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Report

Landcom

Cherrybrook Station Government Land and Precinct – Utilities Assessment

Date: 28/03/2022
Revision: 4.1
Issue: Client Issue

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1. Introduction

1.1. Purpose

This report, prepared by Atmos Consulting, responds to the requirements as outlined in the report *Study Requirements for Cherrybrook Station Government Land (May 2020)* relating to the Utilities and Infrastructure (Electricity, Communications, Water & Gas) that is intended to service the nominated Development area at Bradfield Parade, Cherrybrook (**Site**) and the Broader Precinct (**Precinct**).

This report outlines the existing capacity, required capacity and augmentation required for the Site and Precinct, together with future provisions. The report is informed by negotiations with the relevant authorities and information received through various enquiries. This is an update of the report (Revision 3.0) authored in December 2020 and reflects the updated reference design information as provided by Landcom.

1.2. Project Overview

This study relates to a proposal to develop land called the 'Cherrybrook Station Government Land State Significant Precinct' **(the State Significant Precinct)** by Landcom on behalf of the landowner, Sydney Metro. The State Significant Precinct is centred around Cherrybrook Station on the Metro North West Line. The Metro North West Line delivers a direct connection with the strategic centres of Castle Hill, Norwest, Macquarie Park and Chatswood. It covers 7.7 hectares of government-owned land that comprises the Cherrybrook Station, commuter carpark and station access road (Bradfield Parade) and vacant land to the east of the station (referred to as the Developable Government Land) (DGL). It is bound by Castle Hill Road (south), Franklin Road (south east) and Robert Road (north west).

As a State Significant Precinct, the Minister for Planning and Public Spaces **(the Minister)** has determined that it is of State planning significance and should be investigated for rezoning. This investigation will be carried out in accordance with study requirements issued by the NSW Department of Planning, Industry and Environment (now Department of Planning and Environment (DPE)) in May 2020. These study requirements were prepared in collaboration with Hornsby Shire Council and The Hills Shire Council.

The outcome of the State Significant Precinct process will be new planning controls. This will enable the making of development applications to create a new mixed-use local centre to support Cherrybrook Station and the needs of the local community.

At the same time, DPE is also working with Hornsby Shire and The Hills Shire Councils, as well as other agencies such as Transport for NSW, to undertake a separate planning process for a broader area called the Cherrybrook Precinct. Unlike the State Significant Precinct, the outcome of this process will not be a rezoning. Instead, it will create a Place Strategy that will help set the longer-term future for this broader area. Landcom will be consulted as part of this process.

1.3. Authority

Authority to undertake this updated report was provided by Samantha Mitchell of Landcom in March 2022.

1.4. Outline

This report:

- Assesses the existing utilities infrastructure (Electricity, Communications, Water, Sewer and Gas) to the SSP Site;
- Assesses the proposed load growth against the nominated proposal for the SSP Site and broader Precinct;
- Incorporates details provided from the relevant authorities based on preliminary requests; and
- Provides recommendations on the implementation strategy of the utilities to the site.

1.5. Relevant Study Requirements

The following table outlines the sections/clauses in this report that respond to the requirements of the document *2020.05.26_Study Requirements (Final)_Cherrybrook Station SSP* and specifically **Section 16 – Utilities** of that document.

Study Requirements Clause	Detail	Reference in this Report
16.1	Provide a utilities and infrastructure servicing report identifying existing capacity, required capacity and augmentation needed for the proposal and for the broader precinct, sustainability measures (e.g. Water Sensitive Urban Design (WSUD) and staging.	Section 2. summarises the project requirements Section 3. outlines the Electrical Services requirements, including: - 11kV infrastructure - SSP Site - 11kV infrastructure – Precinct - 132kV infrastructure - Precinct Section 4. outlines the Communication Services requirements, including - Carrier service requirements Section 5 outlines the Hydraulic Services requirements, including: - Water services - Sewer services - Gas services
	The water utilities component should be prepared by a suitably qualified hydraulic consultant.	The document has been prepared by a qualified Hydraulics consultant.
	Required capacity should detail the future potable and non-potable water demand of the SSP site in addition to the stormwater, drainage, and sewer.	Refer to Clause 5.1. There is no authority non-potable (recycled) water infrastructure within the vicinity of the development, so all water requirements would be potable water. If the development itself proposes to utilise its own recycled water system this would be defined by the hydraulic engineer within the detailed development design process. Referring to the report *Cherrybrook Station SSP Ecologically Sustainable Development Plan, by Edge Environment* the document sets the framework for sustainable outcomes for the SSP and specifically assesses whole of life water

Study Requirements Clause	Detail	Reference in this Report
		usage and recommended strategies to reduce and re-use water.
	The power utility requirements should be prepared by a suitably qualified (ASP) consultant.	The document has been prepared by a qualified Electrical Engineer. The requirement for ASP is only required for the design of any Level 3 upgrades/augmentation to the site, not applicable for this feasibility stage.
	Previous Utilities assessment for the SSP site and the broader precinct commissioned by Urbangrowth in 2016-2017 should be utilised where appropriate to inform this report.	Previous reports have been referred to, however for this report new enquiry applications were submitted to each relevant authority.
16.2	The utilities and infrastructure servicing report should outline the proposed development yield and staging for the SSP site and the cumulative impact of the proposed yield and the broader precinct and should include an assessment of the capacity of:	The Urban Design Study outlines yields and staging that inform this Utilities Report. The area and unit quantities are used to assess load demands and provisions.
	- Ausgrid electrical network to service the development and outline the likely impacts on the broader Ausgrid electrical network. This will include direct engagement with Ausgrid on the impacts to ensure early understanding and visibility of any network augmentation required	Refer to Sections 3.1 and 3.2 Enquiries were made to Ausgrid (SSP and Precinct) and Endeavour Energy (Precinct). Both authorities confirmed availability of power for the future requirements.
	- Sydney Water's network to service the development and proposed servicing options considered for the development. The report should also outline any integrated water cycle management and /or sustainability initiatives proposed for the SSP development, including any proposed alternative water supply, proposed end uses of drinking and non-drinking water and proposed water conservation measures.	Refer to Sections 5.1 and 5.2 An enquiry was made to Sydney Water to confirm the water and sewer capacities. Refer to the *Stormwater Management and Preliminary Flood Risk Assessment (Royal Haskoning)* and *Ecologically Sustainable Development Plan (Edge Environment)* for water cycle management and sustainability initiatives.
	- Undergrounding of all new power lines and telecommunications within the SSP site.	Refer to Sections 3.1, 3.2 and 4.1 All new power and communication services within the SSP are currently underground and will be extended to the buildings via underground pathways.
	- Consider the urban design impacts of the existing high voltage electrical power lines and outline the approach to addressing the impacts through land use principles and development controls.	Refer to Section 3.3. Details of the impacts and approach to be adopted by the Urban Designers is presented in this section.

1.6. Information Received

This report is based on the following information:

- Ethos Urban document dated 25/03/2022
- 6082 Cherrybrook Station Precinct - Planning Proposal v7-1.0
- 6082 Cherrybrook Station Precinct - PWG Pre Lodgement Draft 220
- 2020.05.26_Study Requirements (Final)_Cherrybrook Station SSP;
- DP1253104 - Cherrybrook Infrastructure registered plan; and
- North West Rail Link, Cherrybrook Station Structure Plan, A Vision for Cherrybrook Station Surrounds dated September 2013.
- Ausgrid Preliminary Enquiry information received July 2020
- Endeavour Energy Enquiry information received November 2020
- Sydney Water Preliminary Enquiry information received September 2020
- Dial Before You Dig **(DBYD)** application information.

1.7. Revision History

Revision	Date	Issue
1.0	17/07/2020	Preliminary Issue (Draft)
1.1	31/07/2020	Preliminary Issue
2.0	03/12/2020	Final Issue
2.1	11/12/2020	Final Issue (Updated)
3.0	11/12/2020	Client Issue
4.0	18/03/2022	Client Issue
4.1	28/03/2022	Client Issue

1.8. Disclaimer and Confidentiality

The information provided in this Report is confidential and is supplied on the understanding that only the Recipient and their appointed agents will have access to it.

Where this document forms part of a submission, the information, statements, and proposals in this submission are correct and accurate to the best of our present knowledge. Atmos Consulting shall not be liable for any loss, expense, damage, or claim arising out of the advice given or not given or statements made or omitted to be made in connection with this document.

2. Executive Summary

2.1. Cherrybrook Station Government Land – SSP Site

The government land site at Cherrybrook Station is nominated as a State Significant Precinct (SSP), with Landcom as the applicant to undertake planning investigations on behalf of the landowner, Sydney Metro and the determination of the subsequent zoning controls to be made by the Minister for Planning and Public Spaces.

The boundaries of this assessment are detailed in the below figure.

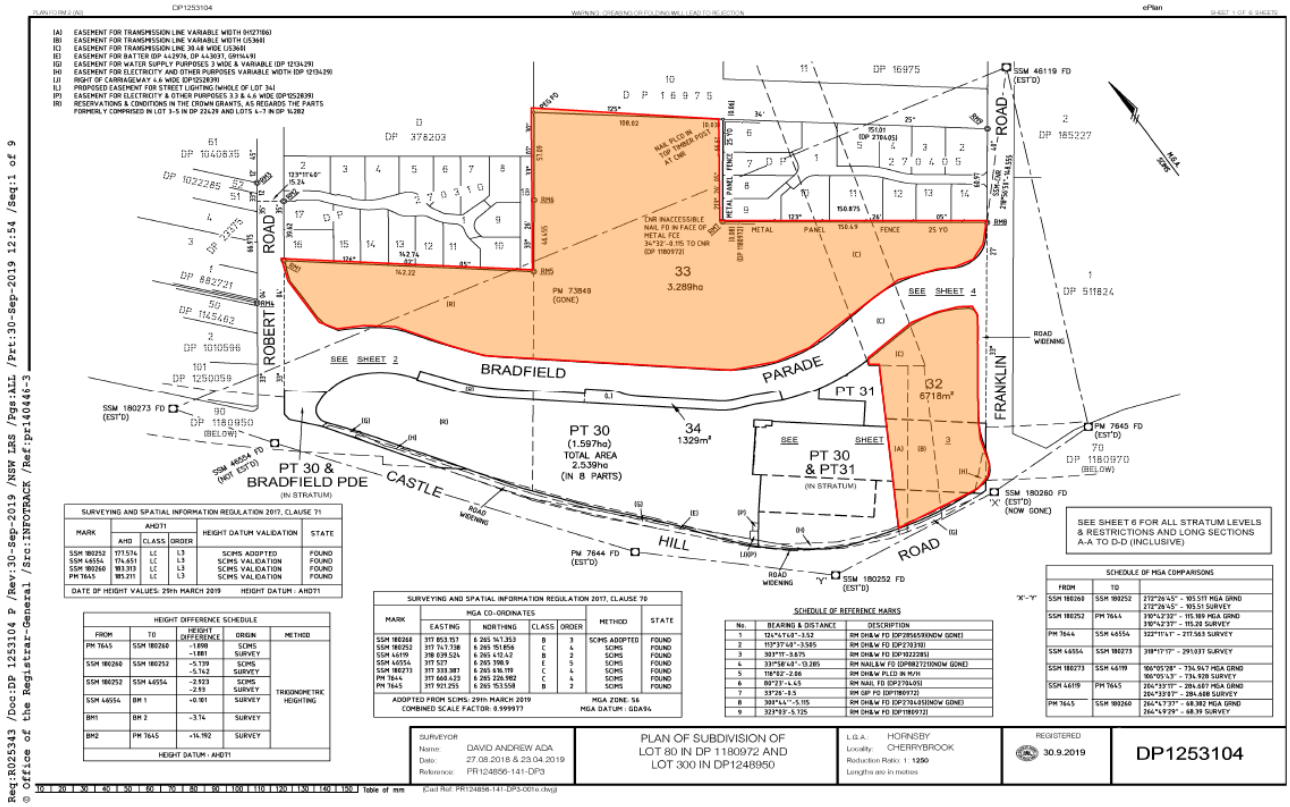

Figure 1 – Map of Cherrybrook Station Government Land SSP site (Developable Area) *(source: Subdivision plans)*

2.2. Cherrybrook Precinct

As indicated in Figure 2 below, the SSP site is part of the broader Cherrybrook Precinct. The broader Precinct refers to the strategy as outlined in the *North West Rail Link, Cherrybrook Station Structure Plan, A Vision for Cherrybrook Station Surrounds* (**Structure Plan Report**) dated September 2013.

This strategy document presents a future strategy up to 2036 for the establishment of Low and Medium density dwellings in specific areas of the Precinct. This is outlined further in this report, together with the high-level implications to the Utilities.

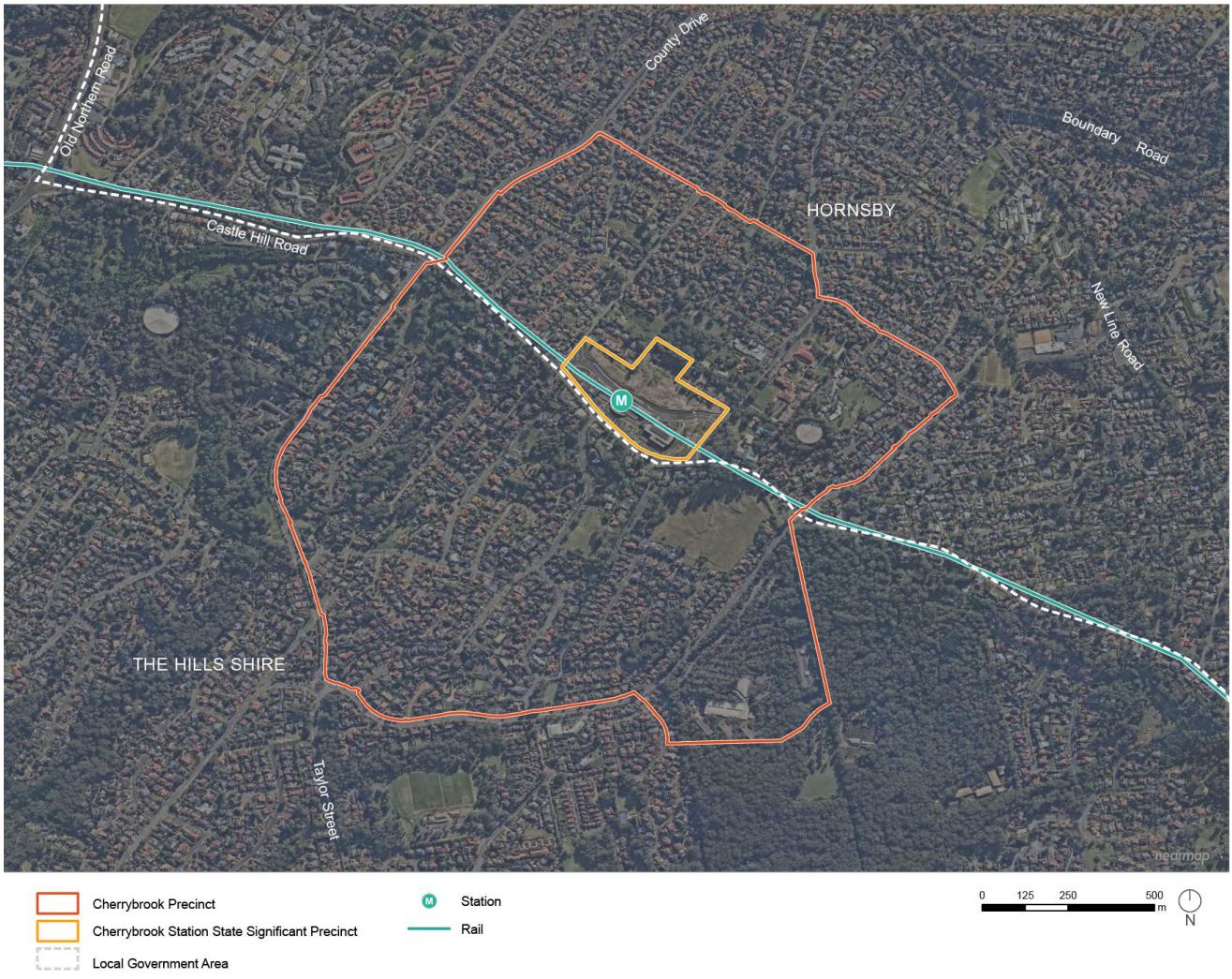

Figure 2 – Site boundaries of the State Significant Precinct and the Cherrybrook Precinct *(source: NSW Department of Planning, Industry & Environment)*

2.3. Proposed Land Use & Mix for SSP Site

The proposed new planning controls for the State Significant Precinct are based on the investigations undertaken as part of the State Significant Precinct Study process. A Reference Scheme has also been prepared to illustrate one way in which the State Significant Precinct may be developed in the future under the proposed new planning controls.

The proposed planning controls comprise amendments to the Hornsby LEP 2013 to accommodate:

- Rezoning of the site for a combination of R4 High Density Residential, B4 Mixed Use and RE1 Public Recreation zoned land;
- Heights of between 18.5m – 22m;
- FSR controls ranging between 1:1 – 1.25:1;
- Inclusion of residential flat buildings as an additional permitted use on the site in the B4 Mixed Use zone;
- Site specific LEP provisions requiring the delivery of a minimum quantity of public open space and a maximum amount of commercial floor space; and
- New site-specific Design Guide addressing matters such as open space, landscaping, land use, built form, sustainability and heritage.

The Reference Scheme (refer to Figure 3) seeks to create a vibrant, transit-oriented local centre, which will improve housing choice and affordability and seeks to integrate with Hornsby's bushland character. The Reference Scheme includes the following key components:

- Approximately 33,350m^2 of residential GFA, with a yield of approximately 390 dwellings across 12 buildings ranging in height from 2 to 5 storeys (when viewed from Bradfield Parade).
- A multi-purpose community hub with a GFA of approximately 1,300m^2.
- Approximately 3,200m^2 of retail GFA.
- Over 1 hectare of public open space, comprising:
  - A village square with an area of approximately 1,250m^2, flanked by active retail and community uses.
  - A community gathering space with an area of approximately 3,250m^2.
  - An environmental space around the pond and Blue Gum High Forest with an area of approximately 8,450m^2.
- Green corridors and pedestrian through site links, providing opportunities for potential future precinct-wide integration and linkages to the north.

Parcel	*Area	Res GFA	Units	Non-Res GFA	Community	Portion FSR*
A	8,597	12,031	141	749		1.49
B	9,610	11,924	140	2,452	1,300	1.68
C	2,574	2,736	32			1.06
D	6,715	6,621	78			0.98
	27,272	**33,312**	**391**	**3,201**	**1,300**	

Notes:
Residential GBA > GFA : 75%
Non-residential GBA > GFA : 85%
Average unit size : 85m

Figure 3: Reference Scheme *(source: SJB planning proposal V07 – 24/02/2022)*

Parcel	*Area	Res GFA	Units	Retail	Community
A	8,597	12,031	141	749	
B	9,610	11,924	140	2,452	1,300
C	2,574	2,736	32		
D	6,715	6,621	78		
	27,272	**33,312**	**391**	**3,201**	**1,300**

Table 1 – Reference Scheme areas and unit quantities, used for the basis of calculating the site load demands *(source: SJB planning proposal V07 – 24/02/2022)*

2.4. Proposed Land & Use Mix for Precinct

The Structure Plan report offers guidance on the proposed land & use mix for the wider Cherrybrook area (**Precinct**). The proposed growth is summarised in the following table and represented in the corresponding images:

RESIDENTIAL

TYPE OF HOUSING	DWELLINGS IN 2012		DWELLINGS IN 2036		GROWTH
	TOTAL	%	TOTAL	%	TOTAL
SINGLE DETACHED	1,100	100%	750	17%	-350
TOWNHOUSE	0	0%	400	10%	400
3-6 STOREY APARTMENT	0	0%	3,150	73%	3,150
7-12 STOREY APARTMENT	0	0%	0	0%	0
TOTAL DWELLINGS	**1,100**	**100%**	**4,300**	**100%**	**3,200**

Table 5.1: Projected Residential Growth in Cherrybrook under the Structure Plan

Table 2 – Projected residential load growth *(source: Cherrybrook Station Structure Plan)*

It is highlighted that the total additional does include the component for the SSP Site (approximately 390 dwellings).

Figure 24: Areas to remain largely unchanged under the Structure Plan

Figure 23: Proposed Location of Medium Density Apartments

Figure 22: Proposed Location of Low/Medium Density Townhouses

Figure 4 – Land Use Proposal (Plan Layout) (extract from Structure Plan Report) *(source: Cherrybrook Station Structure Plan)*

Referring to Figure 4, the predominant development is intended to occur adjacent to the SSP area on either side of Castle Hill Road, however specific land and use densities are not available at present. As noted above and detailed in the body of this report, upgrades to the existing infrastructure were enabled as part of the Cherrybrook Metro Station development and in anticipation of the planned re-development of surrounding areas that have improved the Utility capacity to the Cherrybrook Precinct.

As proposed development areas of the Precinct are better defined, approaches can be then made to the relevant Authorities to coordinate and confirm available infrastructure to service the site.

For the purposes of the Precinct Assessment, in the absence of specific quantity allocations, the report assumes the following allocation as a 60%/40% split. The allocation to the North and South of Castle Hill Road also coincides with the demarcation of the electrical authorities as noted in the report.

Council Zone – Total No. of Dwellings	2012	2036	Growth	SSP Site	Precinct
Hornsby Shire Council (North) (60%)	660	2,580	1,920	390	1,530
Hills Shire Council (South) (40%)	440	1,720	1,280		1,280
TOTAL	**1,100**	**4,300**	**3,200**	**390**	**2,810**

Table 3 – Projected residential load growth split assumptions

2.5. Summary of Utilities and Infrastructure Implementation Impacts

Based on the proposed land use/mix as prepared by Landcom and the strategy for the wider Precinct, the following offers a summary of the existing and proposed utilities infrastructure that will be required to enable the development:

2.5.1. Electrical Services Infrastructure

2.5.1.1. 11kV Electrical Infrastructure

SSP Site

With the recent development of the Sydney Metro Cherrybrook Station, in ground pit and pipe infrastructure was installed to accommodate the future requirements of the Site. A Preliminary Enquiry submitted to Ausgrid confirms that there is available capacity to enable the proposed development with the extension of cable infrastructure and the installation of kiosk type substations.

Three kiosk type substations will be positioned across the SSP Site to service the buildings proposed.

Precinct

The Precinct is served by both Ausgrid and Endeavour Energy power infrastructure, demarcated at Castle Hill Road. The zone substations currently supplying the precinct are Pennant Hills (Ausgrid) and West Pennant Hills (Endeavour Energy).

As part of the SSP Site assessment, enquiries on the available infrastructure to the north of the Precinct were made with Ausgrid who informed that there have been several upgrades within the past 3 years on their assets, a few due to the NorthConnex tunnel project nearby. With the project completing in Q4 2020, tunnel construction infrastructure power capacity is being released that will be available for future use.

A similar application was made to Endeavour Energy who similarly confirmed that there is available capacity within their infrastructure to accommodate the future requirements of the Precinct.

There is suitable capacity available within both authorities' infrastructure to accommodate the Precinct Plans. Noting the time frame for the Precinct development, specific enquiries will need to be made at the time for the various developments to coordinate requirements. As noted by Ausgrid, power allocation and network planning are made on a "first come, first served" basis, so each development area will be assessed as it is submitted and assessed against available capacity and infrastructure. The same will apply for Endeavour Energy.

2.5.2. 132kV Electrical Infrastructure

SSP Site

An assessment of the existing 132kV overhead sub-transmission service has established that any modification to the service to relocate will be highly costly, complex, and span over many years. Any works associated with this element are not considered feasible and not considered further.

This report outlines planning considerations that will need to be accommodated to build adjacent to this electrical infrastructure.

Precinct

Like the SSP Site, no further assessment is made on the 132kV overhead sub-transmission service. Any proposed developments will need to coordinate around this existing infrastructure.

2.5.3. Communication Services Infrastructure

2.5.3.1. Carrier Services

SSP Site

nbn services have recently been established in the area and following a search of connectivity availability, the Site has Fibre to the Node (FTTN) services available for the future connection of the various buildings.

Each building shall be provisioned with a communications room that will accommodate an entry point for the nbn service and connectivity to the premises.

Precinct

A search against the wider Precinct confirms that nbn services are available to the areas nominated. For higher density developments, applications shall be made to nbn for the connection of FTTN services to the building for multiple dwellings.

2.5.4. Hydraulic Services Infrastructure

2.5.4.1. Water Services

SSP Site

The feasibility Section 73 Letter of Advice notes Sydney Water's requirements for the development at the times of the application.

Sydney Water have advised that the existing water mains within the area would service the development.

Precinct

The increase in overall number of dwellings to the Precinct may necessitate augmentation of areas of the water network to accommodate proposed increases in dwelling density. The area around the Cherrybrook Metro Station has been augmented to accommodate some future requirements that may accommodate some additional dwellings beyond the SSP Site. Like the SSP site, when the development areas are better defined, a Section 73 application may be submitted to confirm availability of service.

2.5.4.2. Sewer Services

SSP Site

The feasibility Section 73 Letter of Advice notes Sydney Water's requirements for the development at the times of the application

Sydney Water have advised they would require an extension of their sewer asset to service the development.

Precinct

The increase in overall number of dwellings to the Precinct will necessitate augmentation of areas of the sewer network to accommodate proposed increases in dwelling density. The specific impacts cannot be determined at present in the absence of specific planning. When the development areas are better defined, a Section 73 application may be submitted to confirm availability of service.

2.5.4.3. Gas Services

SSP Site

The existing mains are sufficient for the development.

The available capacity for the gas requirements was assessed from the DBYD information. A formal application through the Jemena portal would be required to at the detailed development stage to confirm that the existing gas assets are sufficient for the development at the time of any specific project commencement.

Precinct

The requirement for an augmentation of the gas infrastructure will be dependent on the proposed dwelling design and use of electricity versus gas appliances. Based on the proposed increase in density of some of the development areas, we anticipate that some upgrades of the gas infrastructure may be required.

A formal application through the Jemena portal would be required to confirm that the existing gas assets are sufficient for the development at the time of any project commencement.

2.6. Budget Cost Summary & Recommendations

2.6.1. SSP Site

The following table summarises the costs for the implementation of the Utilities Infrastructure to the SSP Site. Details for each service are elaborated in the each of the relevant sections in the body of the report.

Item/Scope	Budget Cost
11kV Electrical Infrastructure	$850,000
132kV Electrical Infrastructure	$ -
Communication Services Infrastructure	$150,000
Water Services	$ -
Sewer Service	$350,000
Gas Service	$ -
Contingency (5%)	$67,500
TOTAL	**$1,417,500**

Notes

1. *Budget estimates exclude any professional fees, authority applications or Contractor preliminaries*
2. *All costs excluded GST*

Table 4 – SSP Site Budget Estimate for Authority Infrastructure Upgrades

2.6.2. Precinct

In the absence of specific land and use mix details for the wider precinct, we are unable to provide detailed budget costs as it will be dependent on a range of factors including:

- Availability of local infrastructure to proposed developments;
- Extent of extensions/augmentations that may be required by the authorities such as 11kV cabling, pipe work (water, sewer, gas) upgrades and the like.

At a high level, based on a pro-rated assessment of the Site SSP budget, it is recommended an allowance for the Precinct works, for the addition of up to 2,700 dwellings, of $8,000,000 be provisioned for the Electrical (11kV only), Communications, Water, Sewer and Gas upgrades.

Notes

1. *Budget estimates exclude any professional fees, authority applications or Contractor preliminaries*
2. *All costs excluded GST*

3. Electrical Services Infrastructure

3.1. 11kV Electrical Infrastructure – SSP Site

3.1.1. Existing Arrangement

The Site forms part of the Ausgrid electrical network (that is bounded by Castle Hill Road at its extents). To the South of Castle Hill Road is the Endeavour Energy electrical network.

Further to a review of the recently acquired Ausgrid DBYD information, the surrounding site infrastructure was upgraded with the development of the Cherrybrook Metro Station works. Conduit infrastructure has been installed along Bradfield Parade, connecting back to Robert Road and Franklin Road that will permit the installation of cabling infrastructure to service the proposed new buildings.

3.1.2. Current Negotiations and Status

A Preliminary Enquiry was submitted to Ausgrid based on the proposed land use/mix to enquire on the availability of power infrastructure to the Site and to present a proposed concept design for review and coordination.

In summary, Ausgrid confirmed that an 11kV supply available from Franklin Road in the vicinity of Tangara School for Girls has sufficient capacity available to provide the proposed 3MVA load to the development site. An extension of the 11kV feeder will be required, in the order of 180 metres. A map of the infrastructure is detailed below.

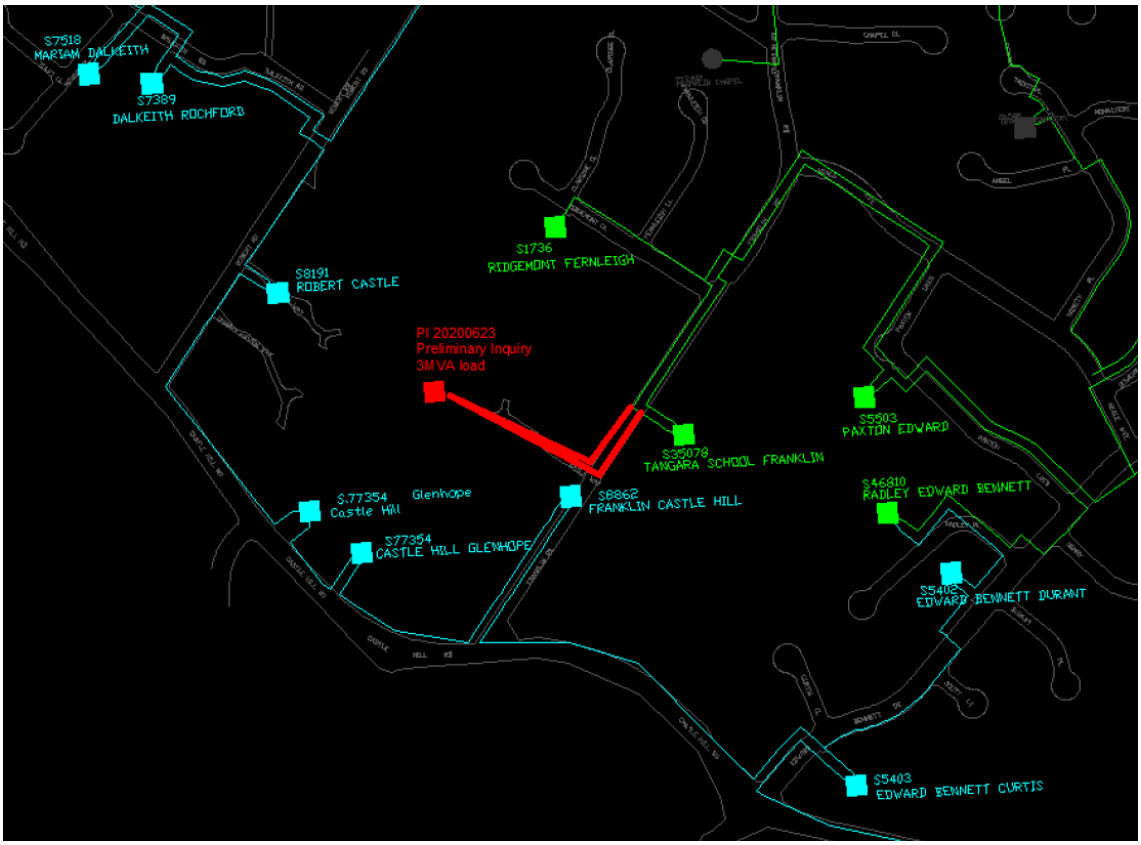

Figure 5 – Proposed 11kV/400V substation locations and servicing options *(source: Ausgrid Preliminary Enquiry letter)*

3.1.3. Existing Load Capacity and Future Capacity Considerations

The nominated Site is fundamentally vacant and was used as a construction zone for the recent completion of the Cherrybrook Metro Station.

Based on the land use/mix prepared by Landcom, it is estimated that the total electrical demand required for the site will be 2,100kVA. The basis of this demand is detailed in the below table:

					Load/Apt to AS3000 (kW)[2]			Electrical Load		
Use/Mix	**m^2**	**#**	**No. of Bldgs.**	**Load (kW) [1]**	**Units/ Phase**	**A/phase**	**Total kW**	**Total kW**	**Total kVA [3]**	**A/ phase**
Non-Residential (Retail/ Commercial/ Community)	3,201			**278**				**1,567**	1,742	2,514
Residential	33,312	391	12	-	131	1860.5	**1289**			

Calculation Notes

1. *Retail electrical load based on a diversified maximum demand of 87W/m2. 60% Retail at 60W/m2 and 40% Food Retail of $150W/m2. (0.7*60+0.3*150) = 87W/m2*
2. *Residential calculation to AS3000, Table C1*
3. *kVA calculation based on 0.9 power factor.*

Table 5 – Total Electrical Demand Estimate for SSP Site based on Land Use/Mix

Based on this load demand and the extent of the site, it is proposed that three kiosk style substations are positioned across the site to service the proposed buildings. Each building will be provided with a dedicated Low Voltage supply from the relevant substation.

Figure 6 – Potential 11kV/400V substation locations and servicing options for the SSP Site based on the reference scheme

3.1.4. Impacts to Infrastructure to Meet Future Requirements

It is considered that the impacts to the existing surrounds and Site are minimal to enable the power infrastructure to be installed. All new services will be installed as underground services to connect from the existing network infrastructure to the proposed substations as presented in Figure 6.

The works to enable the power infrastructure to the site are categorised as contestable works. This will require the preparation of a Design Information Package (DIP) by Ausgrid once the works are planned to commence. The DIP outlines the design, interfaces, and installation requirements in accordance with Ausgrid Network Standards.

A Level 3 Accredited Services Provider (ASP3) will be appointed to develop the design and have it certified by Ausgrid. A Level 1 ASP will then be contracted to complete the contestable works as part of the Construction Delivery.

3.1.5. Estimated Schedule and Budget Costs

3.1.5.1. Schedule

The estimated schedule for the implementation of these works is as follows:

- Design Development and ASP3 – 6 to 9 months
- Inground enabling works (11kV cabling) – 2 -3 months
- Substation implementation – 4 to 6 months (can occur in parallel with the cabling installation works)

3.1.5.2. Budget Costs

Budget Costs for the implementation of the 11kV network to the Site are summarised as follows:

Item/Scope	Budget Cost	Quantity	Total
Concept Design and Design Information Package	$40,000	1	$40,000
Level 3 ASP Design	$100,000	1	$100,000
Substations [(1)]	$80,000	3	$240,000
Level 1 ASP Contractor Works (180m of 11kV cabling)	$700,000	1	$700,000
TOTAL			**$1,080,000**

Notes

1. *The cost for the supply of the substations will most likely be a Non-Contestable cost, with the substations provided by Ausgrid for the developments at no charge. The works associated with enabling the positioning of the substations is Contestable and chargeable.*

Table 6 – SSP Site 11kV Electrical Budget Estimate for Authority Infrastructure Upgrades

3.1.6. Information Received

- Ausgrid Distribution and Transmission Annual Planning Report – December 2018
- DBYD Information

3.2. 11kV Electrical Infrastructure – Precinct

3.2.1. Existing Arrangement

The Cherrybrook Precinct is served by both Ausgrid and Endeavour Energy distribution network zone substations, demarcated at Castle Hill Road. The zone substations currently supplying the precinct are West Pennant Hills (Endeavour Energy) and Pennant Hills (Ausgrid) as shown in Figure 7.

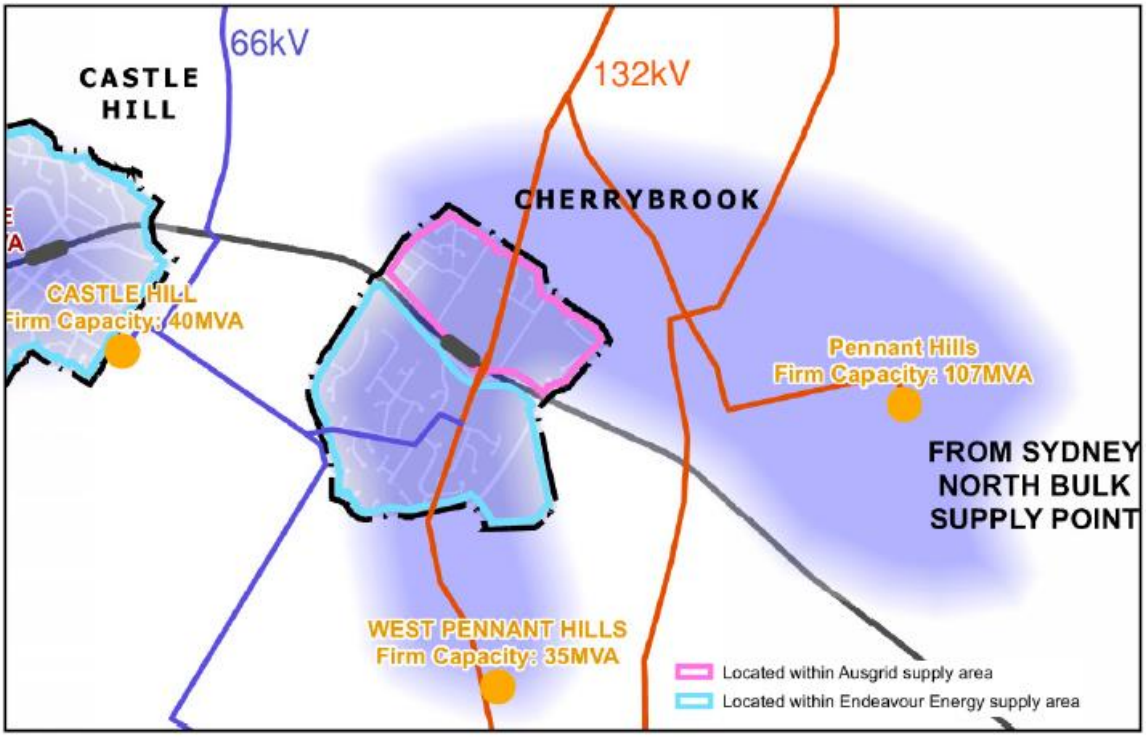

Figure 7 – 11kV infrastructure demarcation *(source: Aecom Report)*

3.2.2. Current Negotiations and Status

As part of the SSP Site assessment, enquires on the available infrastructure were made with Ausgrid who informed that there have been several upgrades within the past 3 years on their assets, a few due to the NorthConnex tunnel project nearby. With the project nearing completion, tunnel construction infrastructure power capacity is being released that may be available for future use.

Similarly, an enquiry was made to Endeavour Energy who advised that at present West Pennant Hills Zone Substation could have enough capacity to support this proposed Cherrybrook Precinct Development.

Currently there are two 11kV feeders that run into this area. Both feeders are terminated at Switching Station No. 36615 in south of Castle Hill Road and can be used to supply the entire development.

To enhance the supply reliability, a cross feeder/zone tie is required for every 1.5MVA load. At this moment there are three adjacent feeders in the area where cross ties can be established to. These are Castle Hill ZS C833, West Pennant Hills ZS X866 and West Pennant Hills ZS X870.

3.2.3. Existing Load Capacity and Future Capacity Considerations

Based on the estimated dwelling allocations across the Precinct, it is estimated that the additional power load will be as in the order of 8,250kVA (excluding the SSP Site Load), split as follows:

Council Zone – Total No. of Dwellings	2036	Growth	SSP Site	Precinct	Load Increase (kVA)
Hornsby Shire Council (North) (60%)	2,580	1,920	390	1,530	4,950
Hills Shire Council (South) (40%)	1,720	1,280		1,280	3,300
TOTAL	**4,300**	**3,200**	**390**	**2,810**	**8,250**

Table 7 – Assumed projected power load growth across the Precinct

3.2.4. Impacts to Infrastructure to Meet Future Requirements

Both Ausgrid and Endeavour Energy have clarified that there is suitable capacity available within both authorities' infrastructure to accommodate the Precinct Plans. Noting the time frame for the Precinct development, specific enquiries will need to be made at the time for the various developments, to coordinate requirements.

As noted by Ausgrid, power allocation and network planning are made on a "first come, first served" basis, so each development area will be assessed as it is submitted and assessed against available capacity and infrastructure. The same will apply for Endeavour Energy.

3.3. 132kV Electrical Infrastructure – SSP Site & Precinct

3.3.1. Existing Arrangement

The SSP Site falls within the Ausgrid *North West Sydney Load Area* as defined in their Distribution and Transmission Annual Planning Report 2019. The 132kV infrastructure extends beyond the Ausgrid operation area into the Endeavour Energy operation area to the South.

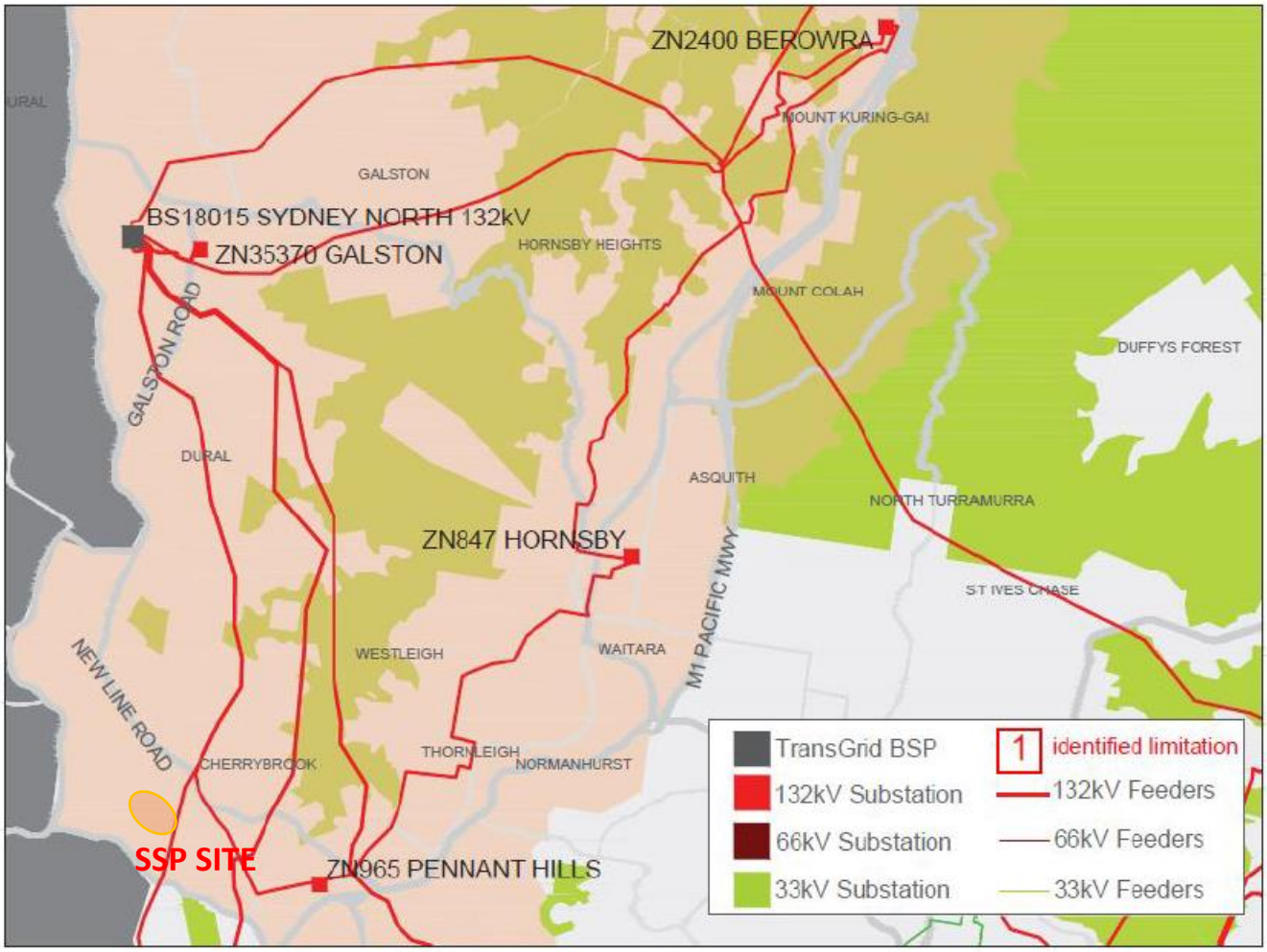

Figure 5.15: North West Sydney load area

Figure 8 – Extract from Ausgrid Distribution and Transmission Annual Planning Report 2019

There is an existing overhead 132kV sub-transmission line (owned by Ausgrid) that traverses the Eastern boundary of the SSP site. To the North of the site, this sub-transmission lines connect to the TransGrid BSP (Bulk Supply Point) and interfaces to the Ausgrid Zone Substation ZN35370 Galston. There is a connection to the Ausgrid Zone Substation ZN965 Pennant Hills, and the sub-transmission line continues south towards Endeavour Energy's Transmission substation.

Figure 1 Existing Feeder 927 route

Figure 9 – Extract from Ausgrid Route Feasibility Report – Relocation of 132kV Feeder 927 at Cherrybrook

3.3.2. Current Negotiations and Status

Ausgrid were requested by Landcom (formerly UrbanGrowth NSW) to investigate the feasibility of undergrounding the portion of the Ausgrid 132kV tower line Feeder 927 at Cherrybrook between Ausgrid towers EP-03111 and EP-03118 as noted in the above Figure 9.

Ausgrid examined the constraints in the area and identified several challenges and risks involved, to underground the Feeder. Challenges included existing land use, easement requirements, design, and community impacts.

Ausgrid identified two pathway options, both raising options having several constraints.

In the Ausgrid Report *Route Feasibility Report – Relocation of 132kV Feeder927 at Cherrybrook*, Ausgrid stated that a budget cost for the project would be in the order of $40M to $55M with a time frame of 3.5 to 4.5 years.

3.3.3. Existing Load Capacity and Future Capacity Considerations

Further to the Ausgrid report and discussions with Landcom, it is considered that the option to underground the 132kV Feeder is cost prohibitive and not feasible. This option is not further considered in this report, however as part of planning for the Site, consideration is given to the clearances and zones required to work alongside the existing 132kV Feeder overhead service.

3.3.4. Impacts to 132kV Overhead Infrastructure to Meet Future Requirements

The existing electrical easement through the SSP Site and wider Precinct varies in width from approximately 25 to 35 metres in width as it passes across the site. Any buildings within this easement will need to comply to the clearance requirements of the 132kV Feeders in accordance with such Ausgrid Standards as NS143 and NS135 and the associated Technical Drawings.

A summary of the key applicable restrictions for this easement are:

Access

- Ausgrid require 24-hour access along the easement for plant and personnel. In exercising its rights under the easement, Ausgrid may cut fences and/or walls and install gates in them.
- If an access driveway is built it shall withstand the weight of a heavy rigid truck when fully laden weighing 30 tonne.
- No obstruction of any type shall be placed within 10 metres of any part of a transmission line structure.

Fences

- Metallic fencing is generally not permitted to extend away from the easement site unless an insulating section is installed, at least 3 metres wide.
- All metal work within the easement site including metallic fencing, are to be locally earthed by a qualified electrician via a 50mm^2 insulated stranded copper earthing cable, bonded to a copper-clad earth-stake driven at least 1.6 metres into the ground.

Permissible development

- The erection of minor structures such as clothes hoists, barbecues, small sheds (<6m^2) and the like are generally permitted within the easement provided they do not exceed 2.5 metres in height, and all metallic components are earthed. These minor structures are not permitted within 10m of a transmission line structure.
- Apart from minor structures mentioned above, no structure will be permitted within 5m, measured horizontally, from any transmission line phase conductor (i.e. conductor/wire that carries power).

Development requiring consultation with Ausgrid Directly

- Any change to ground levels must be submitted to Ausgrid for consent.
- Any development within the non-cable covered area of the easement must be submitted to Ausgrid for consent.
- Any development below the cable covered area of the easement.

A summary of the applicable restrictions is depicted in the below Figure 10. It is important to note that these outcomes are only potentially achievable via direct consultation with the Ausgrid Asset Protection Team.

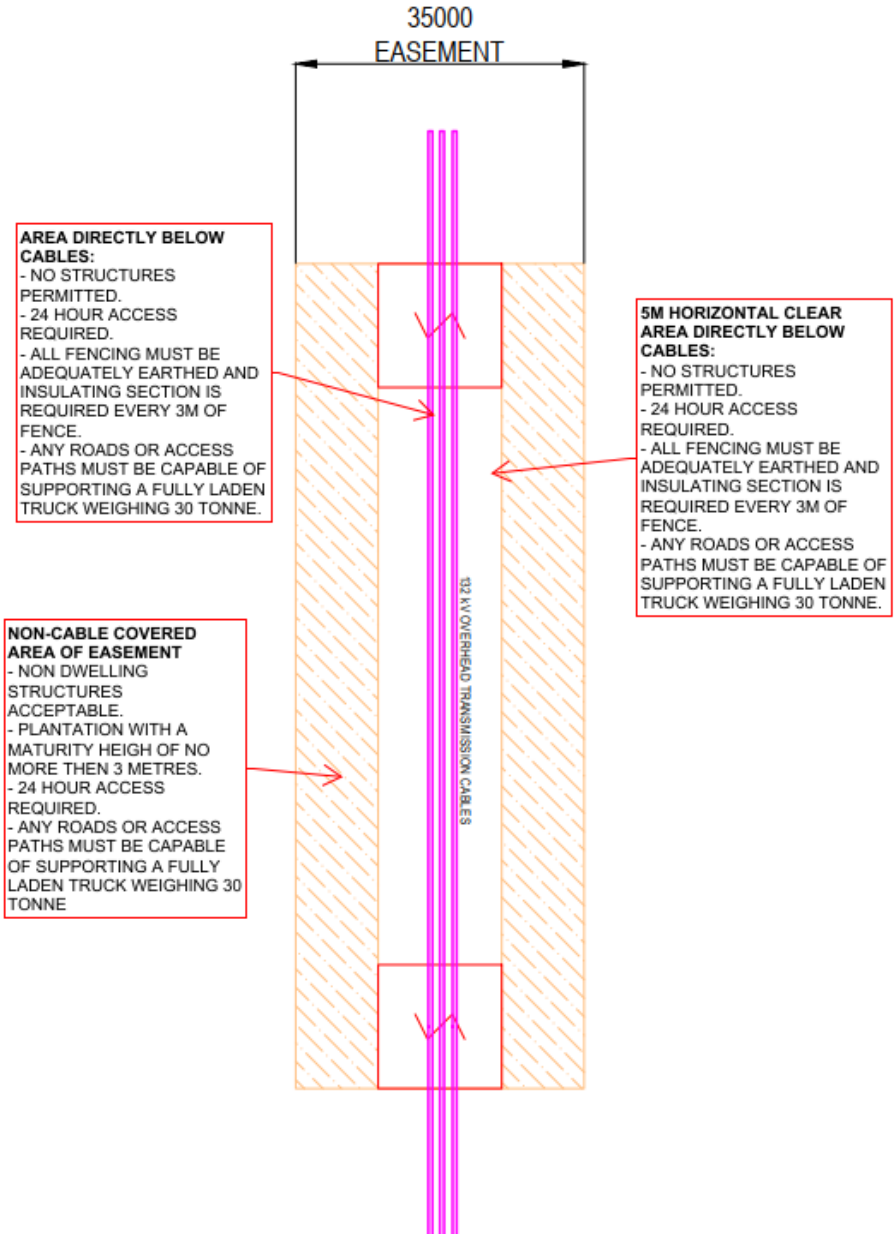

Figure 10 – Easement Development Restrictions *(source: Aadler Easement Assessment Report Rev A)*

3.3.5. Electromagnetic Frequency Coordination and Impacts

As noted in the Ausgrid standards, there is a requirement to maintain a minimum of 10m clearance from any part of the tower. The same would apply for the associated cables interconnecting the towers.

With any electrical cabling, in particular bare/non-insulated cabling used for these overhead conductors, there is the phenomena of electromagnetic field (EMF) radiation that is a function of the voltage and current carrying capacity of the conductor.

Recommended limits and requirements are informed by The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) (https://www.arpansa.gov.au/).

The EMF is informed by the inverse square law that states that the magnitude of one's exposure drops dramatically, proportionally to the square of one's distance from the source. Therefore, when allowing for clearance from the overhead tower, the distance from the tower reduces the field effects by the inverse square. For example, at 3m away from the cabling or tower, the electromagnetic field is 1/9th of its strength at the source. At 10m away, the electromagnetic field reduces to 1/100th of its strength.

At the time of developing the detailed planning, it is recommended that an electromagnetic field study be completed to coordinate and validate compliance of the building design to the Authority requirements and recommended minimum exposure requirements.

3.3.6. Estimated Schedule and Budget Costs

There are no schedule or budget cost impacts associated with this element of the Utilities and Infrastructure service.

3.3.7. Information Received

- Route Feasibility Report – Relocation of 132kV Feeder927 at Cherrybrook – Version 1.0, 13 Feb 2018
- Ausgrid Distribution and Transmission Annual Planning Report – December 2018

4. Communication Services Infrastructure

4.1. Carrier Services – SSP Site & Precinct

4.1.1. Existing Arrangement

There are several telecommunication carriers that traverse adjacent to the SSP Site and across the wider Precinct. With the implementation of the National Broadband Network (nbn), all premises will now generally interface to the nbn in lieu of specific connections to the more traditional providers such as Telstra and Optus.

On review of the nbn coverage, the SSP Site and the wider Precinct are within the available coverage area:

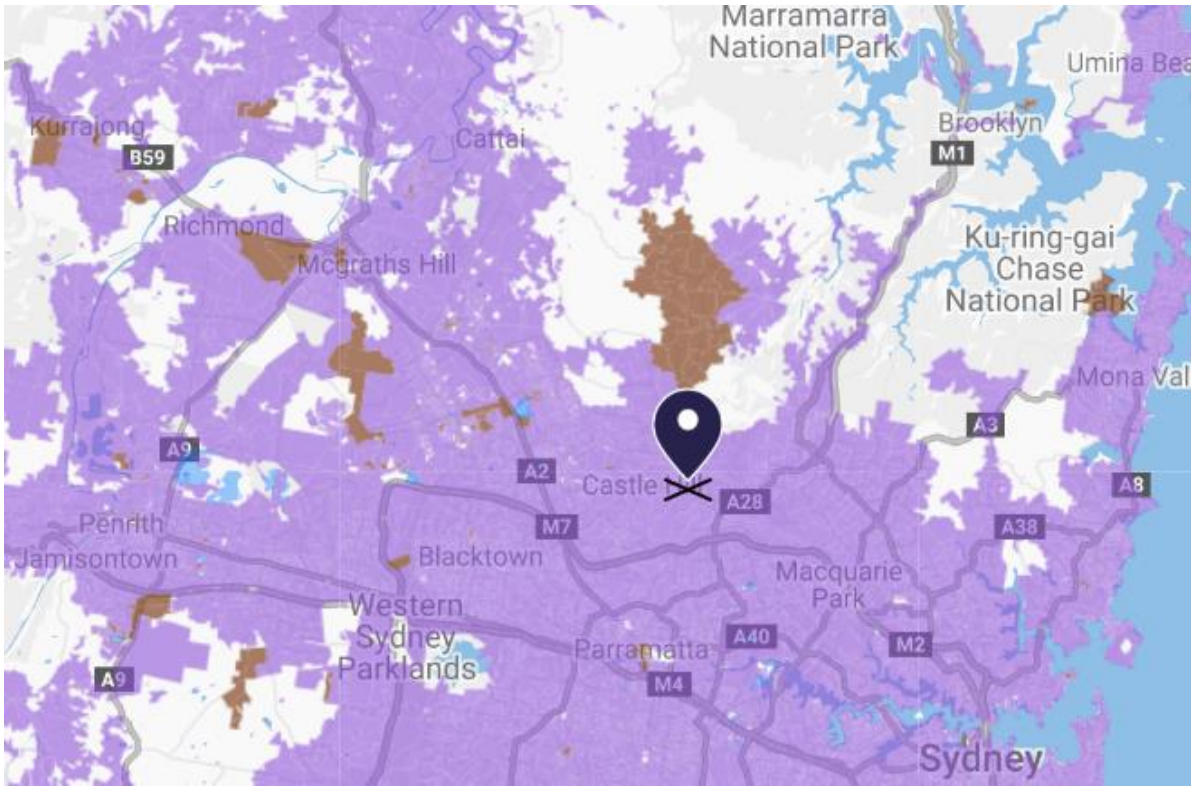

Figure 11 – nbn Coverage Map (purple shade indicates service availability)

The DBYD search identified the following communication carriers have services in the immediate area of the SSP Site:

- nbn
- Telstra
- Optus
- Uecomm
- Nextgen

The nbn DBYD information indicates live services within the SSP Site. These are most likely services that were installed during the use of the site for the construction of Cherrybrook Metro. Whilst they may be redundant, the services will connect back to the main street infrastructure and can be re-enabled when the future development is implemented.

4.1.2. Current Negotiations and Status

A location search of the nbn service confirmed that the SSP Site is “ready to connect” with Fibre to the Node (FTTN) technology available.

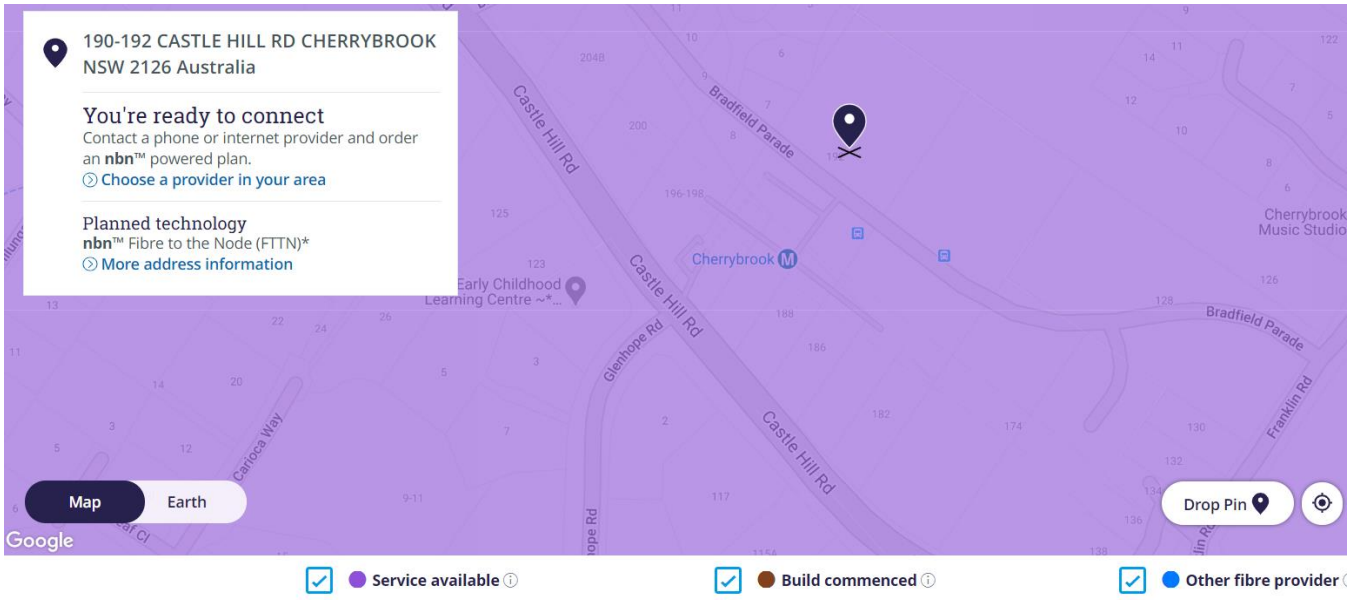

Figure 12 – nbn confirmation of service availability to Site

An nbn FTTN connection is utilised where the existing copper phone and internet network from a nearby fibre node is used to make the final part of the connection to the nbn access network. The fibre node is likely to take the form of a street cabinet or can be in a communications room where there are multiple dwellings.

For planning purposes, a communications room, typically 4m x 4m, shall be provisioned for each residential building. Each FTTN cabinet will allow the nbn access network signal to travel over a fibre optic line from the exchange, to the cabinet, and connect with the copper network to reach each premises.

A similar approach to the SSP Site shall be adopted for future Precinct developments to plan for the implementation of nbn services.

4.1.3. Existing Load Capacity and Future Capacity Considerations

Based on the nbn search and DBYD information, there is adequate infrastructure to accommodate the proposed SSP Site development. New underground pit and pipe networks will need to be provisioned as part of the development that will connect back to the street infrastructure.

It is considered that there is no requirement for any augmentation.

4.1.4. Impacts to Infrastructure to Meet Future Requirements

Based on the available information and nbn search, there is appropriate infrastructure in place to accommodate the connection of future telecommunication services to the SSP Site. For the future Precinct developments, applications shall be made for FTTN connections to the dwellings based on the number of dwellings proposed.

4.1.5. Estimated Schedule and Budget Costs

Budget Costs for the implementation of the telecommunications network to the Site are summarised as follows:

Item/Scope	Budget Cost	Quantity	Total
Pit and pipe network within site to enable telecommunication services (average cost/site)	$25,000	12	$300,000
TOTAL			**$300,000**

Notes

1. *Communication rooms will form part of each building and not included in any Site costs.*
2. *Final connection negotiations for telecommunication services will be coordinated by each tenant/retailer.*

4.1.6. Information Received

- Dial Before You Dig information for nbn, Optus, Uecomm, Nextgen.
  Note: Telstra DBYD information required payment of a fee to source the information. It was considered that this information was not required based on the utilisation of nbn services that will be used for future connectivity.
- NBN Property Search - https://www.nbnco.com.au/

5. Hydraulic Services Infrastructure

This report assesses the Utility infrastructure necessary to service both the SSP and Precinct sites.

Referring to the report *Cherrybrook Station SSP Ecologically Sustainable Development Plan, by Edge Environment*, dated March 2022, the document sets the framework for sustainable outcomes for the SSP and specifically assesses whole of life water usage and recommended strategies to reduce and re-use water.

5.1. Water Services - SSP Site & Precinct

5.1.1. Existing Arrangement

The existing Cherrybrook station precinct is be served by Sydney Water potable water network.

Specific to the SSP Site, there is a DN225 water main that runs along Bradfield Parade between Franklin Road and Robert Road. A further DN250 water main traverses along Franklin Road as shown on Figure 13.

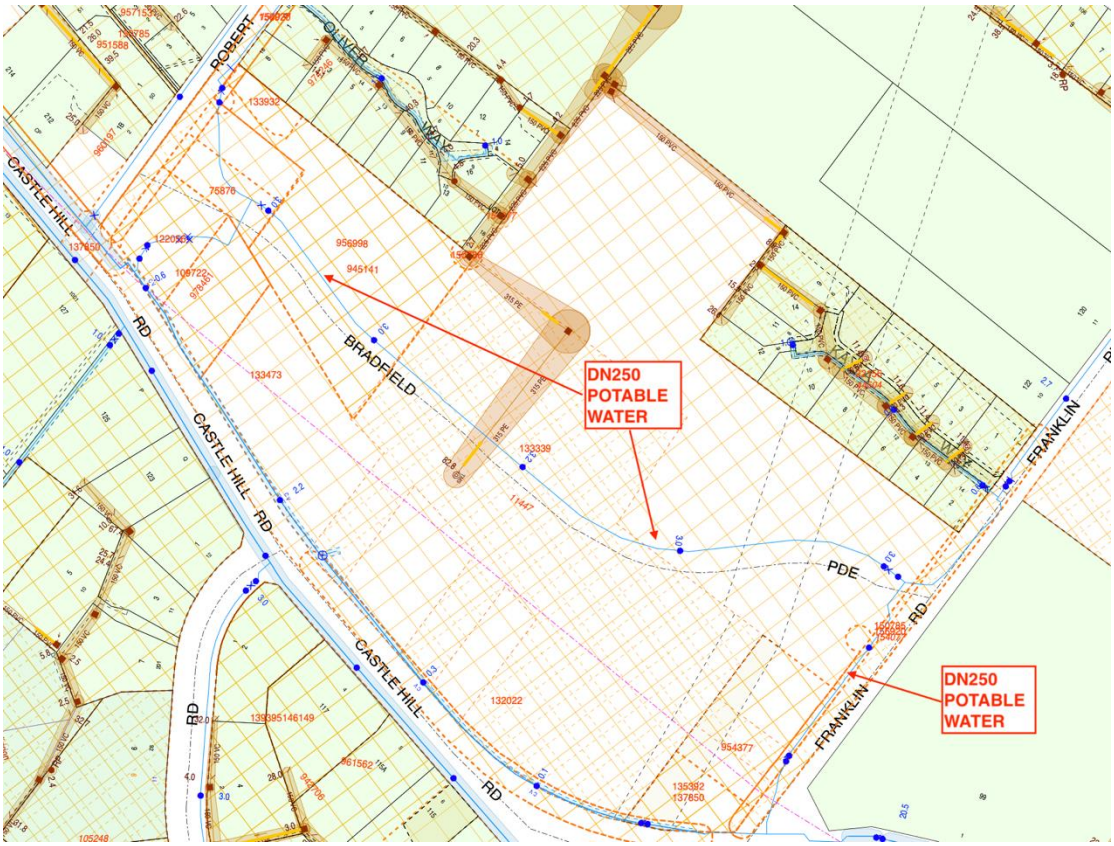

Figure 13 – Sydney Water - water mains *(source: Sydney Water Hydra)*

5.1.1.1. Non-Potable Water

There is no authority recycled water infrastructure within the vicinity of the development, so all water requirements would be potable water.

If the development itself proposed to utilise its own recycled water system this would be defined by the hydraulic engineer within the detailed development design process.

5.1.2. Current Negotiations and Status

A feasibility Section 73 application to Sydney Water has been made and confirms that the existing DN250 water mains would be adequate to service the proposed development.

As per the Water Supply Code of Australia (WSA 03-2011-3.1) the minimum pipe size for a multiple development of high density that is greater than eight storeys within a greenfield site is DN225.

5.1.3. Existing Load Capacity and Future Capacity Considerations

5.1.3.1. SSP Site

In the feasibility S73 response, Sydney Water have noted that the development can be connected to the DN250 in Bradfield Parade.

Upon receipt of the planning authority approval for the development, a further Section 73 application will need to be made to formalise the Sydney Water requirements as it should be noted that the requirements provided in a feasibility Section 73 are only valid for the date of the letter issued.

We would anticipate that the Notice of Requirements of the Section 73 application would note that the buildings that front onto Bradfield Parade would connect onto the DN250 in Bradfield Parade and the buildings that front onto Franklin Road would connect to the DN250 in Franklin Road.

5.1.3.2. Precinct

The future Precinct plan seeks to accommodate in the order of an additional 2,810 dwellings across the Precinct area. In the absence of specific land use and mix details, budget allowances shall be made for potential augmentations or upgrades, as noted in the initial section of this Report.

Once planning details are further refined, a Section 73 application will need to be made to formalise the Sydney Water requirements.

5.1.4. Impacts to Infrastructure to Meet Future Requirements

Based on the feasibility Section 73 advice received from Sydney Water for the SSP, the existing infrastructure is adequate for this development. Once the Precinct development has been defined further, Sydney Water advice shall be sought to obtain their probable requirements for the further developments.

5.1.5. Estimated Schedule and Budget Costs

5.1.5.1. Schedule

For the SSP Site, there are no schedule or budget cost impacts associated with this element of the Utilities and Infrastructure service. Schedule and budget impacts for the Precinct are noted at a high level and will be defined once the planning is further developed.

5.1.5.2. Budget Costs

There are no schedule or budget cost impacts associated with the SSP Site element of the Utilities and Infrastructure service.

5.1.6. Information Received

- DBYD information
- Letter of Advice from Sydney Water dated 21 September 2020

5.2. Sewer Services – SSP Site & Precinct

5.2.1. Existing Arrangement

The proposed Cherrybrook precinct is served by Sydney Water sewer networks.

Cherrybrook Station is serviced by a 315 PE sewer that traverses across Bradfield Parade in a north-east direction and changes direction to north-west before connecting into a DN225 at the back of Oliver Way.

The invert levels of these sewers have been noted on Figure 14.

The invert levels of the sewers will need to be considered during the detailed design phase of the development and Sydney Water's Technical Guidelines for building over and adjacent to pipe assets (refer to link below) will need to be consulted. A Sydney Water, Water Services Co-ordinator (WSC) will be able to advise of the Sydney Water Building Plan Approval requirements once a final detailed development application is available.

https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdc2/~edisp/dd_076198.pdf

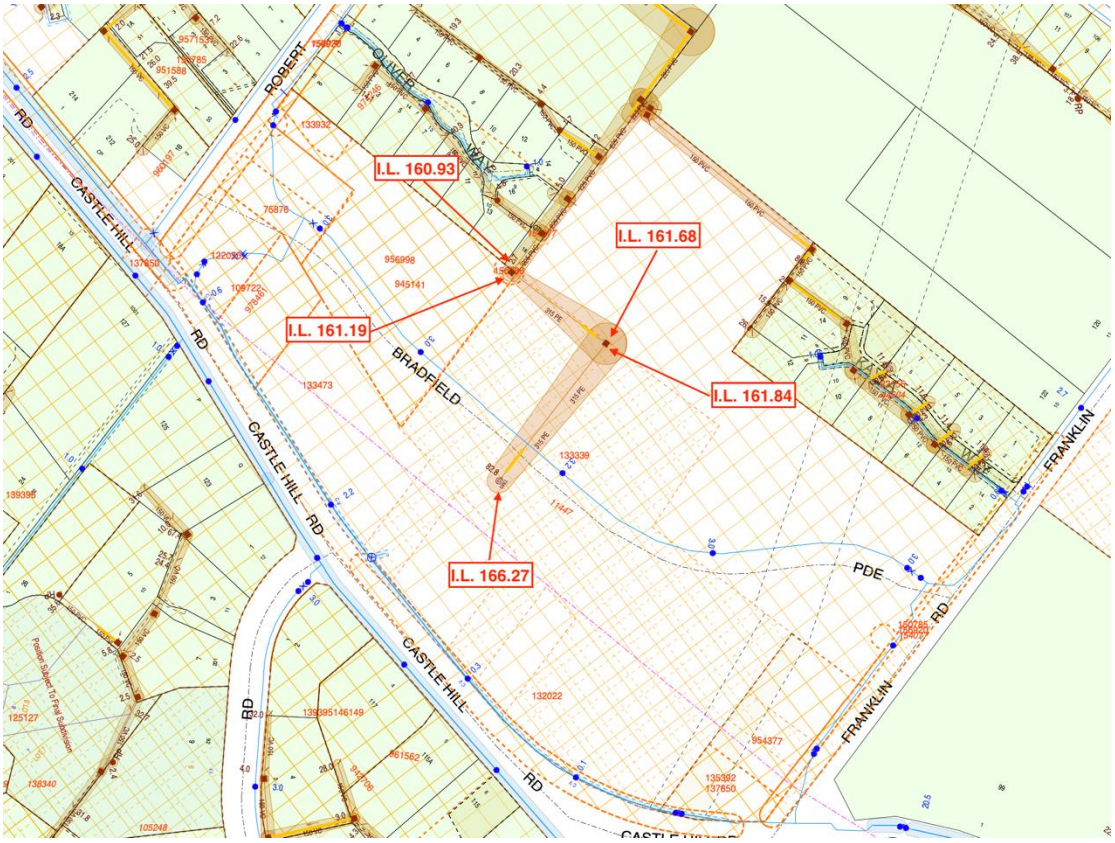

Figure 14 – Sydney Water sewer invert levels *(source: Sydney Water Hydra)*

5.2.2. Current Negotiations and Status

A feasibility Section 73 application to Sydney Water has been made to confirm that the development is able to be serviced utilising the existing Sydney Water sewers.

As per the Sewerage Code of Australia (WSA 02-2002-2.2) the maximum Equivalent People (EP) for a DN225 sewer with a grade of 1% is 3025. The maximum EP for the proposed SSP site and future stage was estimated to be 2700EP, therefore is within the nominated provisions.

5.2.3. Existing Load Capacity and Future Capacity Considerations

5.2.3.1. SSP Site

Sydney Water have noted that they will require an extension of their existing sewer asset to service the development. This extension will need to consider the natural catchment area and ensure that current grade is maintained.

Upon receipt of planning authority approval for the development, a further Section 73 application will need to be made to formalise the Sydney Water requirements as it should be noted that the requirements provided in a feasibility Section 73 are only valid for the date of the letter issued.

5.2.3.2. Precinct

The future Precinct plan seeks to accommodate in the order of an additional 2,810 dwellings across the Precinct area. In the absence of specific land use and mix details, budget allowances shall be made for potential augmentations or upgrades, as noted in the initial section of this Report.

Dependant on the increase of dwelling capacity to specific developments, Sydney Water will require an extension of their existing sewer asset to service the developments. A feasibility Section 73 Letter of Advice from Sydney Water will confirm the requirements.

5.2.4. Impacts to Infrastructure to Meet Future Requirements

Based on the feasibility Section 73 advice received from Sydney Water for the SSP, the existing infrastructure is adequate for this development, however, the sewer reticulation will need to be extended to ensure the full development is serviced.

Once the Precinct development has been defined further, Sydney Water advice will be sought to obtain their probable requirements for the further development. Estimated Schedule and Budget Costs

5.2.4.1. Schedule

For the SSP Site, a typical programme for design and construction of this extension of Sydney Water sewer main would be approximately 6 months. Schedule and budget impacts for the Precinct are noted at a high level and will be defined once the planning is further developed.

5.2.4.2. Budget Costs

Budget Costs for the implementation of the sewer services network to the SSP Site are summarised as follows:

Item/Scope	Budget Cost	Quantity	Total
DN225 sewer extension	$1000/m	350m	$350,000
TOTAL			**$350,000**

Notes

1. *This is dependent on if the Development is to be sub-divided as each lot is required to have a connection point to a Sydney Water within their lot*

5.2.5. Information Received

- DBYD information
- Letter of Advice from Sydney Water dated 21 September 2020

5.3. Gas Services – SSP Site & Precinct

5.3.1. Existing Arrangement

The SSP Site and Precinct is within the Jemena gas infrastructure network area.

There is a 50mm gas main that runs along Bradfield Parade. A 63mm gas main is installed along Franklin Road as shown in Figure 15.

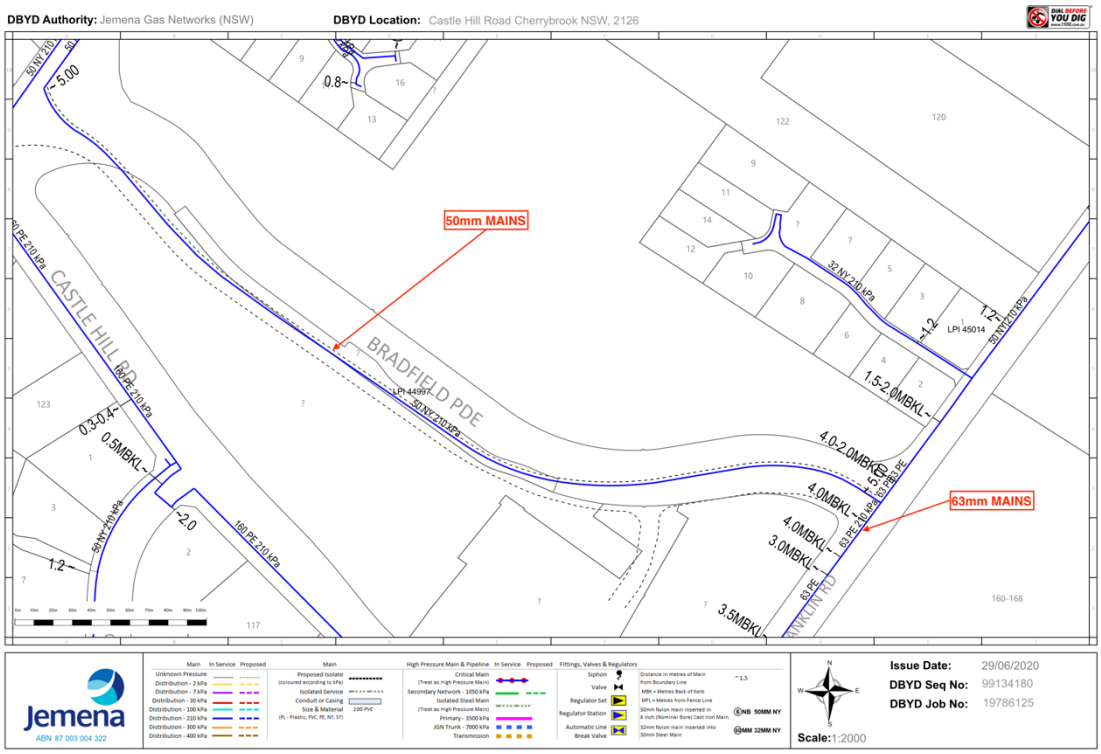

Figure 15 – Jemena gas assets *(source: Dial Before You Dig)*

5.3.2. Current Negotiations and Status

The existing 50mm gas main in Bradfield Parade was installed at the request of Transport for NSW as part of the Sydney Metro project to accommodate up to 500 residential apartments.

5.3.3. Existing Load Capacity and Future Capacity Considerations

5.3.3.1. SSP Site

Based on the assessment of the existing DBYD information further Jemena infrastructure would not be required to be installed for the SSP Site development.

A formal offer through the Jemena portal would need to be applied for each development during the detailed design development process, to confirm the developments requirements.

5.3.3.2. Precinct

The requirement for an augmentation of the gas infrastructure will be dependent on the proposed dwelling design and use of electricity versus gas appliances. Based on the proposed increase in density of some of the development areas, we anticipate that some upgrades of the gas infrastructure may be required.

A formal application through the Jemena portal would be required to confirm that the existing gas assets are sufficient for the development at the time of any project commencement.

5.3.4. Impacts to Infrastructure to Meet Future Requirements

As noted above, it is considered that no further augmentation of services will be required for the Gas service at the SSP Site. Any future works will form part of the specific developments and connection to the main service.

Future Precinct works will need to be treated on a case-by-case basis with relevant applications submitted.

5.3.5. Estimated Schedule and Budget Costs

There are no schedule or budget cost impacts associated with the SSP Site element of the Utilities and Infrastructure service.

5.3.6. Information Received

- DBYD Information

No formal enquiry was issued based on the existing infrastructure or confirmation from Jemena received as this will be dealt with at the detailed development design stage.

---END OF REPORT---

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however the vision of **Atmos Consulting** is to create a firm that acts as a conduit to conne
industry experts in their stated fields to Define Ideas and Deliver Outcomes.

PROJECT INFORMATION

Project Name: Cherrybrook Station Government Land – Utilities Assessment

Date of Issue: 28/03/2022

Revision: 4.1 – Client Issue

Author: Peter Koulos – Electrical/Communications | Alex Ross – Water/Sewer/Gas

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