Monday, 4 July 2022

CKDI
Suite 703 North Tower
1-5 Railway Street
Chatswood NSW 2067

Response to Council Comments – Planning Proposal for South Creek West - Belmore Road Precinct

Attention: Mr. Tank Tan

Please see our responses to comments provided by Camden Council on the Infrastructure Servicing Strategy, to be included as an addendum to the report. Should you have any questions or concerns, please feel free to contact the undersigned.

1 Water

Existing Network - reference is made to the following statement on page 8 of the Infrastructure Servicing Strategy;

"Sydney Water have indicated that this infrastructure will have sufficient capacity to supply the proposed development of the Belmore Road Precinct."

It is requested that correspondence from Sydney Water confirming this statement is provided.

Refer to meeting minutes in Appendix A.

Sydney Water Growth Servicing Plan - reference is made to the following statement on page 9 of the Infrastructure Servicing Strategy;

"The GSP indicates that infrastructure to support the South Creek West Release Area is in the design and delivery phase and was due for completion in December 2019".

Notwithstanding the above statement, Sydney Water's Growth Servicing Plan 2020 – 2025 also states regarding South Creek West, that *"Existing services are limited until Sydney Water delivered reservoirs are constructed by 2022/2023".* In this regard, as noted in response to item 3.1 above, clear confirmation in writing from Sydney Water is required as to the extent of water servicing capacity available for the Belmore Road Precinct.

Noted, meeting minutes confirming that the proposed reservoirs will have capacity to support the development have been provided in Appendix A. As these reservoirs are currently being

delivered, we do not expect the provision of potable water infrastructure to pose a constraint to development.

Proposed Network - reference is made to the following statement on page 9 of the Infrastructure Servicing Strategy;

"As discussed in Section 3.1, it is expected the Belmore Road Precinct will be supplied by the new Oran Park reservoirs. In the unlikely event of insufficient capacity in the trunk mains constructed in The Northern Road, a further 400mm main would need to be constructed to supply Sub- Precinct 2. However, given the size of newly constructed mains, this is considered unlikely".

It is requested that correspondence from Sydney Water confirming this statement is provided. It is also requested that the Infrastructure Servicing Strategy is revised to clearly articulate and demonstrate satisfactory arrangements, with agreement from Sydney Water, for the provision of temporal, spatial and causal infrastructure provision.

Meeting minutes have been included in Appendix A. A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

Servicing Strategy - as depicted in 'Figure 5 **–** Water Servicing Strategy' on page 10 of the strategy, proposed Water Mains are depicted throughout the extent of the Belmore Road Precinct.

Further information in the Strategy is requested to demonstrate how these Water Mains will ultimately be delivered (i.e. the southern-most connection point to the Trunk Water Main in The Northern Road would presumably be constructed by the proponent, to facilitate access to their development site).

It is also requested that the strategy is revised to demonstrate the proposed arrangements in facilitating Water Main connections to the remaining (fragmented) landholdings in the Precinct, whether from the east (The Northern Road corridor) or from the south (i.e. within the Sub- Precinct, from the proponents landholding).

Report has been updated to include commentary around the delivery of infrastructure within the precinct. Development is generally expected to progress from south to north, with the CKDI site delivered first and more fragmented areas delivered in later stages. Initial stages of development will be serviced by extending the existing 450mm main in Belmore Road along the collector road constructed in Stage 1. Internal mains through the CKDI site will then be extended along key road corridors, and connected back to the existing main along Belmore Road.

2 Sewer

Existing Network – reference is made to the following statement on page 11 of the Infrastructure Servicing Strategy;

"Relevant to the Belmore Road Precinct are the Bringelly Carrier and Bringelly North Carriers (shown in Figure 6 below). This infrastructure drains northwards, towards the future Upper South Creek Advanced Water Recycling Centre (USCAWRC). The status, timing and staging of these projects is unclear and further liaison will be required as designs progress with Sydney Water to determine these details."

Further information is requested in the form of correspondence from Sydney Water regarding the timing and staging of these projects in relation to South Creek West Belmore Road Precinct.

We understand from our engagement with Sydney Water on other projects in the area that SP1209 will transfer flows to the Upper South Creek AWRC from 2028. A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

Sydney Water Growth Servicing Plan – it is noted that the 'Infrastructure Servicing Strategy' may have referenced an out-of-date extract of Sydney Water's Growth Servicing Plan on page 11. It is recommended the strategy is revised to reflect the most recent GSP.

It is noted that the strategy makes the point that "Sydney Water's GSP indicates that the northern parts of the South Creek West Release Area are in the strategic planning phase (indicated in orange) while the southern parts have been further progressed to the concept design phase (shown in blue)".

Given Sydney Water have delineated their study areas on this basis (i.e. not on any discernible precinct boundaries) there may be potential limitations for servicing capacity across the extent of the proposed Belmore Road Precinct (between the northern vs. southern area). It is requested that confirmation in this regard is provided from Sydney Water.

Report has been updated to reflect latest Growth Servicing Plan.

Proposed Network – reference is made to the following statement on page 13 in the 'Infrastructure Servicing Strategy'.

"This pump station has been designed for an interim capacity of 4,000 dwellings, however it is understood that Sydney Water are currently amending the concept designs to allow for the pump station to be delivered at full capacity (approximately 70,000 dwellings). Sydney Water have indicated that SP1209 will be delivered to align with development in the Lowes Creek Marylands precinct and is likely this infrastructure will be delivered in 2023/24. Sydney Water's

development priorities and infrastructure delivery timing are unknown at this stage".

The above statements are not considered adequate in demonstrating evidence of servicing capacity. It is requested that a written commitment from Sydney Water, clearly articulating the timeframe and servicing quantum of utility infrastructure for the Belmore Road Precinct is provided.

Meeting minutes have been included in Appendix A. A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

Servicing Strategy Option 1 - The 'Infrastructure Servicing Strategy' proposes that the 'Bringelly Carrier' and the 'Bringelly North Carrier' could service part of the Belmore Road Precinct. However, as stated on page 14 of the Strategy;

"It is expected that delivery of the Bringelly and Bringelly North Carriers would be some time after the initial infrastructure to be provided for the Aerotropolis by 2026, possibly around 2028-2032 depending on the pace of development within the catchment".

Given that under Option 1, servicing for Sub-Precinct is available 10+ years from now, it is not considered a viable option.

We understand from our engagement with Sydney Water on other projects in the area that SP1209 will transfer flows to the Upper South Creek AWRC from 2028. Given development in Catchment 2 is currently planned to commence in 2028 and Catchment 3 in 2035, we consider Option 1 to be viable, pending confirmation from Sydney Water.

A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

Servicing Strategy Option 2 – Drain to SP1209 via Pump Station - as noted under this option, the Infrastructure Servicing Strategy states:

"…further discussion with Sydney Water will be required should this option be progressed to confirm that sufficient capacity is available".

It is unclear as to whether SP1209 can service Sub- Precinct 2, in addition to other Precincts that may already have been accounted for in its planning. In this regard, as previously stated, further confirmation from Sydney Water is required.

Refer meeting minutes attached in Appendix A. Catchment 1 naturally drains to SP1209, and servicing this catchment using this infrastructure was discussed with Sydney Water. Figure 6 shows a Sydney Water planned main which would drain Catchment 1 to SP1209. SP1209 has

capacity to service 4,000 lots up to 2026. Capacity at this pump station cannot be reserved by other developments.

A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

Option 3 – Interim On-Site Package Plant - Given the likely adverse environmental implications for on-site wastewater management, it is not reasonable to anticipate Council would be supportive of this option.

Noted, given the considerable land take required for irrigation we would not expect this option to be further progressed. It has been included as one of many options assessed in this report for completeness.

3 Electricity

Proposed Network – in noting that Endeavour Energy's Bringelly Zone Sub-Station is adjacent to the Belmore Road Precinct, as stated in the 'Infrastructure Servicing Strategy', its augmentation is intended to facilitate increased service to the Aerotropolis, supply of the new Sydney Metro line and spare capacity for Agribusiness or Sydney Water requirements. In this regard, current service planning for the Bringelly ZS does not appear to support the release of the Belmore Road Precinct.

The statement that the Belmore Road Precinct *"…could utilise the spare connection if not taken by other development sites"* is not considered as satisfactory to demonstrate capability of infrastructure servicing.

In response to the above, it is requested that evidence of appropriate arrangements which are not to the detriment of any other development is provided via written confirmation from Endeavour Energy.

The augmentation of the Bringelly ZS includes three additional connection points. The third connection point is a spare connection for other developments, Endeavour Energy have provided the example that this may include Sydney Water infrastructure or development within the Agribusiness precinct. This statement does not suggest that these examples will be the only development able to utilise the spare connection.

Should there be no available capacity at the Bringelly ZS, Endeavour Energy have indicated the site would be serviced by either the Oran Park ZS or North Leppington ZS.

The strategy outlined in this report has been prepared by Endeavour Energy for IDC. Given this, we consider the advice provided to be sufficient evidence to support the rezoning of the precinct from an electricity supply perspective. (refer to correspondence in Appendix A).

4 Gas

It is requested that written confirmation from Jemena is provided as to the means and timing for servicing of the precinct, and that the provision of gas supply to the site will not pose a constraint to the development of the site or its staging.

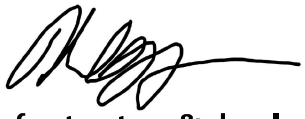
Gas is no longer being considered for this precinct and this section has been removed from the report.

5 Telecommunications

Written confirmation is requested from NBN/Telstra as to their capacity/commitment to deliver telecommunications infrastructure to the precinct.

CKDI are currently in discussion with NBN Co. to provide fibre infrastructure for the development. Please refer to Appendix A for correspondence with the NBN Co. New Developments team.

Yours Sincerely,



infrastructure & development consulting
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Senior Infrastructure Engineer

infrastructure & development consulting

South Creek West Belmore Road Precinct

Infrastructure Servicing Strategy

July 2022

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Project Number	19-046	**Date**	4 July 2022
Project Name	South Creek West – Bringelly	**Status**	Final
Client	CKDI	**Revision**	G
Author	R. Higgisson	**Reviewed**	C. Avis

1 Introduction

This report summarises the infrastructure investigations relating to the infrastructure strategies for the South Creek West Belmore Road Precinct. The Belmore Road Precinct is located within the South Creek West Release Area, however it is yet to be rezoned for residential development.

The Belmore Road Precinct is expected to be developed into primarily low-density residential estates, with potential for mixed use and/or higher density development around local and town centres.

The Belmore Road Precinct is located within the South West Growth Area and is subject to the Western Sydney Growth Area Special Infrastructure Contribution (SIC) framework.

This report outlines a potential strategy for the provision of utility services for the Belmore Road Precinct. Specifically, this report will outline:

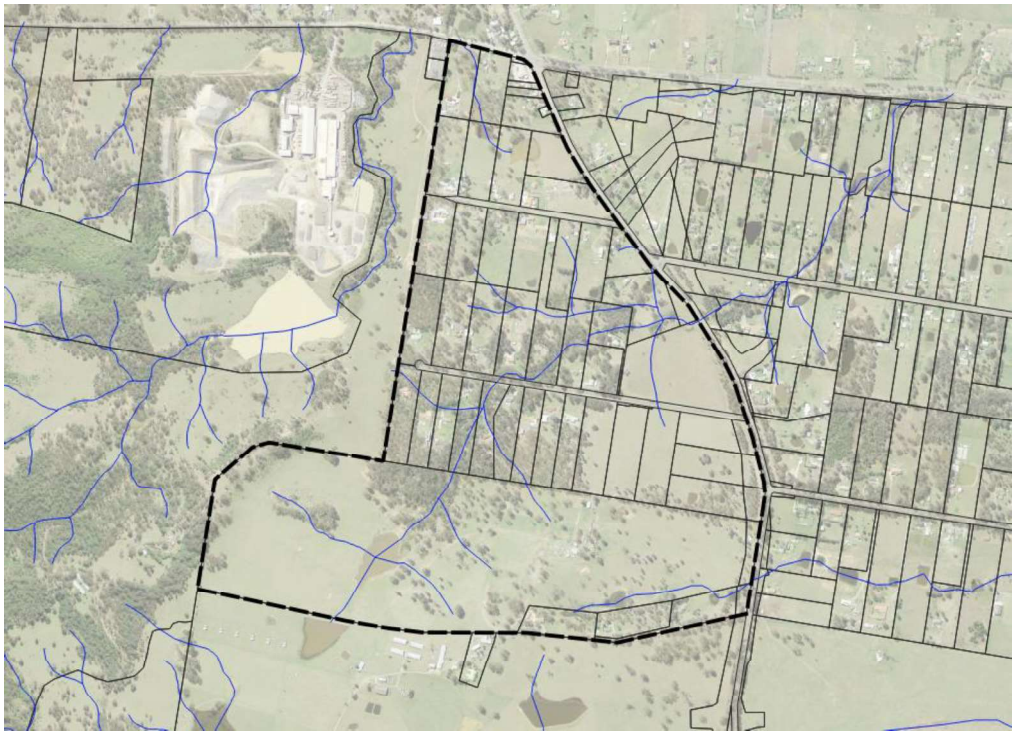
- Existing services within the vicinity of the Belmore Road Precinct
- Current and planned projects
- Implications of the above and potential servicing strategies for the proposed development of the Belmore Road Precinct

2 Belmore Road Precinct

The South Creek West Belmore Road Precinct is located within the Camden LGA and is approximately 186 hectares in size. It is part of the South West Growth Area and is bound by The Northern Road to the east, Bringelly Road to the north and existing rural properties to the south and west. Importantly, to the south of the precinct is the Lowes Creek Maryland proponent led development site. The Belmore Road Precinct is currently zoned for agricultural purposes.

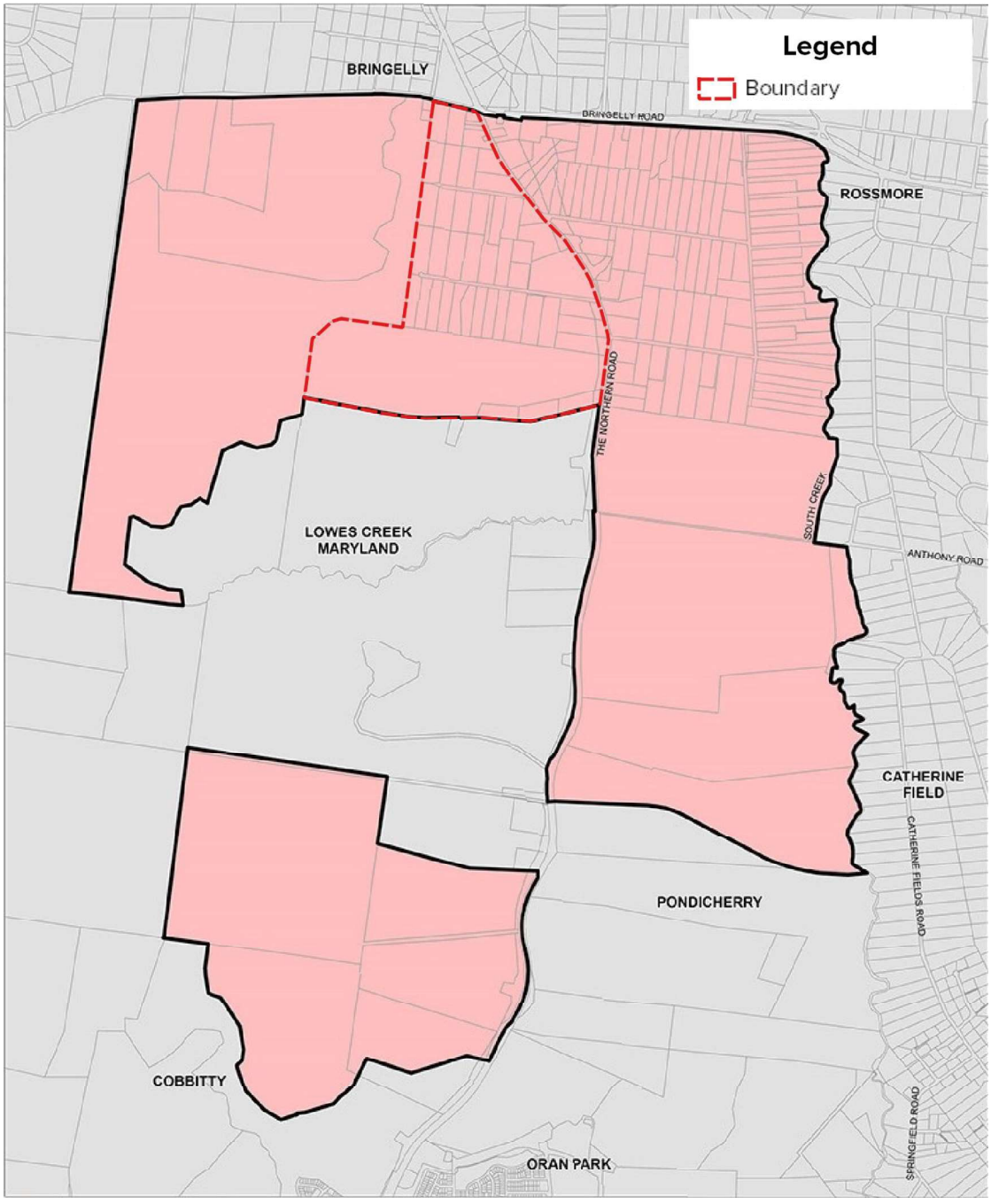
This area generally falls from south-west to north east and contains numerous creeks as is indicated in Figure 1.

Figure 1 – Belmore Road Precinct Cadastre and Hydrolines



The Belmore Road Precinct is situated within the South Creek West Release Area as defined by the NSW Department of Planning, Industry and Environment (DPIE). The South Creek West Release Area is shown in Figure 2. The area is 1,500 hectares in size and will be rezoned for urban development. It is anticipated that up to 30,000 new homes will be provided within the South Creek West Release Area.

Figure 2 - South Creek West Release Area



Source: NSW Department of Planning, Industry and Environment (2020)

2.1 Proposed Development

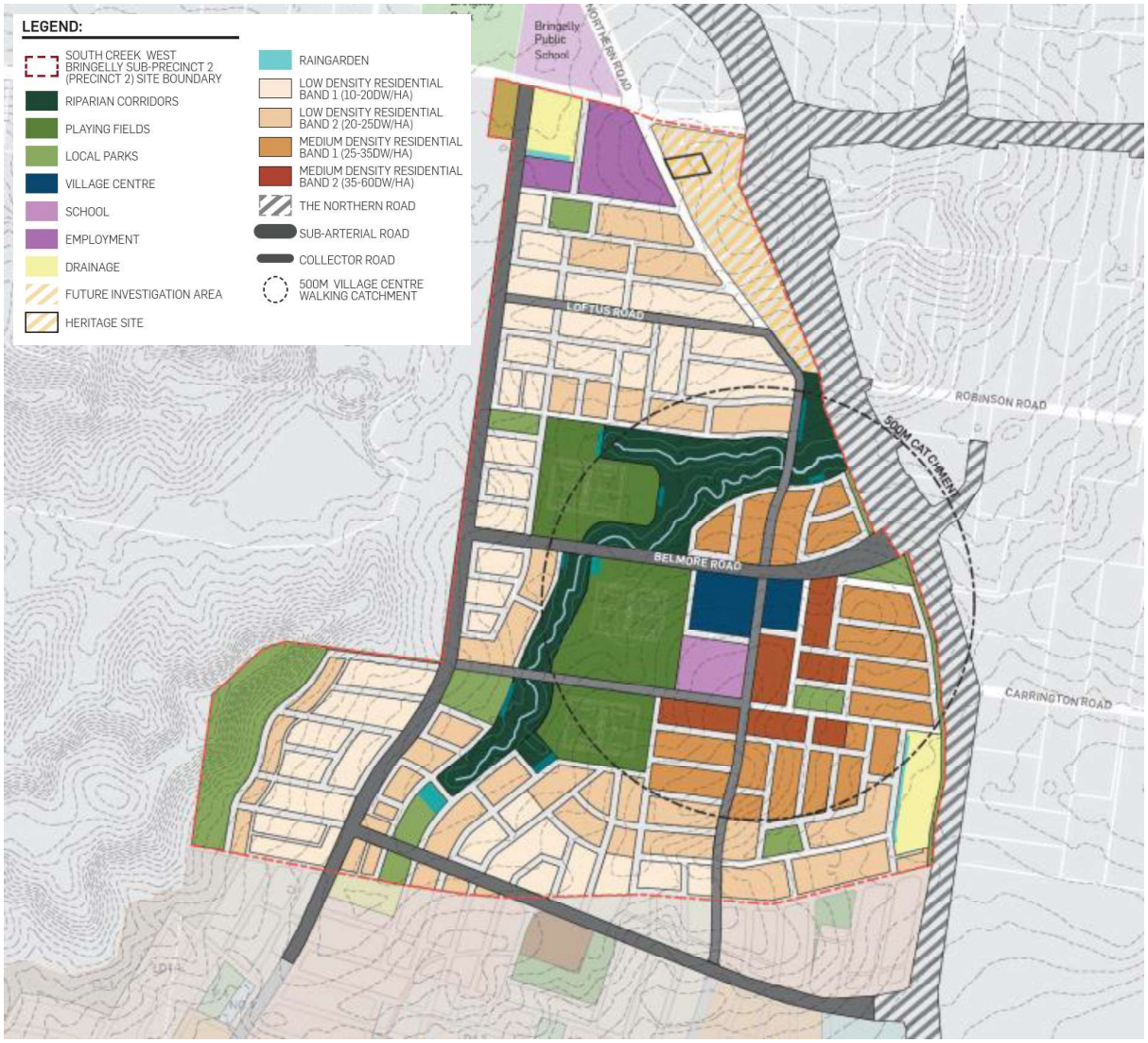
The Belmore Road Precinct will be rezoned as part of the South Creek West Release Area to provide a mix of development typologies. For the purpose of this assessment we have assumed the maximum dwelling yield. A breakdown of the expected residential development is provided in Table 1.

Table 1 – Belmore Road Precinct Residential Development Breakdown

Land Use	Area (Ha)	Yield
Low Density Residential Band 1 (10-20 dw/ha)	41.6	831
Low Density Residential Band 2 (20-25 dw/ha)	35.4	885
Medium Density Residential Band 1 (25-35 dw/ha)	25.7	899
Medium Density Residential Band 2 (35-60 dw/ha)	7.3	440
Village Centre (2-3 Storey Apartments)	3.6	217
Total	**113.6**	**3,271**

The proposed Indicative Layout Plan is shown in Figure 3.

Figure 3 - Proposed Development



3 Water

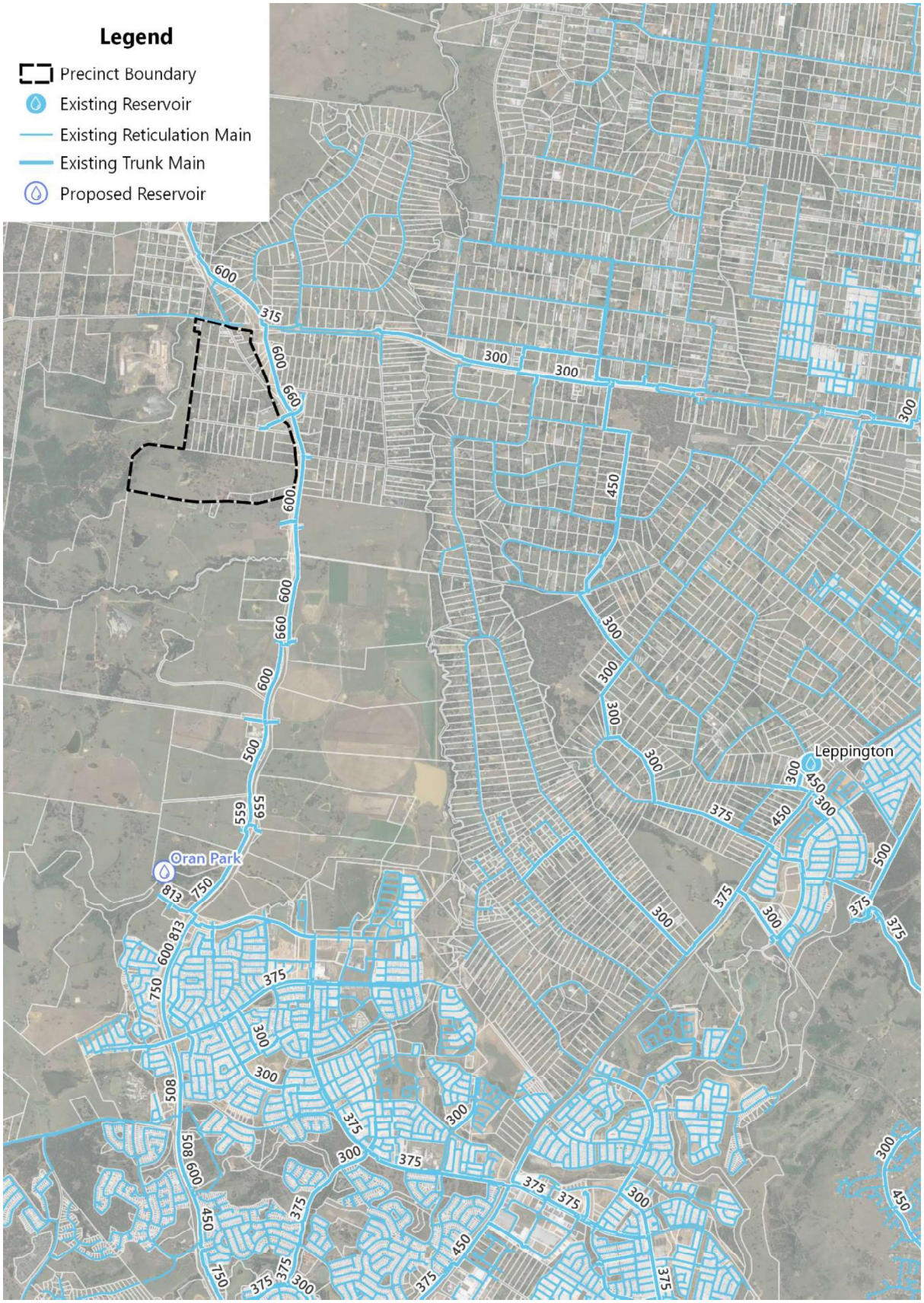
3.1 Existing Network

The Belmore Road Precinct is not currently serviced by the Sydney Water potable water network. Existing infrastructure is largely located to the east of the Belmore Road Precinct on the Northern Road, supplying existing rural properties in Rossmore and Leppington, and recent developments in Oran Park, to the south of Belmore Road Precinct. The closest reservoir to The Belmore Road Precinct is the Leppington reservoir, located 6km to the south east.

Sydney Water have recently delivered two trunk potable water mains along The Northern Road. These mains will connect to two 24ML reservoirs which are currently being delivered at Oran Park. These reservoirs are located on the western side of The Northern Road and will be operational in late 2023. An indicative location is shown on the figure below.

Sydney Water have indicated that this infrastructure will have sufficient capacity to supply the proposed development of The Belmore Road Precinct (refer meeting minutes in Appendix A). The trunk potable water network is shown in Figure 4 below.

Figure 4 - Existing Potable Water Network



3.2 Sydney Water Growth Servicing Plan

Sydney Water's Growth Servicing Plan (GSP) outlines the servicing strategy to support planned growth in Greater Sydney from 2020-2025. The GSP indicates that there are limited existing services until planned reservoirs at Oran Park are delivered in 2023. Services for the South Creek West precinct are in the design and delivery phase.

3.3 Proposed Network

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

The maximum water demand rates were estimated using the WSA. These rates were used to determine the peak hour demand for each land use type. The results of the assessment are provided in Table 2.

Table 2 - Proposed Water Demand Calculations

Land Use	Max Day Demand (kL/day)	Peak Hour Demand (kL/hour)	Peak Demand (L/s)
Low Density	3,157.0	289.4	80.4
Medium Density	1980.0	165.0	45.8
Village Centre (Apartments)	173.6	14.5	4.0
Retail & Employment	294.2	24.5	6.8
School	90.0	7.5	2.1
Open Space	1968.4	12.4	3.4
Total	**5,893.1**	**513.3**	**142.6**

Based on the above assessment a trunk water main of approximately 400mm diameter would be required to support the proposed development. This may be provided through a series of smaller mains rather than a single 400mm main and would be subject to future options analysis, concept and detailed design. As discussed in Section 3.1, Sydney Water have advised that the Belmore Road Precinct will be supplied by the new Oran Park reservoirs, via the recently constructed trunk mains in The Northern Road.

3.4 Servicing Strategy

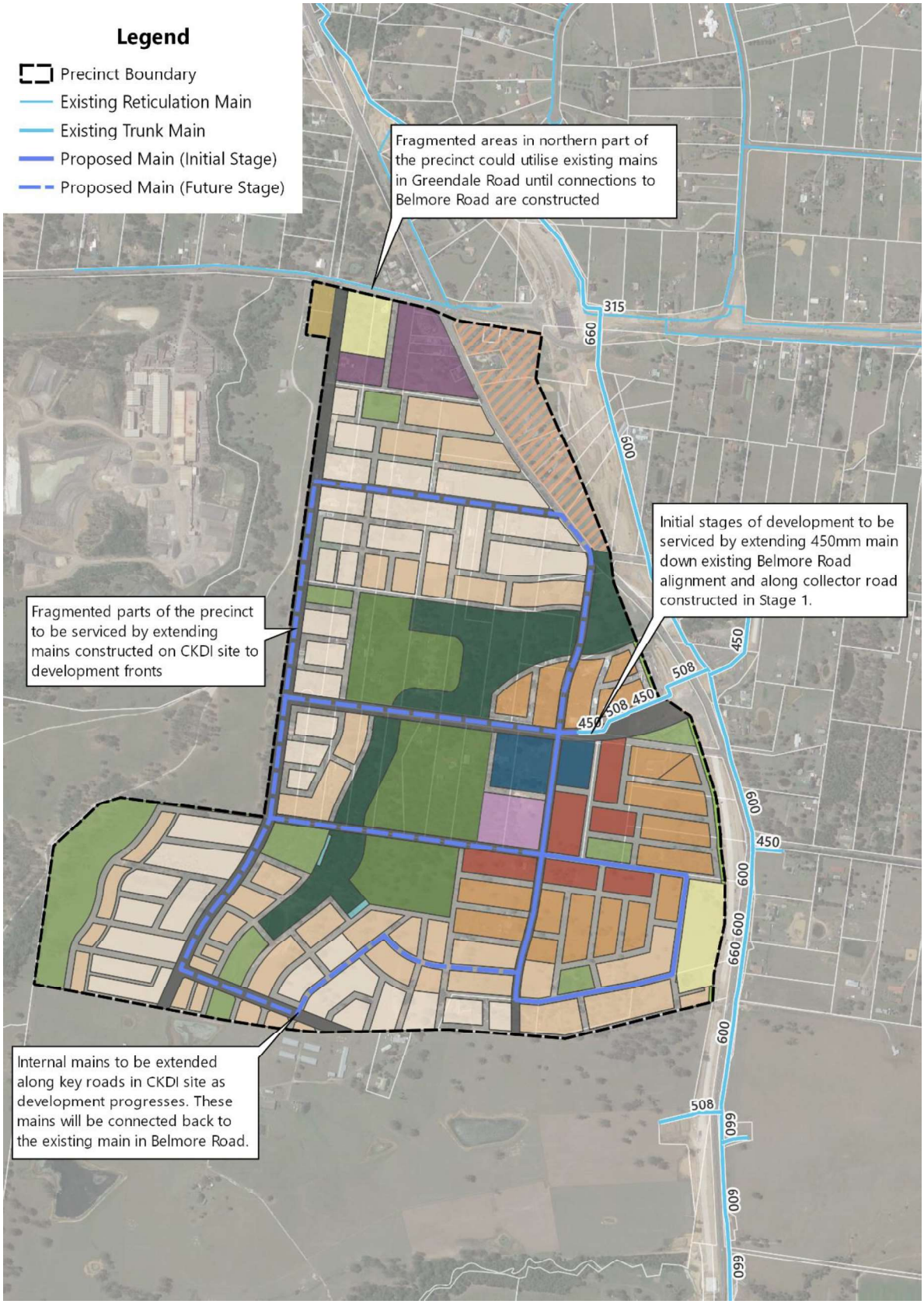
Initial stages of development will be serviced by extending the existing 450mm main in Belmore Road along the collector road constructed in Stage 1. Internal mains through the CKDI site will then be extended along key road corridors, and connected back to the existing main along Belmore Road.

To supply fragmented areas, the main along Belmore Road could be extended to development fronts. For development in the northern parts of the precinct, existing reticulation mains in Greendale Road could be extended to the site until these areas can be connected to new reticulation within the precinct. New water mains will be constructed within the standard shared trench allocation in the reserve of all new roads within The Belmore Road Precinct boundary. All roads within the precinct boundary will be delivered by the proponent. The proposed potable water servicing strategy is shown in Figure 5.

3.5 Feasibility Application

A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. The associated case number is 200326. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

Figure 5 – Water Servicing Strategy



4 Sewer

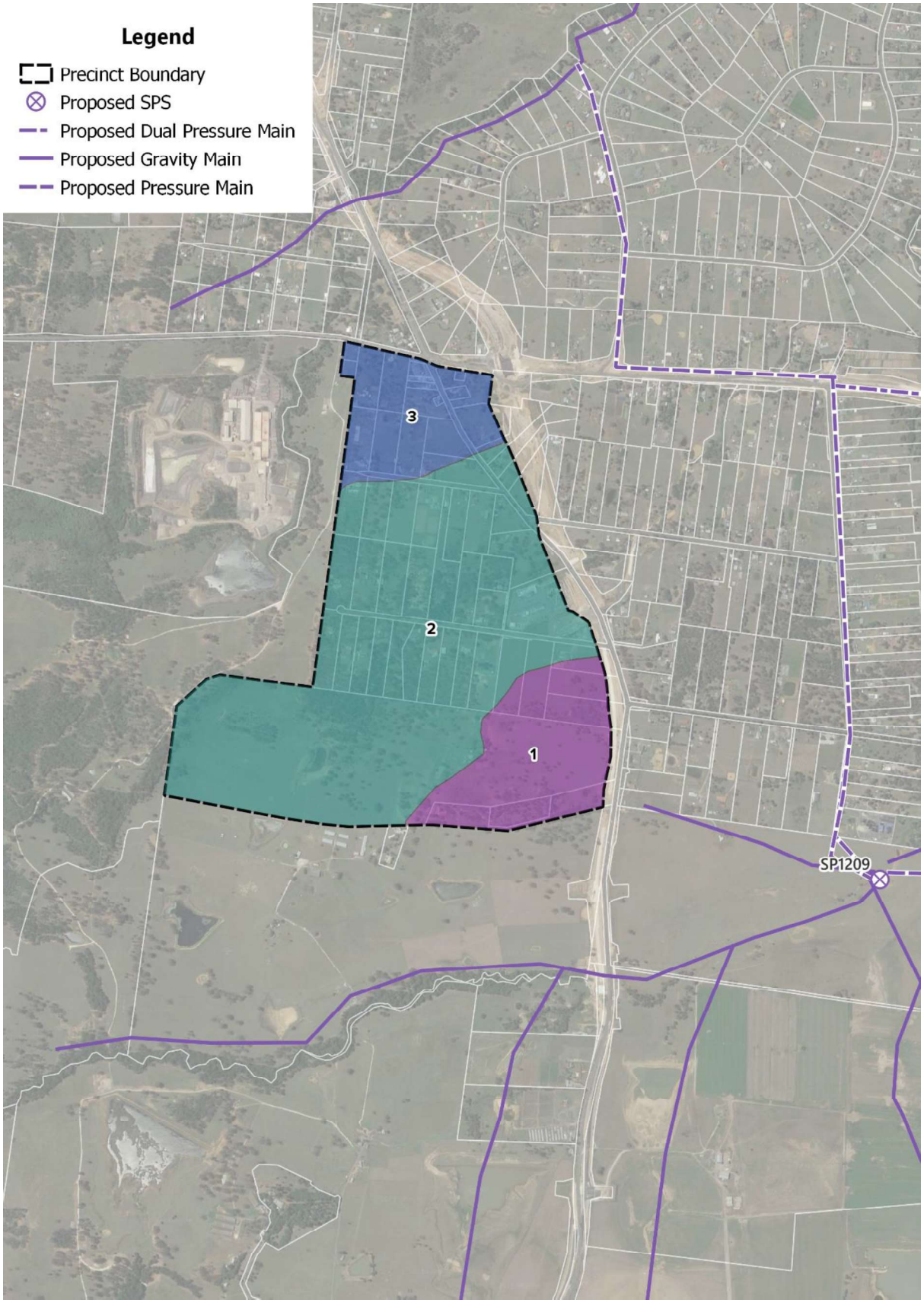
4.1 Existing Network

The Belmore Road Precinct and surrounding area are not currently serviced by the Sydney Water sewer network. Existing rural properties in the area utilise on-site septic systems for sewage collection and disposal. Newer developments within the Oran Park, Harrington Park and Turner Road developments, located to the south of the Belmore Road Precinct, are serviced by the Sydney Water sewer network. Sewer from these developments is transferred to the West Camden Water Recycling Plant (WRP), located approximately 12km south west of the subject site.

The SWGA and Aerotropolis are set to undergo significant change over the coming years which will require large investment in utilities infrastructure. Relevant to the Belmore Road Precinct are the Bringelly Carrier, the Bringelly North Carrier and the Lowes Creek Lead-In (shown in Figure 6 below). This infrastructure drains northwards, towards the future Upper South Creek Advanced Water Recycling Centre (AWRC).

The Belmore Road Precinct falls into three sewer catchments which drain to different carriers and trunk infrastructure. The sewer catchments are shown in Figure 6.

Figure 6 – Sewer Catchments & Trunk Infrastructure

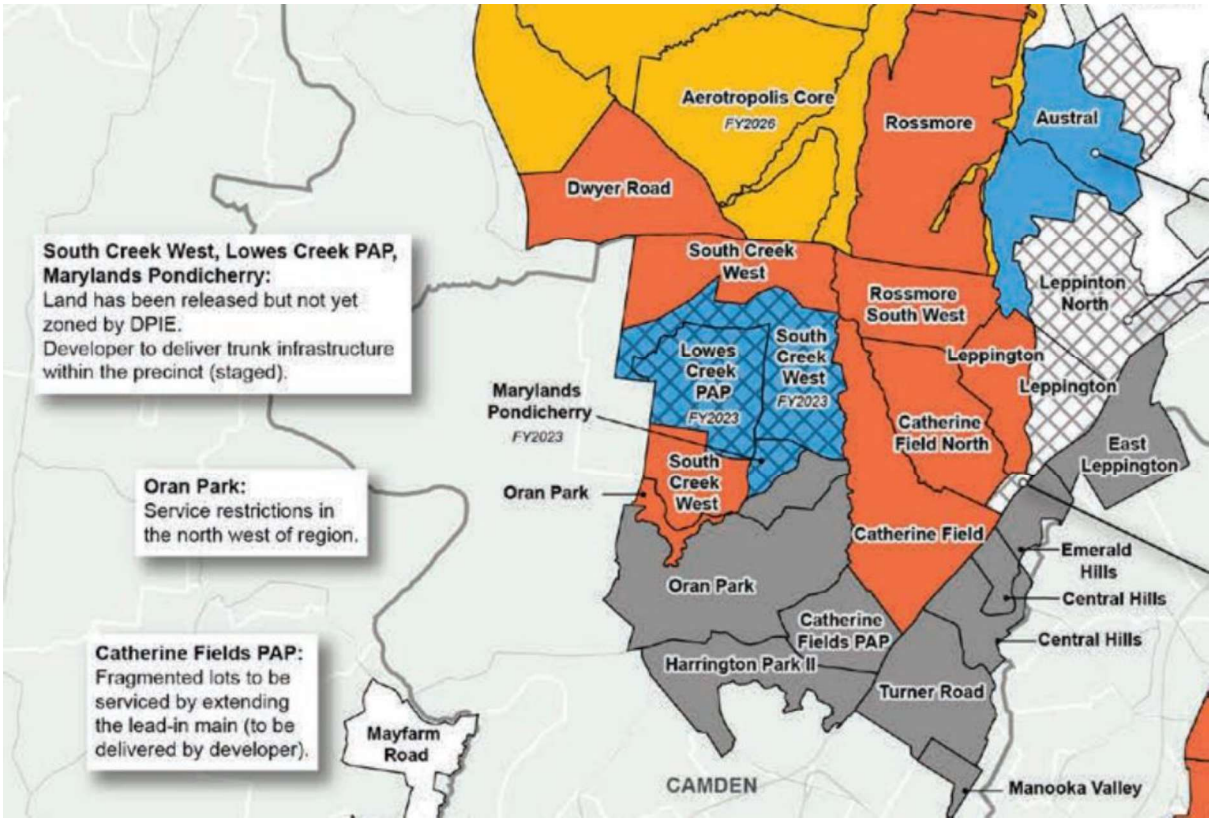


4.2 Sydney Water Growth Servicing Plan

Sydney Water's GSP indicates that the northern parts of the South Creek West Release Area are in the strategic planning phase (indicated in orange on Figure 7) while the southern parts have been further progressed to the concept design phase (shown in blue), with infrastructure delivery currently planned for the 2023 financial year. There is currently limited existing trunk capacity in the South Creek West precinct.

The plan indicates that trunk infrastructure will service initial development within the Belmore Road Precinct and infrastructure is expected to be delivered by developers.

Figure 7 - Sydney Water Growth Servicing Plan - Sewer



4.3 Proposed Network

As discussed in Section 4.1 and shown in Figure 6, the Belmore Road Precinct contains three distinct sewer catchments. Catchment 1 drains via gravity to a future sewer pump station at Lowes Creek (known as SP1209). This pump station has an interim capacity of 4,000 dwellings until 2026. Sydney Water have indicated that SP1209 will be delivered in 2023/24. A trunk main would need to be constructed from the Belmore Road Precinct to SP1209, approximately 800m.

Sydney Water note that there is limited capacity within the West Camden sewer network and SP1209 can only service 4,000 dwellings via transfer to West Camden WRP until 2026. After 2026, flows from SP1209 will be transferred to the Upper South Creek AWRC via a dual pressure main. The AWRC will be located near the confluence of South Creek, Badgerys Creek and Kemps Creek, north of Elizabeth Drive.

Catchment 2 drains to the Bringelly Carrier, a dual pressure main which will transfer flows from SP1209 to the Upper South Creek AWRC. The development will drain to this carrier via a developer delivered lead-in main. The Bringelly Carrier will service areas to the north of the Belmore Road Precinct within the planned Aerotropolis Core Precinct.

Catchment 3 drains to the Bringelly North Carrier, located to the north of the Belmore Road Precinct. The Bringelly North Carrier will also service areas within the Aerotropolis Core Precinct.

Sydney Water have indicated that flows from SP1209 will be transferred to the Upper South Creek AWRC from 2026. It is unclear whether this will occur via the dual pressure main or via transfer to other infrastructure supporting the Aerotropolis Core Precinct (which could include the Bringelly North Carrier).

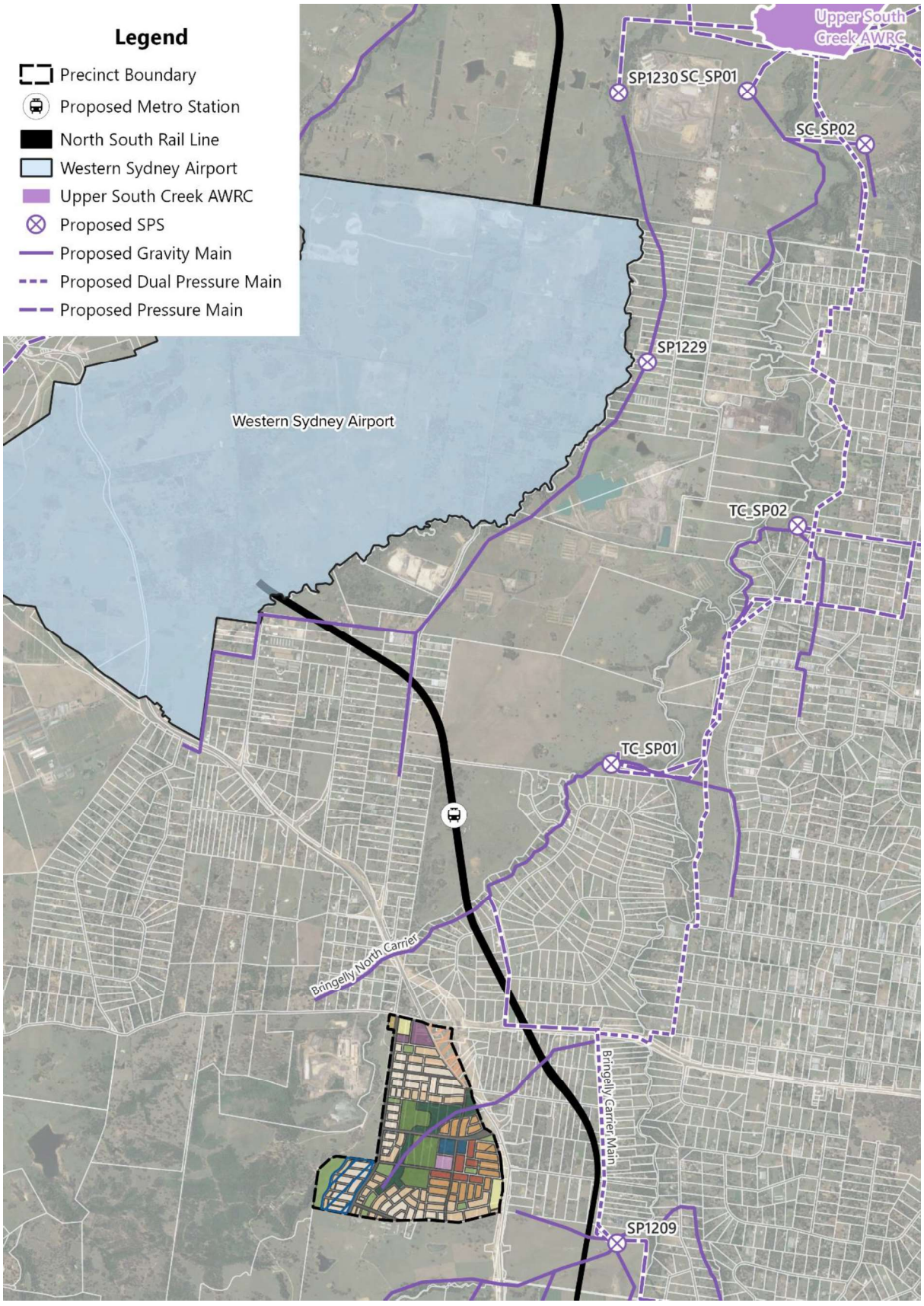
A summary of the trunk infrastructure servicing each catchment is provided in Table 3 and the regional sewer strategy is shown in Figure 8.

Table 3 - Sewer Catchment Data

Catchment No.	Size (Ha)	Carrier	SPS	Delivery Date
1	32.7	Local Feeder to SP1209	SPS1209	2023/24
2	132.8	Lead-In to Bringelly Carrier	N/A	2028*
3	25.1	Bringelly North Carrier	TC_SP01	2028*

*Dates to be confirmed by Sydney Water

Figure 8 - Regional Sewer Strategy



4.4 Servicing Strategy

As discussed in the Sections above, the Belmore Road Precinct falls into three sewer catchments which are serviced by different trunk infrastructure. We have undertaken a high-level analysis to determine the most efficient way to provide sewer infrastructure to the development.

Engagement with Sydney Water indicates that the infrastructure required to support Catchment 1 (SP1209 and associated lead-in main) will be delivered in conjunction with development.

Given the trunk sewer infrastructure for Catchments 2 and 3 are unlikely to be delivered prior to 2026, several interim servicing options have been explored that would enable development to progress ahead of the delivery of this infrastructure. These options include:

- Provision of pump stations to convey flows to SP1209 (and then to West Camden WWTP); or
- A decentralised system (either pre-package plant and truck waste via Interim Operating Procedure (IOP), or on-site irrigation) with alternative water discharge off-site until the Upper South Creek AWRC is operational.

These options are explored further in the following sections.

A high-level assessment of the required trunk sewer infrastructure was undertaken using the Sewage Supply Code of Australia (SSA). The load on the sewer network is expressed in Equivalent Population (EP). The EP for each land use were extracted from the SSA. For residential uses, EP is expressed as a rate per dwelling. For non-residential uses, EP is expressed as a rate per hectare of development (gross). The proposed land uses were split based on the catchments shown in Figure 6. The approximate total EP for each catchment was then calculated using the EP rates tabulated below.

Table 4 – Calculated Equivalent Population

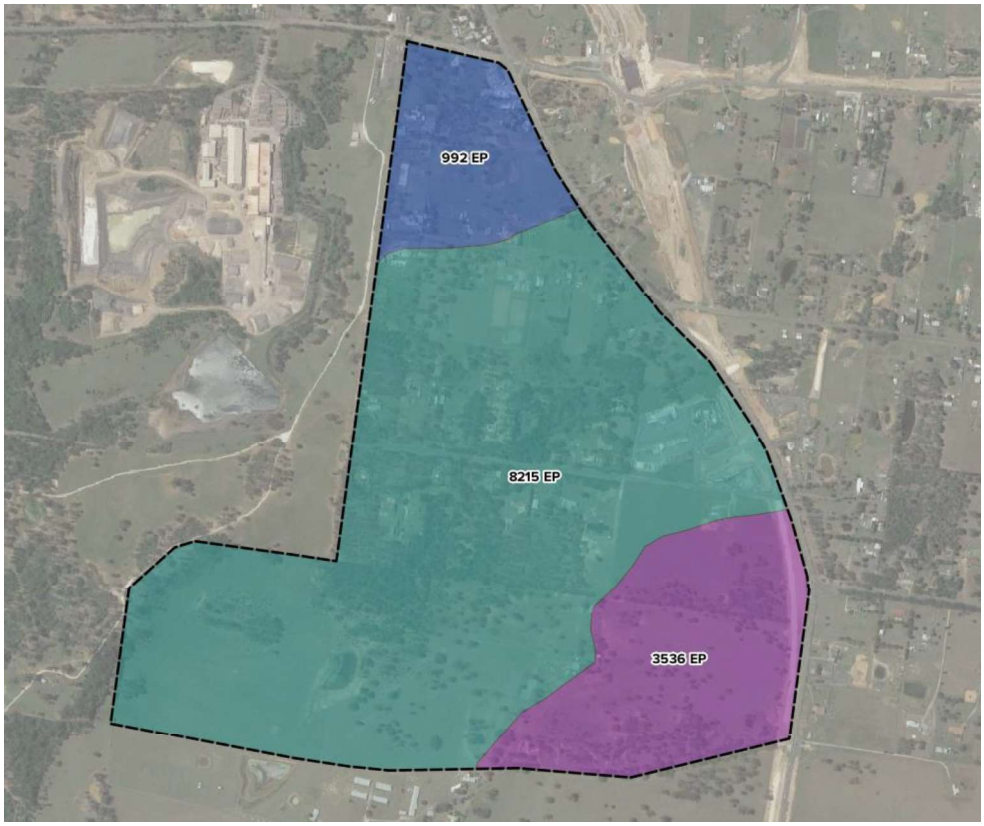
Land Use	EP Rate	Catchment 1	Catchment 2	Catchment 3	Total EP
Low Density Residential	3.5/dw	963	4,309	735	6,006
Medium Density Residential	3/dw	2,238	1,779	-	4,017
Town Centre Units	2.5/dw	-	543	-	543
Open Space	20/Ha	22	531	13	566
School	100	-	100	-	100
Employment & Retail	75/Ha	-	220	318	538
Total		**3,222**	**7,482**	**1,065**	**11,227**

Based on the above, a total equivalent population of 11,770 is expected within the Belmore Road Precinct.

Approximate trunk main sizing requirements have been estimated for each catchment based on the above EP values. Catchment 1 will require a 225mm main, Catchment 2 a 300/375mm main and Catchment 3 a 225mm main.

As discussed above, the sizing of the trunk carrier mains that will ultimately service the development are unknown at this stage. Given that these trunk mains will service a larger catchment including development outside the Belmore Road Precinct, it is likely these mains will be considerably larger than this.

Figure 9 – EP per Catchment



4.4.1 Option 1 – Connect to Bringelly & Bringelly North Carrier

Sydney Water have indicated that wastewater infrastructure to support the Aerotropolis Core Precinct will be delivered to align with the new Upper South Creek AWRC in 2026. This could include the Bringelly Carrier, Bringelly North Carrier and associated pump station to transfer flows to the Upper South Creek AWRC.

It is unclear whether Sydney Water will construct the full length of this carrier, or if it will be staged. However, if this infrastructure is delivered by 2026, Catchment 2 can drain to the Bringelly Carrier.

Given Catchment 3 is not expected to be delivered for a considerable period of time (likely around 2034), we would expect that the Bringelly North Carrier will be available to connect to at the time of development.

A high-level estimate of the costs associated with Option 1 are summarised in Table 5. It should be noted that the connection point for lead-in mains on the respective carrier mains are unknown and have been estimated for this assessment.

Table 5 – Sewer Option 1 Cost Estimate

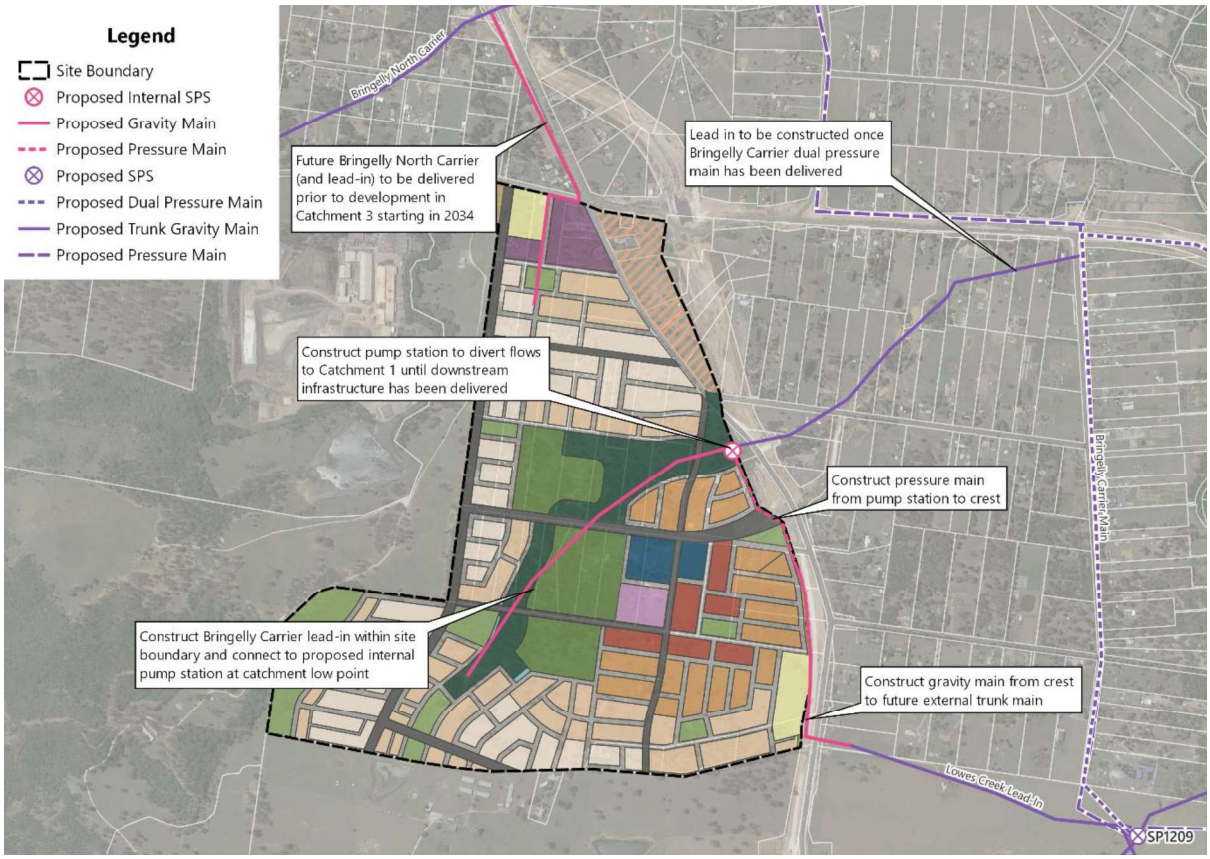
Item	Unit	Benchmark Rate	Quantity	Cost
New 300mm dia uPVC sewer gravity main servicing Catchment 2 and connecting to Bringelly Carrier	m	$500	2,500	$1,250,000
Underbore of Northern Road	item	$600,000	1	$600,000
New 225mm dia uPVC sewer gravity main servicing Catchment 3 and connecting to Bringelly North Carrier	m	$300	910	$273,000
			Approx. Total (excl contingency)	$2,123,000

4.4.2 Option 2 – Drain to SP1209 via Pump Station

In the event that Option 1 is not viable, we have explored the feasibility of draining Catchment 2 to the Lowes Creek Carrier. In order to connect to the Lowes Creek Carrier, pump stations would need to be constructed within the Belmore Road Precinct boundary at the low point in each catchment, as indicated on Figure 10. The pump stations would transfer flows to the low point in Catchment 1, where flows are drained via a gravity main to SP1209.

It is understood that flows from SP1209 will be transferred to the West Camden WWTP via SP1198 until downstream infrastructure connecting this pump station to the Upper South Creek AWRC has been delivered. It is unclear if SP1198 has been sized to accommodate development within the Belmore Road Precinct and further discussions with Sydney Water will be required should this option be progressed to confirm that sufficient capacity is available.

Figure 10 - Sewer Servicing Strategy - Option 2



A high-level estimate of the costs associated with Option 2 are summarised in Table 6 below.

Table 6 – Sewer Option 2 Cost Estimate

Item	Unit	Benchmark Rate	Quantity	Cost
New 225mm dia uPVC sewer gravity main servicing Catchment 3	m	$300	960	$339,000
New 300mm dia uPVC sewer gravity main servicing Catchment 2	m	$500	1,150	$575,000
New 250mm dia SCL sewer rising main from Catchment 2 SPS	m	$300	430	$129,000
New 375mm dia uPVC sewer gravity main	m	$650	720	$468,000
New Sewer Pump Station	Item	$1,500,000	1	$1,500,000
			Approx. Total (excl contingency)	$3,011,000

4.4.3 Option 3 – Interim On-Site Package Plant

An on-site packaged wastewater treatment plant run by either Sydney Water or a third party could also be utilised until the regional Sydney Water infrastructure is operational. Wastewater is collected from dwellings via reticulation sewer mains and is pumped to a local treatment and water recycling plant.

Biosolids from the plant could be recycled as fertilizer in the agribusiness precinct within the Aerotropolis, or other agricultural pursuits in the Sydney basin and recycled water disposed of on-site via above or below ground irrigation or other re-use scheme

A high-level analysis was undertaken on the potential land take of an above-ground sewer irrigation system. Using Sydney Water wastewater generation rates, assumed soil parameters and climate data from the Australian Bureau of Meteorology, calculations determined that an area approximately 70 hectares in size would be required to cater for the 8,152 EP in Catchment 2, and 9 hectares would be required for the 992 EP in Catchment 3.

Figure 11 shows a 13-hectare irrigation area. This would cater for approximately 1,500 EP, or 20% of Catchment 2. This option could provide a feasible interim servicing strategy for initial stages of development. However given the large land take required, it is unlikely that this option could support all development within Catchments 2 and 3. Please note that the irrigation area shown does not take into account environmental constraints such as offsets to riparian zones, boundaries, etc.

It should be noted that the required irrigation area is extremely sensitive to the soil type. Should this option be further progressed, we recommend that detailed on-site soil testing be conducted in accordance with AS1547 and to the satisfaction of Sydney Water.

As an alternative to irrigation, waste from the plant could be transported via truck to the nearest pump station to convey flows to the South Creek USCAWRC. An Interim Operating Procedure (IOP) would need to be entered into with Sydney Water for this arrangement. This option may prove more economical from a land efficiency perspective than an on-site irrigation system and can be pursued with Sydney Water as more detailed investigations are undertaken.

A high-level estimate of the costs associated with Option 3 are summarised in Figure 6 below. Please note the below packaged plant system is for approx. 500 dwellings.

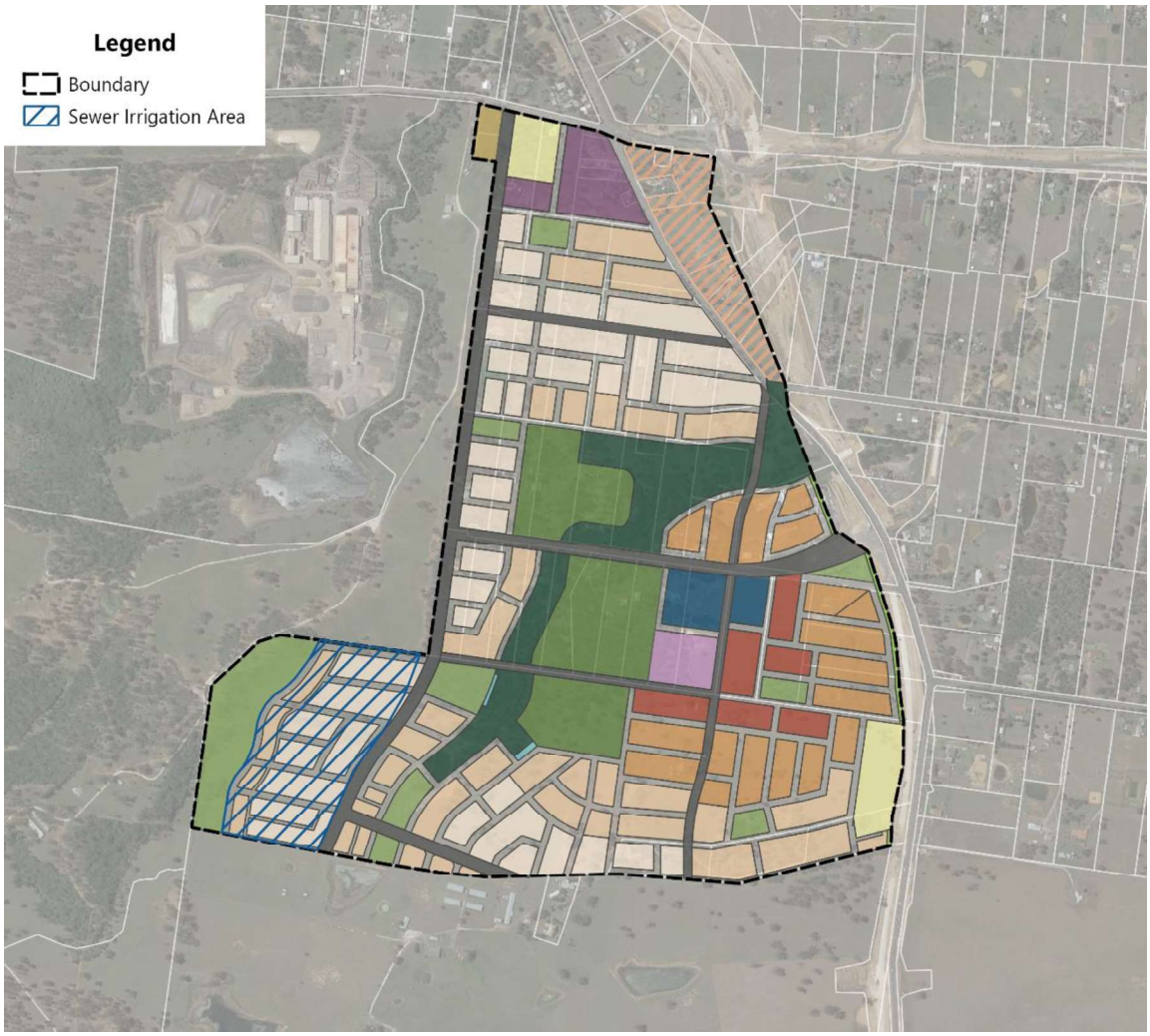
Table 7 – Sewer Option 3 Cost Estimate

Item	Unit	Benchmark Rate	Quantity	Cost
Package Plant*	Item	$4,500,000	1	$4,500,000
On-site above ground irrigation system**	Ha	$130,000	12.5	$1,690,000
			Approx. Total (excl contingency)	$6,690,000

* Cost based on information from *Aquacell* for a blackwater recycling plant. Packaged plant is sized for 500 dwellings.

** Cost based on a benchmarked rate of $130k/Ha

Figure 11 - Approximate Irrigation Area for 500 lots



4.5 Staging

We have prepared a high-level staging plan based on the above sewer servicing options. The staging plan assumes 300 lots are delivered each year, starting in 2025.

Based on our discussions with Sydney Water, we have assumed Catchment 1 is developed first as the trunk infrastructure will likely be available for connection at SP1209. In this scenario, it has been assumed the trunk infrastructure for Catchment 2 will not yet be delivered when development commences, and the temporary infrastructure outlined in Option 2 would therefore be required. It has been assumed that trunk infrastructure to support Catchment 3 will be available in time for development (approximately 2034).

A summary of the staging plan is provided in Table 8.

Table 8 - Staging

Stage	Year	Catchment	Dwellings	Dwellings Total	Key Infrastructure
1	2025	1	300	300	SP1209 & Lead-In Main
2	2026	1	300	600	
3	2027	1	300	900	
4	2028	1/2	300 (121 in Catchment 1, 179 in Catchment 2)	1,200	Developer lead-in and temporary SPS
5	2029	2	300	1,500	
6	2030	2	300	1,800	
7	2031	2	300	2,100	
8	2032	2	300	2,400	
9	2033	2	300	2,700	
10	2034	2	300	3,000	
11	2035	2	300 (62 in Catchment 2, 210 in Catchment 3)	3,272	Lead-in to Bringelly North Carrier

4.6 Feasibility Application

A feasibility application has been lodged with Sydney Water to determine the servicing requirements for the site. The associated case number is 200326. This application is currently being assessed and should the strategy outlined by Sydney Water differ from the above, this report will be updated to reflect any change in advice.

5 Electricity

5.1 Existing Network

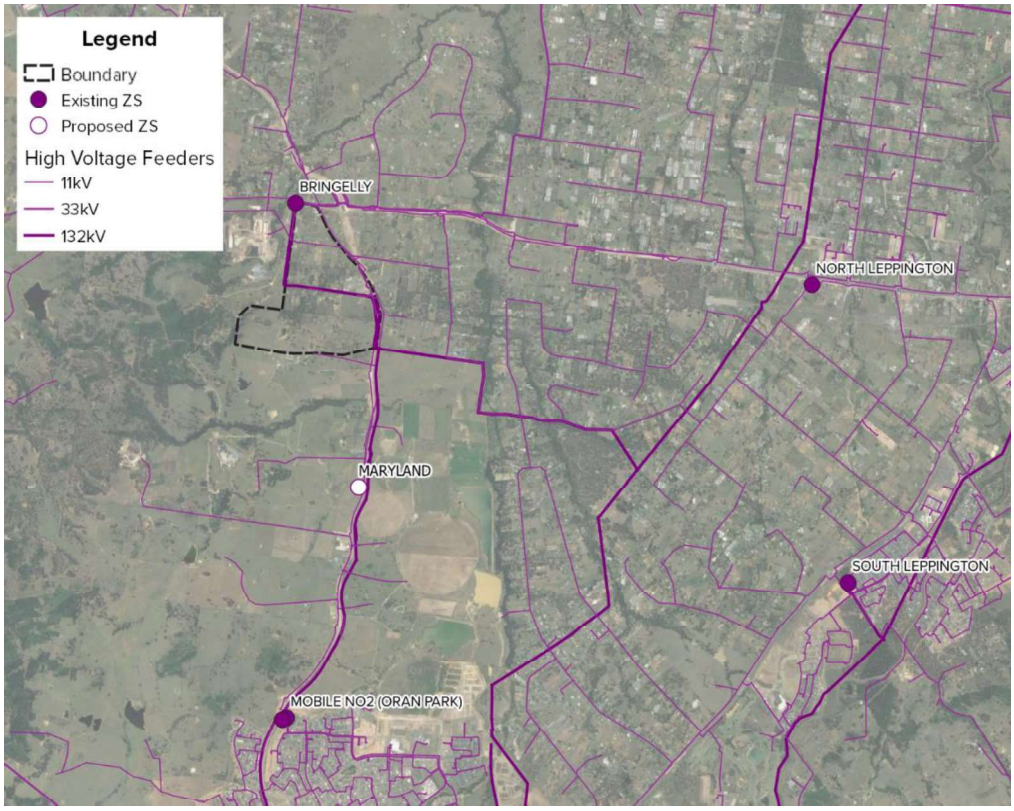
The Belmore Road Precinct is located within the Endeavour Energy (EE) electrical supply zone. The Bringelly Zone Substation (ZS) is located adjacent the north west corner of the Belmore Road Precinct boundary. Endeavour Energy have indicated that there is limited available capacity in this zone substation to support additional growth. EE estimate that two existing 11kV distribution feeders from this ZS have capacity for 795 additional dwellings.

Existing substations are also located at North Leppington, on Bringelly Road at Eastwood Road, and at Oran Park, located on The Northern Road near Dick Johnson Drive.

EE are planning for two new ZS within the vicinity of the precinct. The Bradfield City ZS will be located within the Aerotropolis Core precinct and support growth in this area. The Maryland ZS will be located on the western side of The Northern Road, approximately 2km south of the precinct. This ZS is flagged for delivery in 2027.

The Belmore Road Precinct is bisected by twin 132kV overhead Sub-Transmission Lines. These Sub-Transmission Lines have an associated easement width of 30m.

Figure 12 - Existing High Voltage Electrical Network



5.2 Endeavour Energy Growth Servicing Plan

Endeavour Energy released a Growth Servicing Plan in 2018 which outlines the servicing strategy to support planned growth across Greater Sydney. Over the next four years Endeavour Energy will invest $52 million on growth projects in the South West Growth Area to ensure connection capacity is available for new developments.

This includes a new substation at Maryland which will support development in the Lowes Creek Maryland and South Creek West precincts. It is anticipated that 11,000 lots will be delivered which will generate an ultimate load of 44MVA. Initial development in the area will be supplied by the Oran Park and Bringelly ZS before the delivery of the new ZS.

A new substation will also be provided within the Aerotropolis Core on Badgerys Creek Road. This substation is expected to be delivered after 2025.

5.3 Proposed Network

Endeavour Energy have assessed the proposed development and determined a combined forecast load of 16MVA (see Appendix A – noting there has been a reduction in dwellings since this advice was provided). The results are tabulated below.

Table 9 – Endeavour Energy Demand Forecast

Land Use	Dwellings	ADMD per Dwelling (kVA)	Forecast Load (kVA)	Forecast Load (MVA)
Low Density	1,716	5,4	9,266	9.3
Medium Density	1,339	4,5	6,025	6.0
High Density	716	3,3	716	0.7
Total			**16,008**	**16.0**

Based on the assumption that a single 11kV HV feeder can supply approximately 4.5MVA, the proposed development would require four 11kV feeders over time.

IDC have engaged with Endeavour Energy to determine a servicing strategy to suit the proposed development. As mentioned above, EE advised that there are two existing 11kV distribution feeders from Bringelly ZS located along The Northern Road which have capacity for approximately 795 dwellings based on an average ADMD of 4.4kVA per dwelling across the three tabled categories of land use. New distribution feeders would be required to be developed to service dwelling numbers exceeding 795 dwellings.

EE is currently undertaking interim augmentation measures at the Bringelly ZS to provide three additional connection points for new distribution feeders. These connection points will service:

1. Early Aerotropolis development
2. Metro construction supply
3. Spare connection for other development

The development could utilise the spare connection if not taken by other developments including Agribusiness sites or Sydney Water infrastructure requirements. It should be noted that spare capacity cannot be reserved for developments and connection applications are assessed as they are received.

Alternative servicing options include extending distribution feeders from the North Leppington ZS or the Oran Park ZS in the interim period before a committed investment to either establish the Bradfield City ZS or augmentation of the Bringelly ZS (or a combination of both). At this point in time, availability of a new Bradfield City ZS or augmentation of Bringelly ZS is envisaged to occur between 2025 – 2030.

Both options would result in a 22kV serviced distribution network with suitably located special distribution substations (similar to typical padmount substations seen in suburban streets) to transition between the new 22kV network and the existing 11kV network supplied from North Leppington and Oran Park ZS. This could be located along the southern and eastern boundaries of the development where it interfaces with the Lowes Creek Maryland Precinct. A new underground 22kV distribution network would be required to support this.

EE is in the process of confirming the establishment of the Aerotropolis 132kV "foundation supply" feeder. This feeder would extend from the South Erskine Park ZS to the Bringelly ZS following Luddenham Road, Adams Road and the Northern Road. This feeder will provide transmission capacity within the Aerotropolis area. Key load centres such as the Sydney Science Park, Western Sydney Airport and the Aerotropolis Core will then connect to this 132kV transmission artery via new zone substations.

As part of this project, Bringelly ZS will have its existing 132kV busbar extended, making it suitable for subsequent augmentation and provision of 22kV output capacity of the substation.

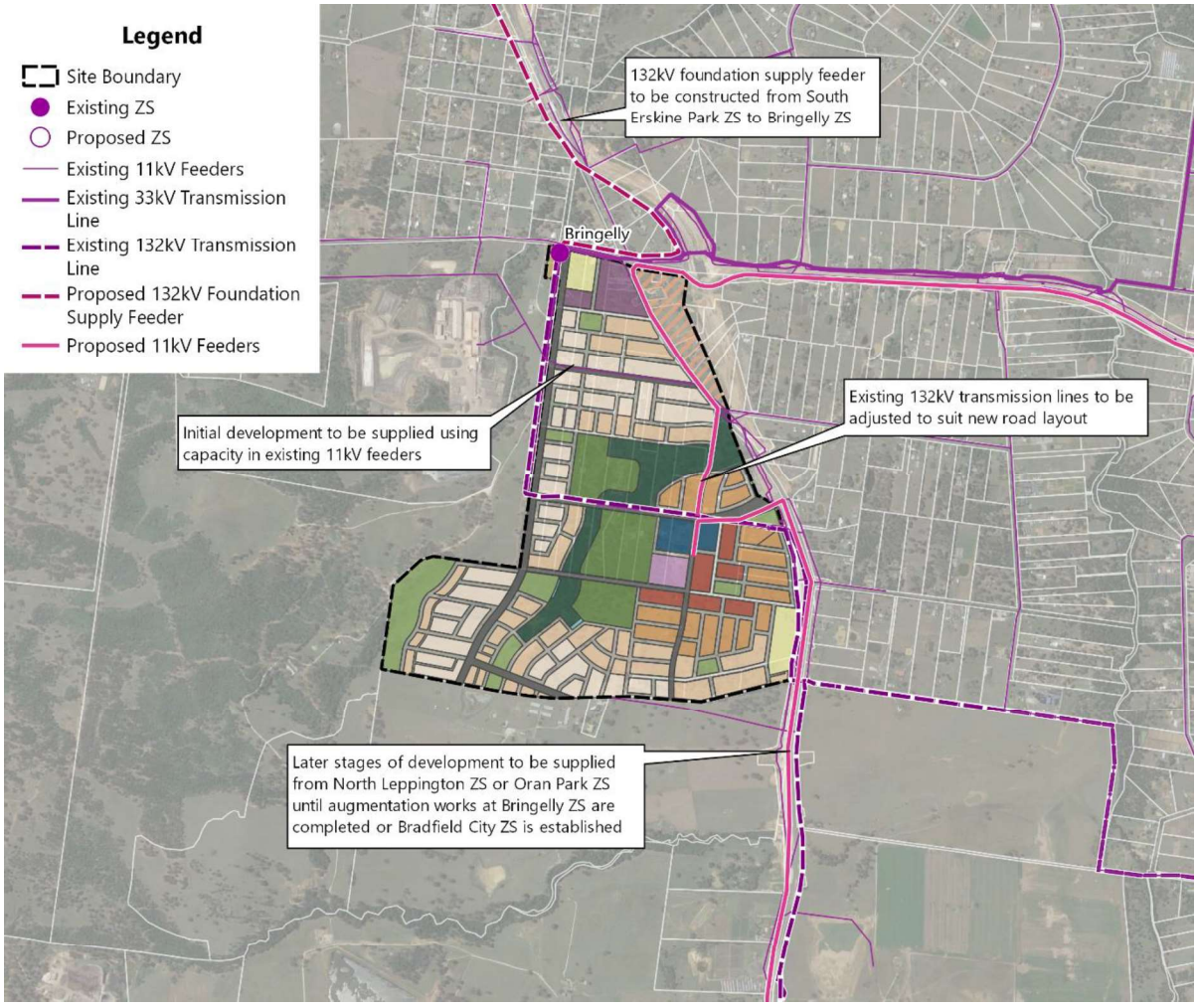
Endeavour Energy's servicing strategy for the site is provided in Appendix A.

5.4 Servicing Strategy

Existing high voltage feeders within the Belmore Road Precinct boundary will be decommissioned or, where required, relocated underground as new roads are constructed to ensure service to adjacent properties is maintained.

As discussed above, initial development may be serviced by leveraging any available capacity in existing high voltage feeders from Bringelly ZS as advised by Endeavour Energy. Subsequent stages of development will be supplied by constructing new high voltage feeders from the Oran Park or North Leppington substations within the standard shared trench allocation in the road reserve. The electrical servicing strategy for the Belmore Road Precinct is shown in Figure 13.

Figure 13 – Electrical Servicing Strategy



6 Telecommunications

6.1 NBN

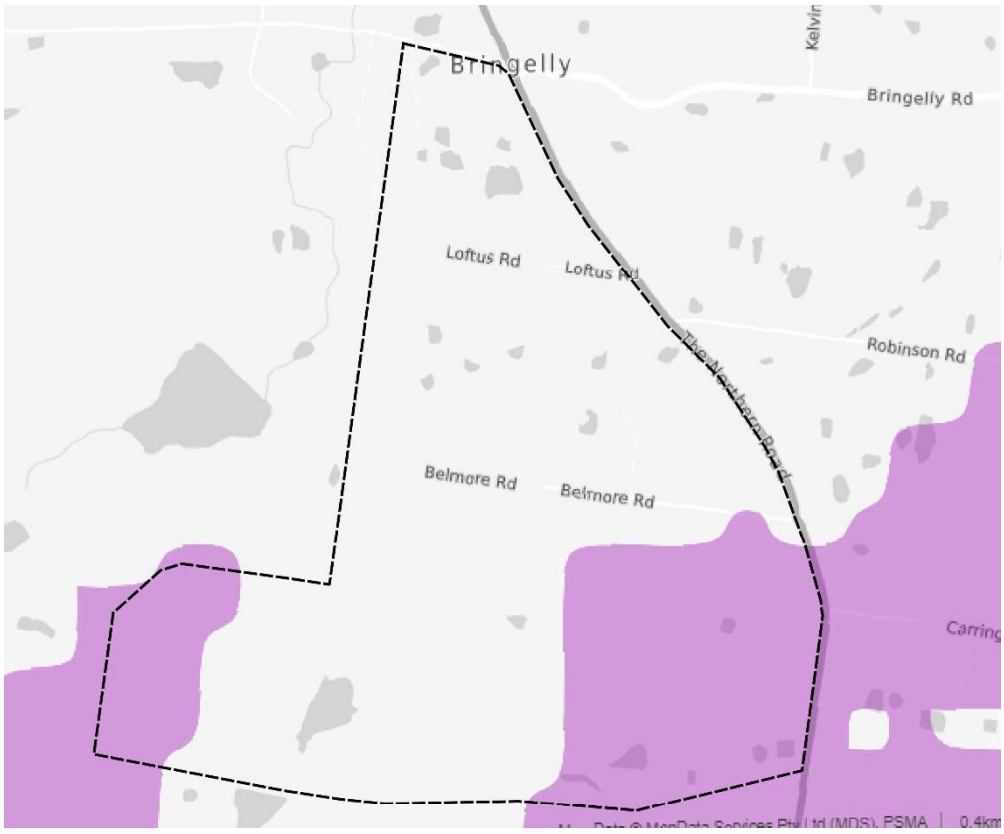
The Belmore Road Precinct will be serviced by NBN Co. fixed line connections. Fibre to the Kerb technology is currently available for the northern portion of the study area. The southern portion is covered by satellite connection, however it is expected that fixed line connections will be available in these areas as development progresses.

CKDI are currently engaging with NBN Co. to establish an agreement for servicing, however NBN Co. have confirmed that the proposed development is located within the fibre footprint and therefore qualifies to receive fibre infrastructure. Confirmation is provided in Appendix A.

6.2 5G Network

Rollout of Telstra's 5G network has commenced across western Sydney. Parts of the Belmore Road Precinct can already access 5G coverage, in the south east and south west corners. Figure 14 shows the existing 5G network coverage in purple. Future infrastructure rollout across the South West Growth Area and Western Sydney Aerotropolis will be staged to match the pace of development. It is expected that 5G network coverage will extend across the whole Precinct over the coming years.

Figure 14 – Existing Telstra 5G Coverage



7 Conclusion

7.1 Water

The Belmore Road Precinct will be supplied potable water by the Oran Park reservoirs and associated trunk mains located along The Northern Road. Reservoir construction is expected to be completed in 2022.

New water mains will be constructed within the standard shared trench allocation in the reserve of all new roads within the Belmore Road Precinct boundary. For trunk supply, a 300mm ring main will be constructed along the key collector roads within the Belmore Road Precinct, with smaller reticulation mains constructed along local roads to supply dwellings. It is understood that no potable water lead ins will be required.

7.2 Sewer

The Belmore Road Precinct contains three distinct sewer catchments as shown in Figure 6:

- Catchment 1 drains via gravity to a future sewer pump station at Lowes Creek (known as SP1209). A trunk main would need to be constructed from the Belmore Road Precinct to SP1209, approximately 800m. This pump station will transfer to the West Camden WWTP until downstream infrastructure connecting to the future Upper South Creek AWRC has been delivered. The Upper South Creek AWRC is expected to be operational by 2026.
- Catchment 2 drains to the Bringelly Carrier, a dual pressure main which will transfer flows from SP1209 to the Upper South Creek AWRC via a series of pump stations. The development will drain to this carrier via a developer delivered lead-in main.
- Catchment 3 drains to the Bringelly North Carrier, located to the north of the Belmore Road Precinct.

Sydney Water have indicated that flows from SP1209 will be transferred to the Upper South Creek AWRC from 2028. It is unclear whether this will occur via the dual pressure main or via transfer to other infrastructure supporting the Aerotropolis Core Precinct (which could include the Bringelly North Carrier).

Given the trunk sewer infrastructure for Catchments 2 and 3 are unlikely to be delivered for a considerable period of time, several interim servicing options have been explored that would enable development to progress ahead of the delivery of this infrastructure. These options include:

- Provision of pump stations to convey flows to SP1209 (and then to West Camden WWTP). This would be subject to further discussions with Sydney Water; or
- A decentralised system (either pre-package plant and truck waste via Interim Operating Procedure (IOP), or on-site irrigation) with alternative water discharge off-site until the Upper South Creek AWRC is operational. Alternatively, waste from the plant could be transported via truck to the nearest pump station to convey flows to the Upper South Creek AWRC. This option may prove more economical from a land efficiency perspective

than an on-site irrigation system and can be pursued with Sydney Water as more detailed investigations are undertaken.

7.3 Electricity

IDC have engaged with Endeavour Energy to determine a servicing strategy to suit the proposed development. EE have advised that there are two existing 11kV distribution feeders which have capacity for up to (approx.) 800 dwellings. New distribution feeders would be required to be developed to service dwelling numbers exceeding 800 dwellings.

EE is currently undertaking interim augmentation measures at the Bringelly ZS to provide three additional connection points for new distribution feeders. These connection points will service:

4. Early Aerotropolis development
5. Metro construction supply
6. Spare connection for other development

The development could utilise the spare connection if not taken by other development.

Alternative servicing options include extending distribution feeders from the North Leppington ZS or the Oran Park ZS in the interim period before a committed investment to either establish the Aerotropolis ZS or augmentation of the Bringelly ZS (or a combination of both). At this point in time, availability of a new Aerotropolis ZS or augmentation of Bringelly ZS is envisaged to occur between 2025 – 2030.

7.4 Telecommunications

The Belmore Road Precinct will be serviced by NBN Co. fixed line connections. Fibre to the kerb technology is currently available for the northern portion of the study area. The development qualifies for NBN Co fibre technology, which is expected to be rolled out throughout the precinct.

Rollout of Telstra's 5G network has commenced across western Sydney. Parts of the Belmore Road Precinct can already access 5G coverage, in the south east and south west corners. It is expected that 5G network coverage will extend across the whole Precinct over the coming years.

Appendix A – Service Authority Correspondence

Meeting Minutes

Bringelly

Sydney Water Meeting

Date	**24 July 2020**		
Time	1:00pm –2:00pm		
Location	Microsoft Teams Meeting		
Attendees	**Company**	**Name**	**Initials**
	Sydney Water	Julie Horne	JH
	Sydney Water	Nathan Rafidi	NR
	IDC	Chris Avis	CA
	IDC	Rachel Higgisson	RH

Item	Discussion
1	**Welcome**
2	**Overview of Project & Scope** • Bringelly site will deliver approximately 4,000 dwellings • Half of the site (southern portion) is owned by BHL • Target lodgment date for Planning Proposal is September 2020
3	**Servicing Strategy - Water** • Site to be serviced from the Oran Park Reservoir, expected to be delivered in mid-2022 • Trunk mains in The Northern Road have been delivered • Development site will connect to trunk mains in The Northern Road for supply

4	**Servicing Strategy - Sewer**
	• Site will ultimately be serviced by the South Creek WWTP expected to be delivered 2025/2026.
	• Sydney Water are looking to deliver trunk carrier mains and pumping stations to align with the delivery date of the WWTP.
	• Up to three pump stations may be required to transfer flows from the Bringelly Carrier to the new WWTP.
	• **Catchment 1 (Southern)**
	  ○ Site falls into three catchments, the southern catchment (Catchment 1) naturally drains to SP1209. This catchment includes approximately 1,000 lots.
	  ○ The current design for SP1209 includes capacity for 4,000 lots. These designs are being updated to allow for the construction of the ultimate design which will cater for approximately 70,000 lots.
	  ○ SP1209 will likely be delivered early 2023.
	  ○ SP1209 will transfer flows to the West Camden WWTP in the interim until the South Creek WWTP is operational.

Item	Discussion

	• **Catchment 3 (Northern)**
	  ○ Catchment 3 drains to the Bringelly North Carrier.
	  ○ Bringelly North Carrier delivery timing may align with 2025/26 timeline for Upper South Creek AWRC operation
	• **Catchment 2 (Central)**
	  ○ IDC to prepare servicing options and indicative staging for Catchment 2 which will include:
	  ▪ Drain via gravity to dual pressure main
	  ▪ Construct a small pump station within the site boundary to transfer flows to Catchment 1 and drain via gravity to SP1209
	  ▪ Construct small pump station within site boundary to transfer flows to Catchment 3
	  ▪ Construct an on-site packaged wastewater treatment plant and above-ground sewer irrigation system

5	**Next Steps & Program** • IDC to provide draft report to Sydney Water for comment and endorsement prior to PP lodgement.

Action	Description	Responsibility	Due
2	IDC to send draft report to Sydney Water when available	RH	31/7/20

Rachel Higgisson

Subject: RE: Bringelly Precinct

From: Joe Degabriele
Sent: Wednesday, 2 March 2022 9:49 AM
To: Rachel Higgisson
Cc: Chris Avis; Deepak Sahay; Matt Lee; Jason Lu
Subject: RE: Bringelly Precinct

Hello Rachel,

The advice we provided below has not changed which means at present up to 795 dwellings could be accommodated from existing feeders then a new feeder is required for another 1000 dwellings and so on. As mentioned Bringelly ZS will have only one spare 11kV feeder port available after our interim augmentation works.

Kind Regards,

Joe Degabriele
Capacity Planner - Asset Planning & Performance

51 Huntingwood Drive
Huntingwood NSW 2148

From: Rachel Higgisson
Sent: Tuesday, 22 February 2022 3:09 PM
To: Joe Degabriele
Cc: Chris Avis; Deepak Sahay; Matt Lee; Jason Lu
Subject: RE: Bringelly Precinct

Hi Joe,

Last year you assisted Chris and I with an electrical servicing strategy for a development site at Bringelly. The advice you provided is in the email thread below.

The client lodged the planning proposal for the site with Camden Council late last year, and received the attached RFI just before Christmas. Council have asked for written confirmation from the utility authorities that the strategies outlined in our report are sound and supported by the relevant authorities. I intend to include your advice in the below email as an appendix in the report, however given it has been 12 months I thought I should reach out to

confirm whether the below strategy is still current and appropriate. Can you please confirm whether there have been any changes to your network planning which would impact the advice provided? There have been no changes to the overall yield within the development site.

Thanks in advance for your help.

Kind regards,

infrastructure & development consulting
Rachel Higgisson
Civil Engineer

a Suite 414
410 Elizabeth St
Surry Hills NSW 2010

From: Joe Degabriele
Sent: Friday, 19 February 2021 3:30 PM
To: Jason Lu
Cc: Matt Lee
Subject: Bringelly Precinct

Hi Jason,

We have assessed the proposed development tabled below as having a combined forecast load of 18MVA.

Land Use	Density	Dwellings	Forecast Load kVA / MVA	ADMD kVA per dwelling
Low Density Residential	19 dw/ha	1,238	6,685 / 6.69	5.4
Medium Density Residential	35 dw/ha	1,634	7,353 / 7.35	4.5
High Density Residential	53 dw/ha	1,202	3,967 / 3.97	3.3
High Density Residential (village centre)	173 dw/ha	X	X	X
Total		**4,074**	**18,005 / 18.0**	

We previously advised that two existing 11kV distribution feeders from Bringelly Zone Substation heading south along The Northern Rd have capacity for up to 795 dwellings based on an average ADMD of 4.4kVA per dwelling across the three tabled categories of land use.

Based on the estimated production of 300 dwellings per year starting in 2024 and completing in 2036, this would equate to 3,600 dwellings *(4074 tabled)* in total within this period.

New distribution feeders would be required to be developed by the proponent to service dwelling numbers exceeding 795 dwellings. The capacity of one new distribution feeder can supply on average up to 1000 dwellings. Therefore the Bringelly Precinct ultimately requires the capacity of four (4) feeders at 11kV service voltage.

Endeavour Energy is in the process of carrying out interim augmentation measures at Bringelly Zone Substation to provide three additional connection points for new distribution feeders for (1) early Aerotropolis development, (2) Metro construction supply and (3) Spare.

BHL could utilise the No.3 spare if not taken by other development including Agribusiness or Sydney Water infrastructure requirements to supply the Bringelly Precinct.

Other avenues could be explored such as developing or extending distribution feeders from the North Leppington Zone Substation (located along Bringelly Rd at Eastwood Rd) or the Oran Park Zone Substation (located along The Northern Rd near Dick Johnson Dr) in the interim period leading up to a committed investment to either establish the Aerotropolis Zone Substation or Augmentation of Bringelly Zone Substation or a combination of both. At this point in time, availability of a new Aerotropolis and / or augmented Bringelly substation is envisaged to occur between 2025-2030.

Both these latter investment options would result in a 22kV serviced distribution network with suitably located special distribution substations (similar to typical URD padmount substations seen in suburban streets) to transition between new 22kV network supplied from the Aerotropolis and / or Bringelly zone substations and existing 11kV network supplied from North Leppington and Oran Park zone substations. This may be entertained to occur along the southern and eastern boundaries of the proposed Bringelly Precinct where it interfaces with the Lowes Creek – Maryland Precincts. With this in mind, new underground distribution network is required to be installed and rated for 22kV operation with the exception of padmount substation transformers which would be changed-out by Endeavour Energy upon conversion from 11kV operation to 22kV operation.

Endeavour Energy is in the process of committing to the establishment of the Aerotroplis 132kV *"foundation supply"* feeder to extend from our South Erskine Park Zone Substation to the Bringelly Zone Substation following Luddenham Rd, Adams Rd and The Northern Rd, which will provide capacity at a transmission network level into the Aerotropolis area. Key load centres such as the Sydney Science Park, Western Sydney Airport and the Aerotropolis Core will then connect to this 132kV transmission artery via aptly named zone substations.

As part of the Aerotropolis 132kV feeder project, Bringelly Zone Substation will have its 132kV busbar extended making it future ready for the subsequent augmentation and provision of 22kV output capacity of the substation.

We hope this provides an insight and some clarity into Endeavour Energy's servicing strategy.

Kind Regards,

Joe Degabriele
Capacity Planner – Asset Planning & Performance

Endeavour Energy

Monday 20th June 2022

Tank Tan
CKDI Bringelly Pty Ltd atf CKDI Bringelly Holding Trust
[redacted]

Dear Mr Tank Tan,

Thank you for your application requesting the installation of fibre infrastructure at **Belmore Road Precinct, Bringelly NSW**

We are pleased to confirm that this development is within our fibre footprint, and to that extent, your development qualifies to receive NBN Co fibre.

Once **CKDI Bringelly Pty Ltd atf CKDI Bringelly Holding Trust** has concluded an agreement with NBN Co on NBN Co's terms and conditions (including in relation to the construction of pit and pipe or pathway infrastructure at the development), then provided you comply with the terms and conditions of that agreement, NBN Co will agree to procure the installation of fibre infrastructure at the development.

If you need verification that you have requested broadband infrastructure from NBN Co to get council approval, please use this certificate.

Yours sincerely,

nbn – New Developments Team