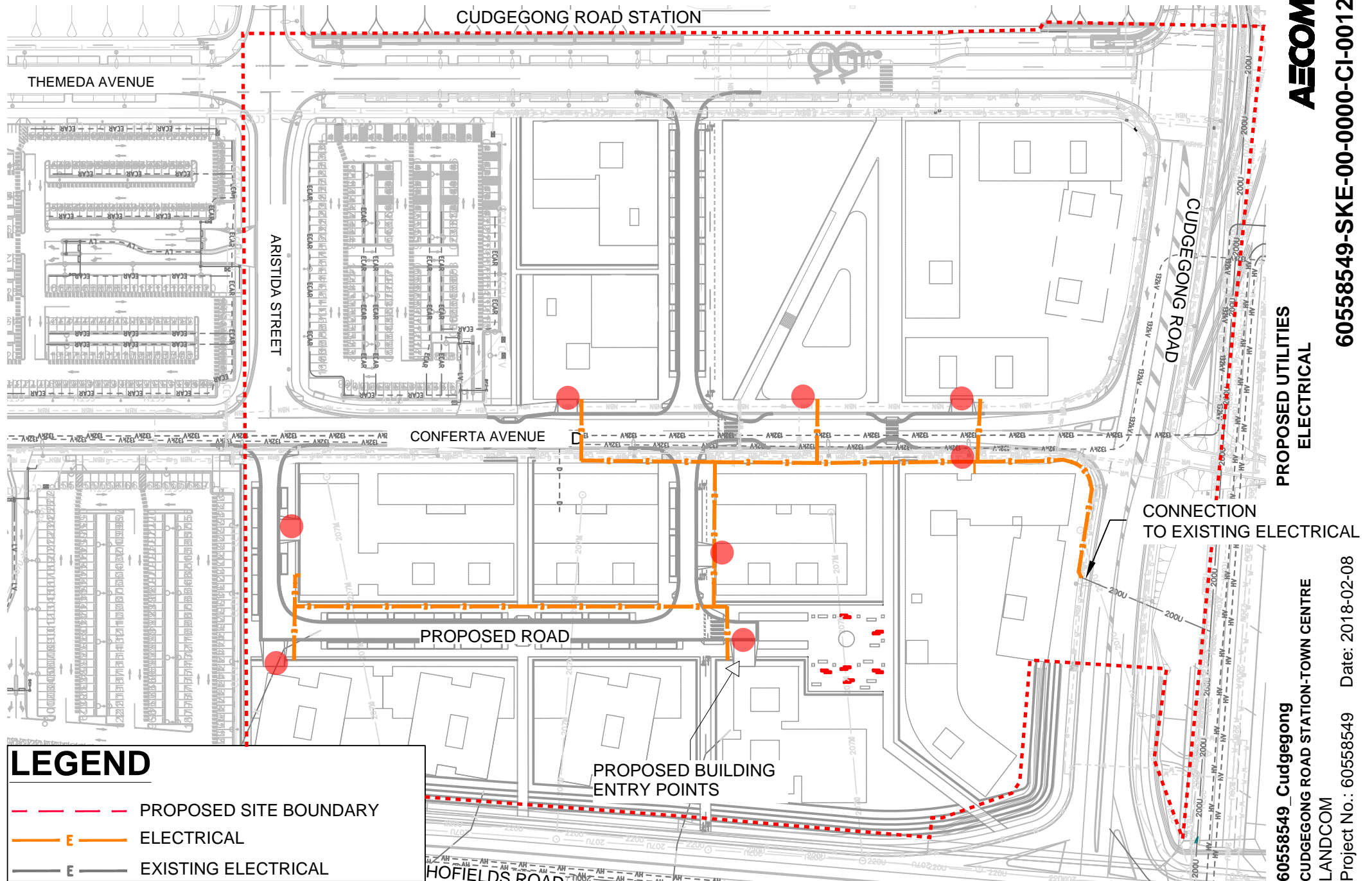


Figure 11 - Electrical Plan

## 8.0 Gas

### 8.1 Background

Gas servicing to the Cudgegong Road Station Precinct South is provided by Jemena. Projections indicate that there will be an increase in the gas demand for the Cudgegong Road Station development site. Whilst there is a substantial distribution network in the area, it is predominately comprised of small connections providing supply at a low pressure.

Jemena have not confirmed whether the existing infrastructure within the Cudgegong Station Precinct has sufficient capacity. Confirmation of capacity and potential required upgrades will be received when formal connection applications are received. Since AECOM's *Services and Infrastructure Strategic Investigation* for NWRL in 2014, there have been a number of newly laid gas mains within the Cudgegong Road Station Precinct South. This indicates that it is no longer necessary to service the precincts natural gas demand solely by utilising infrastructure adjacent to the precinct.

### 8.2 Demand Assessment

An assessment of the gas demand of the precinct has been undertaken to assist in determining the required infrastructure upgrades associated with each precinct.

Jemena use an energy demand of 20 gigajoules (GJ) per year to estimate the average annual domestic usage of natural gas for residential dwellings. This usage rate typically equates to a natural gas hot water tank, cook top and heating point. Peak demand and annual gas demand are also dependent on the plant supplying the project area.

When contacting Jemena they confirmed that different rates are to be used for commercial spaces however they were unable to confirm estimated rates, as such this has been excluded from this assessment. However, the demand from commercial land uses is expected to be substantially less than from residential usage. It should be noted that the gas demands do not account for alternative supply scenarios such as trigeneration.

#### 8.2.1 Forecast Demand

A BASIX reduction target of 25% has been applied to residential dwellings only. While gas usage can increase under BASIX to offset electrical demand, gas prices have a much greater effect on demand. As this price is variable it has been assumed that there is no net increase or reduction as a result of BASIX compliant dwellings. Below are the estimated demands for gas considering both development options.

The projected gas demand across the proposed Cudgegong Road Station Precinct South is approximately **1,800 m<sup>3</sup>/day**. Considering the  $\pm 25\%$  range in development yields, the gas demand could vary between approximately **1,350 – 2,250 m<sup>3</sup>/day**.

As per AECOM's Cudgegong Town Centre Targets that have been adapted from Landcom's *Sustainable Places Strategy*, aspirational targets have been identified in addition to the BASIX base target of a reduction in 25% of gas demand. These aspirational targets include achieving "advanced thermal comfort" and the increased usage of on-site renewable energy to achieve 15% of peak electricity demand.

Provision of trigeneration and co-generation on site as a way to reduce the demand of electricity may result in an increased demand for gas services within the development.

**Table 9 Estimated Cumulative Gas demand assessment (incl. BASIX, residential only)**

Cudgegong Precinct	Gas - m3/day - cumulative (incl. BASIX)				Total m3/day
	0 to 2 yrs		2 to 4 yrs		
	App.	Com.	App.	Com.	
Site 1	325	n/a	586	n/a	586
Site 2 (Phase 1 + Phase 2)	602	n/a	1204	n/a	1204
Total Site	928	n/a	1790	n/a	1790

\* App = Apartments, Com = Commercial

### 8.3 Existing On-Site Utility Infrastructure

Existing Jemena gas infrastructure on site have been identified using Dial Before You Dig (DBYD) records. These records indicate the presence of a number of existing gas mains surrounding the proposed development site. These primarily consist of:

- External DN110 PE main underneath Schofields Road;
- External DN110 PE main underneath Cudgegong Road; and
- External DN50 NY main underneath Tallawong Road.

Plans of newly laid internal mains have also been provided by NRT. These include:

- DN50 NY main underneath Precinct Street A;
- DN50 NY main underneath Precinct Street C; and
- DN50 NY main underneath Precinct Street D.

These existing services are shown below in Figure 12. The exact depths and positions of the existing reticulation mains have not been confirmed and further investigations will likely be required to determine the extent of diversions required.

### 8.4 Potential On-Site Infrastructure Layouts

New internal gas connections will be made between the proposed buildings and existing gas infrastructure. Their connection location will be designed to be adjacent to the assumed building driveways and will include the following:

These proposed layouts are shown below in Figure 12. The natural gas infrastructure is to be installed by Jemena within a trench prepared as part of infrastructure facilitation works.

### 8.5 Coordination of Gas Infrastructure with Other Services

Coordination of the proposed gas infrastructure with other services in the proposed street network would generally be based on the Streets Opening Conference standards (these details are attached in Section 10.1).

Jemena provide guidance on horizontal and vertical clearances, the minimum separations between electrical and natural gas mains are provided in Table 1.0 of "Natural Gas Requirements for Developer Provided Trench" as summarised in Table 10. A feasibility application has been submitted to Jemena as shown in Appendix C.

Table 10: Jemena Minimum Separation Between Utilities

Utility	Minimum Separation	
	Gas Mains up to 75mm diameter	Gas Mains of 110mm diameter or larger
Telecommunication cables and/or conduits	150 mm	300 mm
Protected <sup>2</sup> Low Voltage electricity cables	150 mm	300 mm
Protected <sup>2</sup> High Voltage electricity cables	300 mm	300 mm

1. Separations relate to distances between conduits/cables peripheries
2. "Protected" refers to mechanical protection of the cables, which usually takes the form of either polymeric strips (at least 3 mm thick) or clay brick
3. The above table is considered to provide desirable minimum separations. Consideration should be given for the need to access for future maintenance of services when determining the required separations

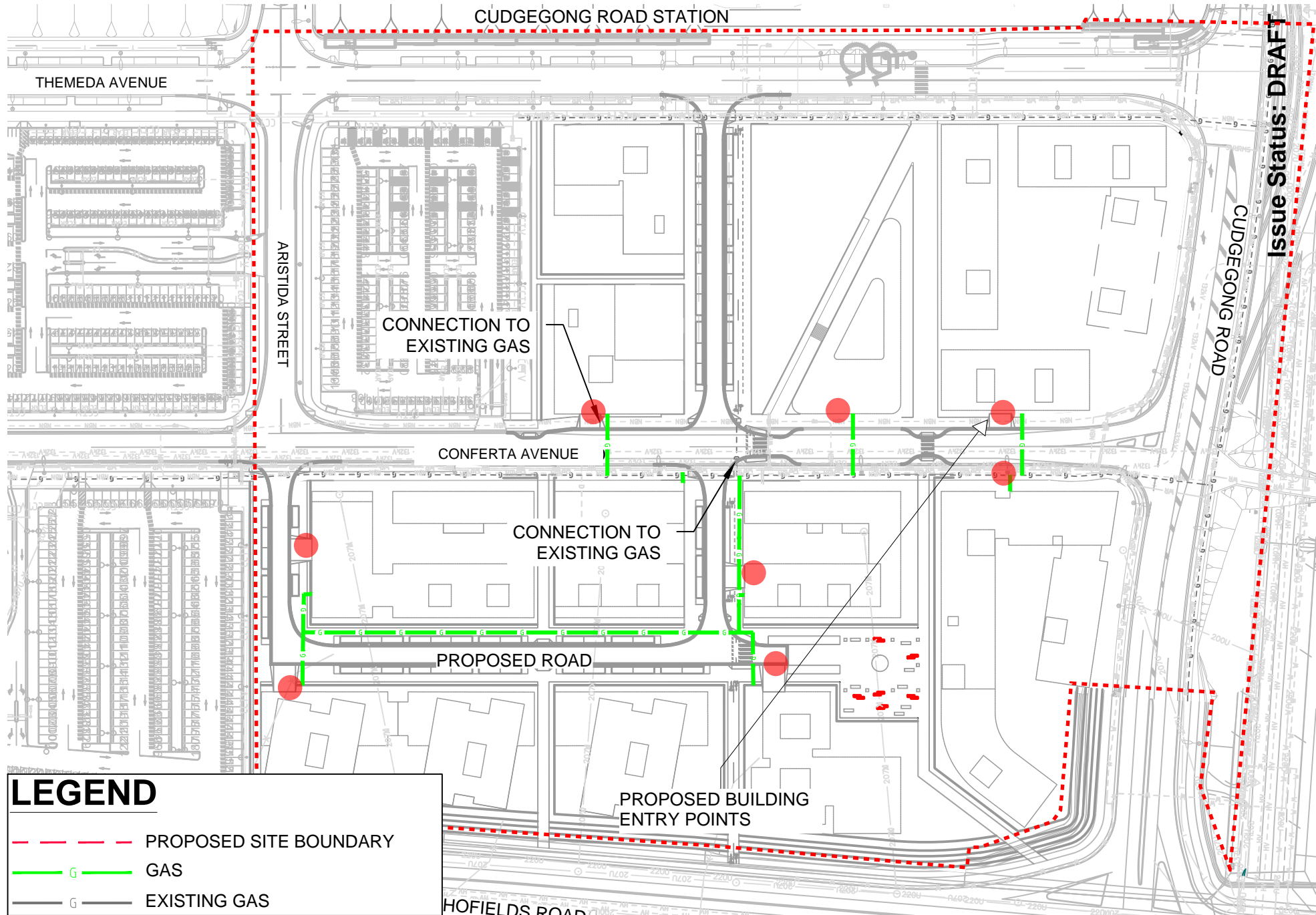
## 8.6 Approvals and Next Steps

Jemena does not have a formal approval process, with supply arrangements being confirmed by Jemena as part of their quotation for construction to be provided following submission of applications for connection.

The formal approval process for provision of Jemena infrastructure to be progressed through 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);
2. Submit masterplan including staging of delivery to Jemena for agreement;
3. Submit application for design to Jemena for individual detailed design packages (to include proposed alignment). Refer to Appendix C for the feasibility application submitted to Jemena; and
4. Jemena will provide a quote for construction works.

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.



## LEGEND

- PROPOSED SITE BOUNDARY
- G GAS
- G EXISTING GAS

Figure 12 - Gas Plan

60558549\_Cudgegong

CUDGEGONG ROAD STATION-TOWN CENTRE

LANDCOM

Project No.: 60558549 Date: 2018-02-08

PROPOSED UTILITIES  
GAS

**AECOM**

60558549-SKE-00-0000-CI-0010



## 9.0 Data and Telecommunications

### 9.1 Background

A number of communication providers have assets around the Cudgegong Station precinct. However, the only providers which have assets that border or intersect with the site are:

- Telstra;
- Uecomm; and
- NBN Co.

Due to the scale of development expected on the site, it is expected that new telecommunications servicing will be provided by the National Broadband Network (NBN). Figure 13 below illustrates the current extents of the NBN rollout with reference to the investigation site area.

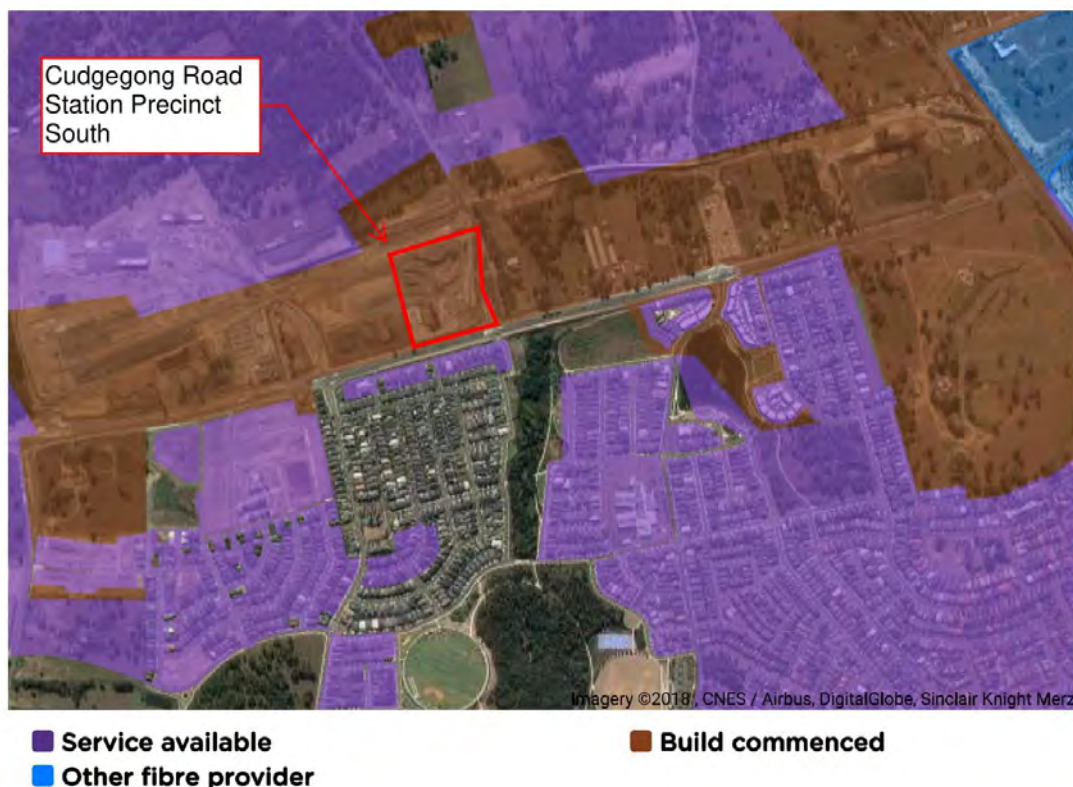


Figure 13 NBN Rollout (NBN Co. 2017)

### 9.2 Demand Assessment

No demand has been calculated for telecommunication infrastructure as it cannot be estimated in the same way as other utilities.

### 9.3 Existing On-Site Utility Infrastructure

#### 9.3.1 Telstra

Underground Telstra services have been identified underneath the streets surrounding the Cudgegong Station precinct boundaries, namely underneath Tallawong, Schofields and Cudgegong Roads. These are assumed to be servicing existing properties and buildings within the site. It has been assumed at this stage that the existing Telstra services are to be retained in order to continue servicing the site's

existing buildings, and to provide connection points for the new reticulation required to service the proposed buildings within the Precinct. This will need to be confirmed as part of the detailed design.

### 9.3.2 Optus/Uecomm

DBYD records have identified a series of Optus pits and underground cables located along Cudgegong Road only.

No existing connections to the proposed development site have been shown.

### 9.3.3 NBN Co.

DBYD records have identified NBN Co. assets being present within the project precinct and are in the process of being rolled out. NRT plans show NBN cables located underneath Precinct Streets A, B and D fed through Cudgegong and Tallawong Roads.

## 9.4 Potential On-Site Infrastructure Layouts

Connections to existing NBN communications infrastructure is proposed to provide services to new buildings within the site.

The proposed arrangement is shown below in Figure 15. It has been assumed that NBN will be the communications service provider however this is to be confirmed during detail design; it has been further assumed based on consultation to date that NBN will be able to share conduits with the existing Telstra external infrastructure.

Discussions with NBN have indicated that they would undertake any backhaul required to bring services to the site boundary. The timeframe for undertaking these works and any costs to be recovered from the developer will be confirmed when a formal application is submitted. A feasibility application has been submitted to Jemena as shown in Appendix D.

## 9.5 Coordination of Telecommunications Infrastructure with Other Services

Coordination of the proposed communications infrastructure with other services in the proposed street network would generally be based on the Streets Opening Conference standards (these details are attached in Section 10.0).

The clearances for NBN services from other utilities is given in Section 5.2.13 of “New Development: Deployment of the NBN Co Conduit and Pit Network – Guidelines for Developers”, these requirements are presented in Figure 14.

Service Item		Minimum Radial Clearances* <sup>1</sup>
Gas Pipe	Over 110 mm	300 mm
	110 mm or Less	150 mm
Power	High Voltage	300 mm
	Low Voltage	100 mm* <sup>2</sup>
Water Mains	High Pressure/Capacity	300 mm
	Local Reticulation	150 mm
Sewer	Main	300 mm
	Connection Pipe	150 mm
Other Telecommunications		100 mm* <sup>1</sup>
* 1 – Reduced separation is possible where all parties (including NBN Co) are consulted and agreement is reached. * 2 – Only where protection barriers are used, for example, conduit, bedding, marker tape and cover batten.		

Figure 14: NBN Clearances from Other Carriers and Underground Services

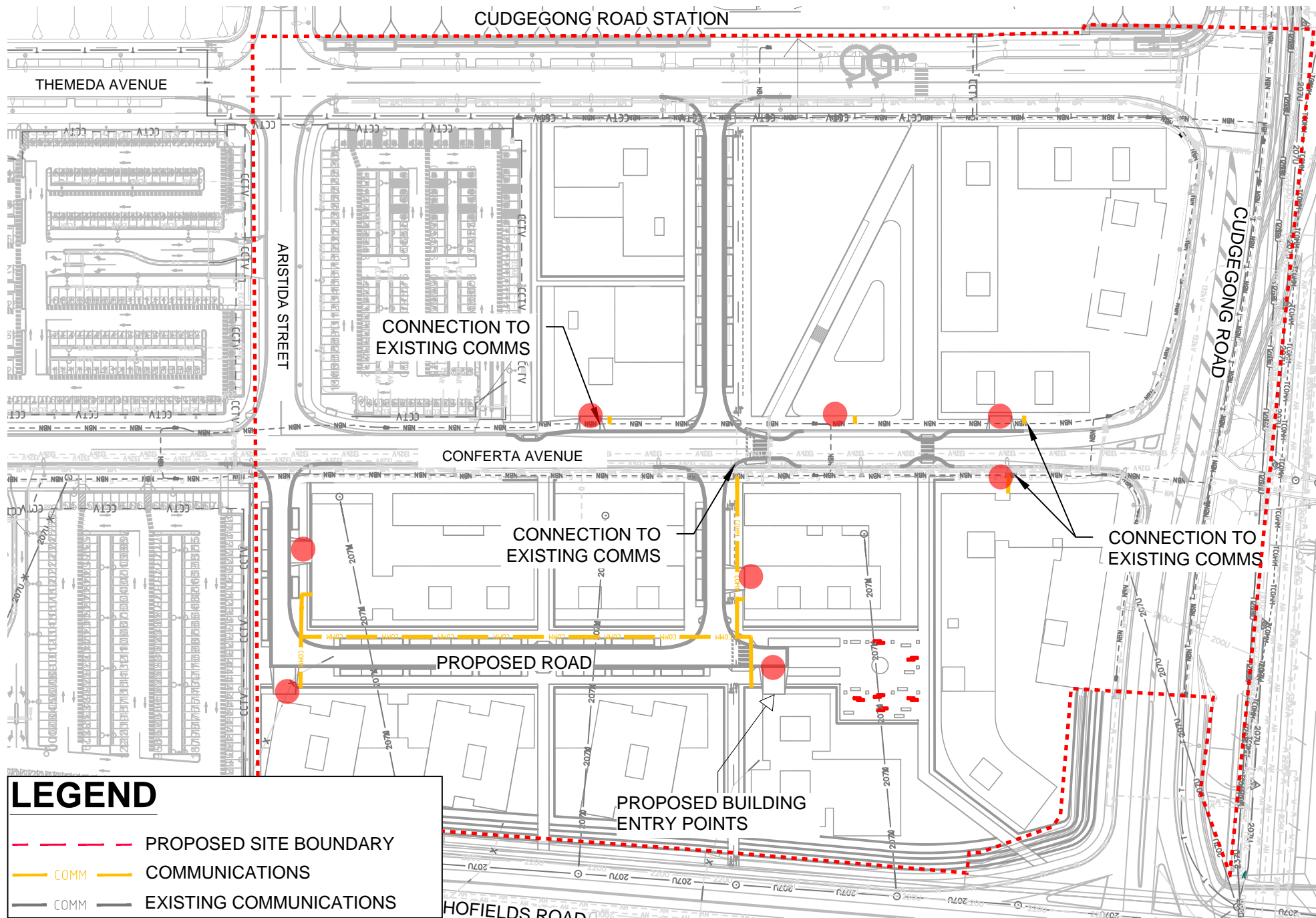
## 9.6 Approvals and Next Steps

Confirmation is required from NBN Co that the site is eligible for supply from their network. Following this an initial application is required and a formal agreement entered into between NBN Co. and the developer prior to construction works commencing (this does not prevent designs from being approved).

The formal approval process for NBN Co. infrastructure to be progressed through the Phase 2 detailed design processes consists of the following main steps:

1. Undertake site investigations to confirm the layout and extent of existing services (including private infrastructure associated with previous land-uses)
2. Liaise with Telstra and Optus to confirm the requirement for diversion and/or relocation of their existing infrastructure
3. Confirm proposed infrastructure master plan (including staging) and in principle supply arrangements with NBN or other provider
4. Initial application submitted to NBN Co. for supply of the site from their network. Refer to Appendix D for the feasibility application submitted to NBN Co.;
5. NBN Co. to confirm supply can be provided and provide draft agreement;
6. Revisions of agreement where required;
7. Landcom to sign NBN Co. agreement;
8. Liaise with Telstra and Optus for quote for diversions or abandonments including any interim works; and
9. Submit detailed design of individual packages for approval.

It is noted that the above is for delivery of the NBN pit and pipe network through the new street network, it is expected that the buildings will need to make separate applications for connection.



**AECOM**

PROPOSED UTILITIES  
COMMUNICATIONS

60558549\_Cudgegong  
CUDGEGONG ROAD STATION-TOWN CENTRE  
LANDCOM

Project No.: 60558549 Date: 2018-02-08

60558549-SKE-00-0000-CI-0011

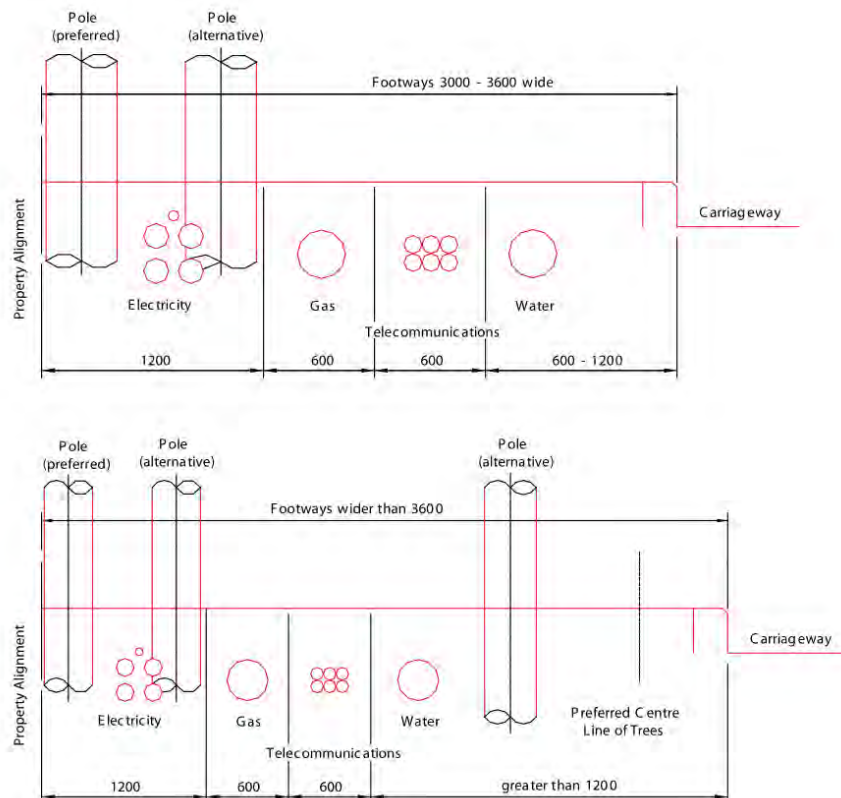
## 10.0 Utility Service Corridors

### 10.1 Street Opening Conference Service Corridors

The “Guide to Codes and Practices for Streets Opening” by the NSW Streets Opening Conference (SOC), 2009 provides guidelines for service allocations within the footpath.

It has been assumed that the majority of new utility infrastructure for the Cudgegong Urban Transformation Site will be within new footpaths, these should follow the allocations shown below in Figure 16.

It is noted that Blacktown City Council generally requires the street lighting to be located adjacent to the kerbline, particularly if it is their asset.





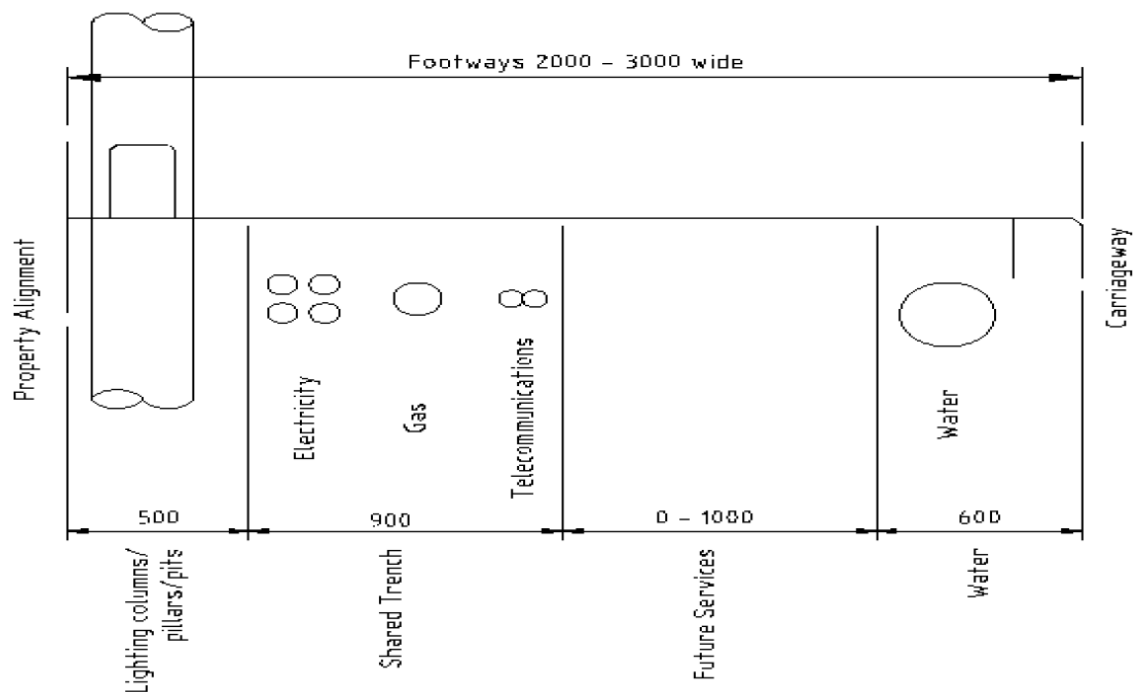
Notes:

1. These allocations apply throughout NSW except where noted in Section 6.4.
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 adjacent to the property alignment. Alternative positions are shown.
5. Where the erection of power poles in the 0-1200 mm 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 3600 mm wide. Consultation with Utility/Service Providers is required and due regard must be given to tree species.
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.

**Figure 16: Streets dedicated after 1 January 1991 (SOC, 2009)**

Where shallow footpaths between 2-3m are required, then shared trench arrangements may be used as shown below in Figure 17.

Again, it is noted that Blacktown City Council generally requires the street lighting to be located adjacent to the kerb line, particularly if it is their asset.



**Notes:**

1. The allocation of space in narrow footways, whether new or pre-existing, was adopted for the first time in the 2002 edition of the Guide to Codes and Practices for Streets Opening.
2. Where it is intended to lay more than one type of Service, shared trenching should be used. However, this does not always allow for large structures and trunk lines.
3. 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.
4. Footways of width less than 2000 mm require special consideration to accommodate Services. Contact the Conference Secretariat for information concerning such designs, community title situations and other special situations. Refer to clauses 3.5 and 6.6.
5. The variable allocation of 0-1000 mm provides for future extensions.
6. The preferred position for poles, pillars, cabinets and street lighting columns is adjacent to the property alignment.
7. Where the erection of power poles in the 0-500 mm allocation is impracticable, these may be located in the water allocation by agreement with the appropriate Utility/Service Provider.
8. No specific allocation for trees can be identified for footways up to 2000 mm wide. Consultation with Utility/Service Providers is required and due regard must be given to tree species.
9. Pillars/pedestals/Service pits etc should be located in a position that is set back from street intersections.
10. See Section 6.6 for guidance on new poles and pole replacements.

**Figure 17: Allocation of space in narrow footways (SOC, 2009)**

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

Furthermore, while Ausgrid has shared trench agreements with Telstra, no such agreement exists with NBN Co. therefore shared trenching is not considered desirable for the Cudgegong Urban Transformation site.

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

## 11.0 Conclusion

This utilities report has outlined the public utility infrastructure, particularly water, electricity, sewage, gas and telecommunications services that are available for the development.

AECOM  
**AECOM Australia Pty Ltd**  
Level 21, 420 George Street  
Sydney NSW 2000  
PO Box Q410  
QVB Post Office NSW 1230  
Australia  
T +61 2 8934 0000  
F +61 2 8934 0001  
[www.aecom.com](http://www.aecom.com)  
ABN 20 093 846 925