MOTT MACDONALD

NSW Planning & Environment

Leppington Town Centre

Utilities Assessment

September 2022

NSW Department of Planning & Environment

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Executive Summary

Leppington Town Centre is a 440 hectare precinct located in Sydney's South West Growth Area and extends across the Camden and Liverpool Local Government Areas (LGAs). In 2013 the precinct was rezoned for urban purposes. Current zoning permits a range of urban land uses including business, industrial, mixed use, residential and open space make up current town centre.

In March 2018 the Greater Sydney Commission (GSC) released the Greater Sydney Region Plan, which identified Leppington Town Centre as a Strategic Centre. This triggered a review of the existing land use, leading to the drafting of a planning proposal to rezone the precinct for high-density commercial and residential uses, consistent with its designation as a Strategic Centre.

Purpose of the Report

The purpose of this report is to assess existing trunk servicing infrastructure in the precinct and outline requirements for new trunk infrastructure to service the proposed growth of Leppington Town Centre.

The report:

- makes use of publicly available growth servicing plans published by the relevant authorities to calculate "per dwelling" and "per square metre" service loads;
- provides a conceptual infrastructure servicing strategy to cater for new demand; and
- relies on information provided by Sydney Water in May 2022, specifying existing sewer and potable water capacity for the precinct.

The findings of the report are organised into five areas: Potable Water, Sewer, Electricity, Telecommunications and Gas.

Potable water

Written advice received from Sydney Water in May 2022 indicates that potable water is supplied via the Leppington and Raby Water Supply Zones (WSZs). Amplifications are required to the networks within both WSZs to service the proposed 10,500 dwellings by 2041.

Hydraulic modelling work to identify the required amplifications and timeframes is in progress and scheduled for completion in October 2022. Until these amplifications are delivered, the system capacity is forecast at approximately 1,000 dwellings or equivalent dwelling/employment mix.

Developer led amplifications (e.g larger pipes and pressure boosters) may provide options to support additional capacity while the WSZ works occur.

Sewer

The Leppington Town Centre precinct is divided into three catchments for the purposes of sewer connection, as depicted in Figure 1 (provided by Sydney Water).

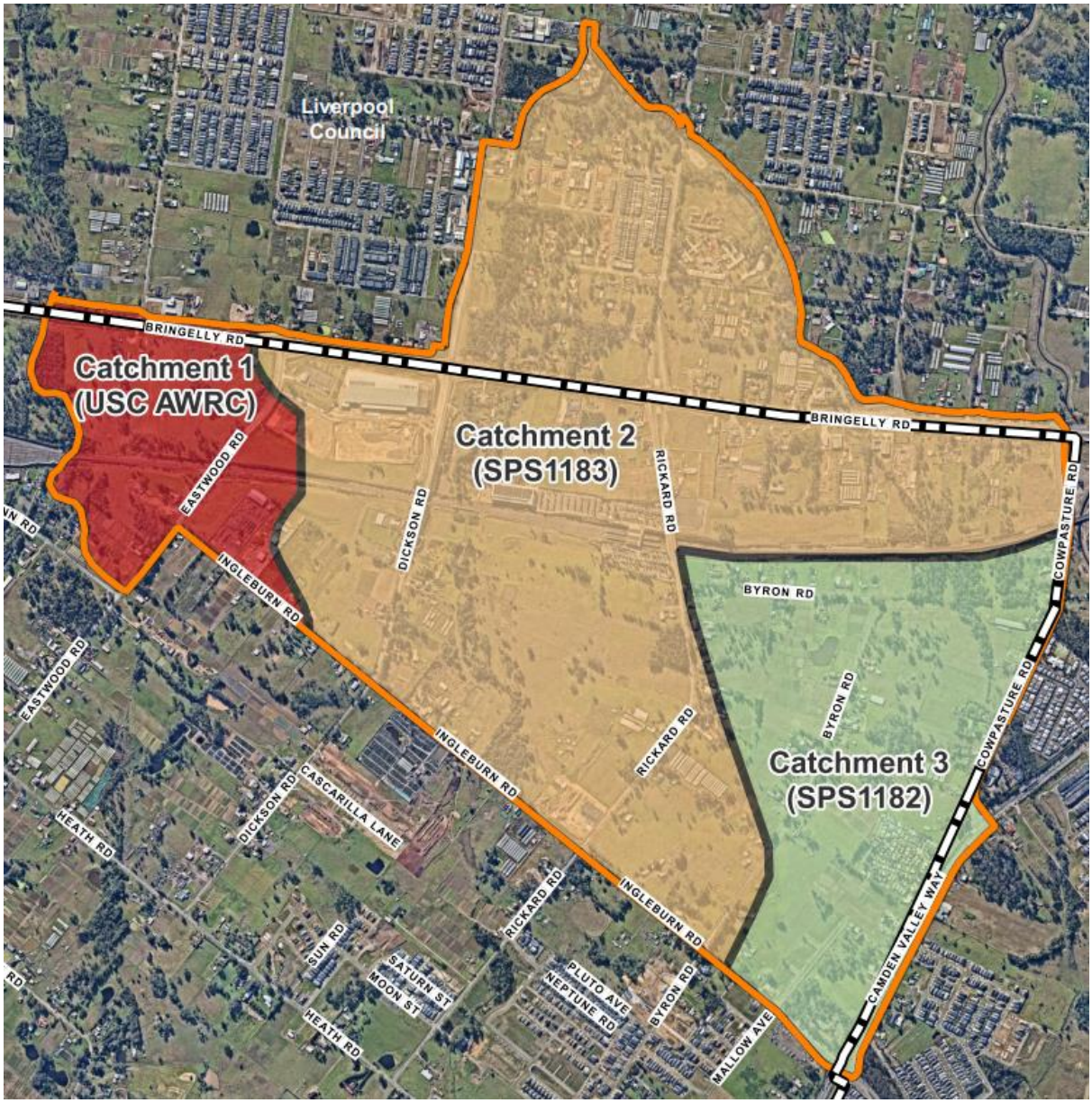
Sydney Water has reported that access to sewer connections will be constrained until 2026, as follows:

- *Catchment 1 - Eastern Front Catchment to be serviced by Sydney Water's Upper South Creek Advanced Water Recycling Centre (USC AWRC)*
  Wastewater services will not be available in Catchment 1 until the USC AWRC facility and associated trunk infrastructure are operational. This is anticipated to occur by mid-2025. Developments with earlier timeframes may investigate other interim options for earlier wastewater services.

- *Catchment 2 – Serviced by sewer pump station SPS1183*
  Currently transfers to the Liverpool treatment plant, however the SPS1183 catchment will ultimately be serviced by USC AWRC in mid-2025. Sydney Water is confident that the forecast growth of up to 748 dwellings and 944 jobs to 2025 can be serviced in this catchment.

- *Catchment 3 —Serviced by sewer pump station SPS1182*
  SPS1182 is connected to the Liverpool wastewater treatment facility. Sydney Water indicates that sewer capacity provided to Catchment 3 can support the forecasted growth up to 2026 and into the future.

Figure 1: Wastewater catchments across Leppington Town Centre



Electricity

This document was prepared in the absence of recent electricity assets data and is therefore considered a ‘worst-case’ scenario.

There is minimal trunk electrical infrastructure located within the study area. A 132 kV and a 330 kV transmission line are located approximately 1.6 km west of the Leppington train station. There are several existing Zone Substations (ZSs) in the vicinity of the study area.

The closest is the South Leppington ZS, located approximately 3.2km South of the train station. This substation is connected to the surrounding substations and bulk supply points via a series of transmission lines.

The Denham Court Transmission Substation is located approximately 2.9km East of the train station and is situated adjacent the rail line. The Prestons ZS is located on the Northern side of Camden Valley Way, approximately 5km from the station.

Endeavour Energy's latest advice was that the North Leppington ZS is currently under construction. The substation will be constructed in stages, with Stage 1 due for completion in June 2019 (Endeavour Energy is yet to confirm if this is on schedule). This stage will include two 45 MVA transformers yielding a firm capacity of 45 MVA.

Endeavour Energy have indicated that the substation could be augmented at a later date to include an additional 45 MVA transformer (increasing the available firm capacity to 90 MVA) and three 11kV switchboards should it be required to meet future demands.

After augmentation, the North Leppington ZS will have sufficient capacity to support development for a large proportion of the Precinct, however additional yield to support the full demand of the developed Precinct will be reliant on shedding power to neighbouring zone substations to address the long term shortfall.

Telecommunications

The NBN currently provides telecommunications servicing to the study area. Fibre optic assets are challenging and costly to relocate, therefore relocation should be avoided where possible. The existing Telstra network is shown in **Figure 30** of this report. Developers will be expected to provide pit and pipe infrastructure, and any other required infrastructure within the site boundary. This includes providing ducts for any new roads.

Gas

Jemena concluded that the precinct would be adequately serviced by gas given its proximity to existing and proposed infrastructure.

There is currently a primary gas main running along Bringelly Road, and this will be the key feeder for the Leppington Town Centre. Secondary and reticulation gas mains will be provided from the primary main. Jemena have indicated that a new trunk main is also proposed for Ingleburn Road and delivery is expected between 2026-2030, this will increase the precinct's gas connectivity.

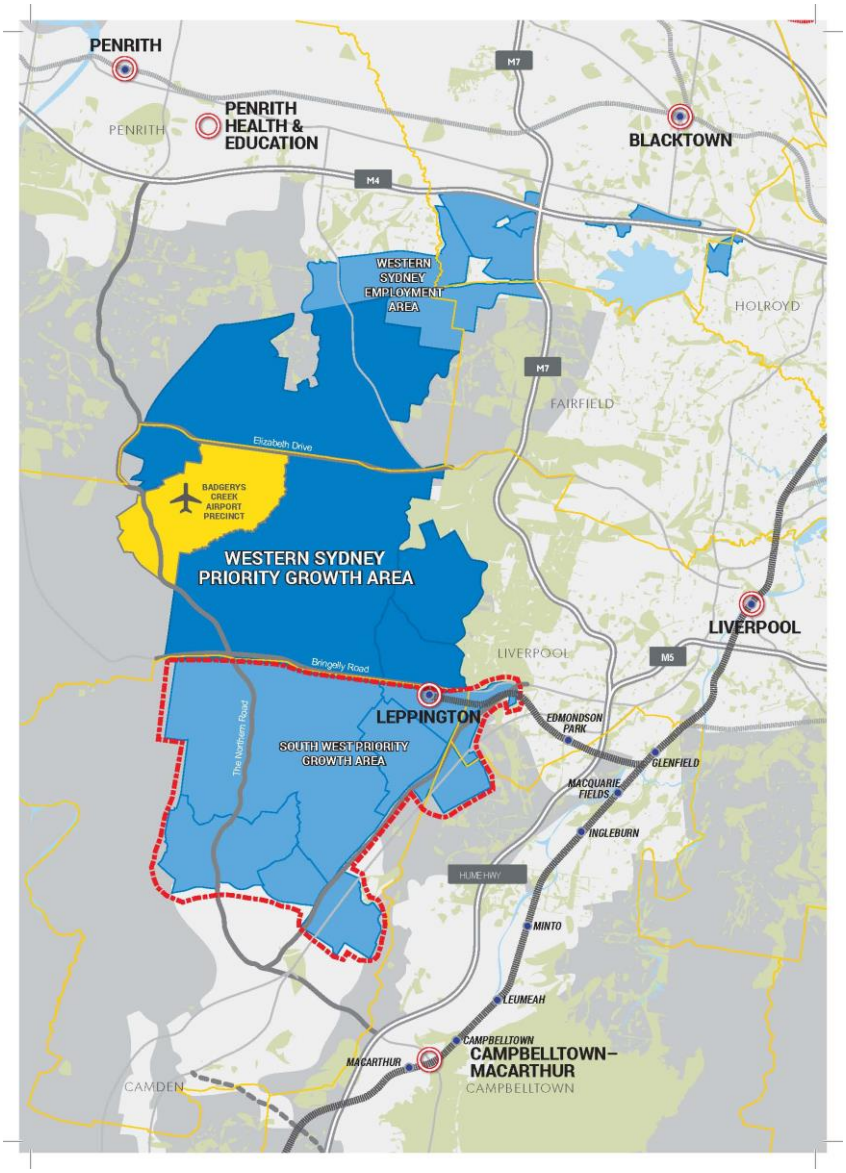
1. Introduction

1.1 Regional Context

Leppington is located approximately 40 kilometres South-West of the Sydney CBD and is located within the Camden and Liverpool Local Government Areas (LGA). Leppington Town Centre (LTC) forms part of the South West Growth Area (SWGA) which covers an area of approximately 10,000 ha and includes the suburbs of Leppington, Oran Park, Turner Road, East Leppington, Austral & Leppington North, Edmondson Park, Catherine Fields and South Creek West.

The SWGA is located adjacent the Western Sydney Airport Growth Area (WSAGA), as shown in **Figure 2**. The WSAGA consists of approximately 11,000 ha of rural land, including the proposed Badgerys Creek Airport site which will be rezoned for a mix of proposed land uses.

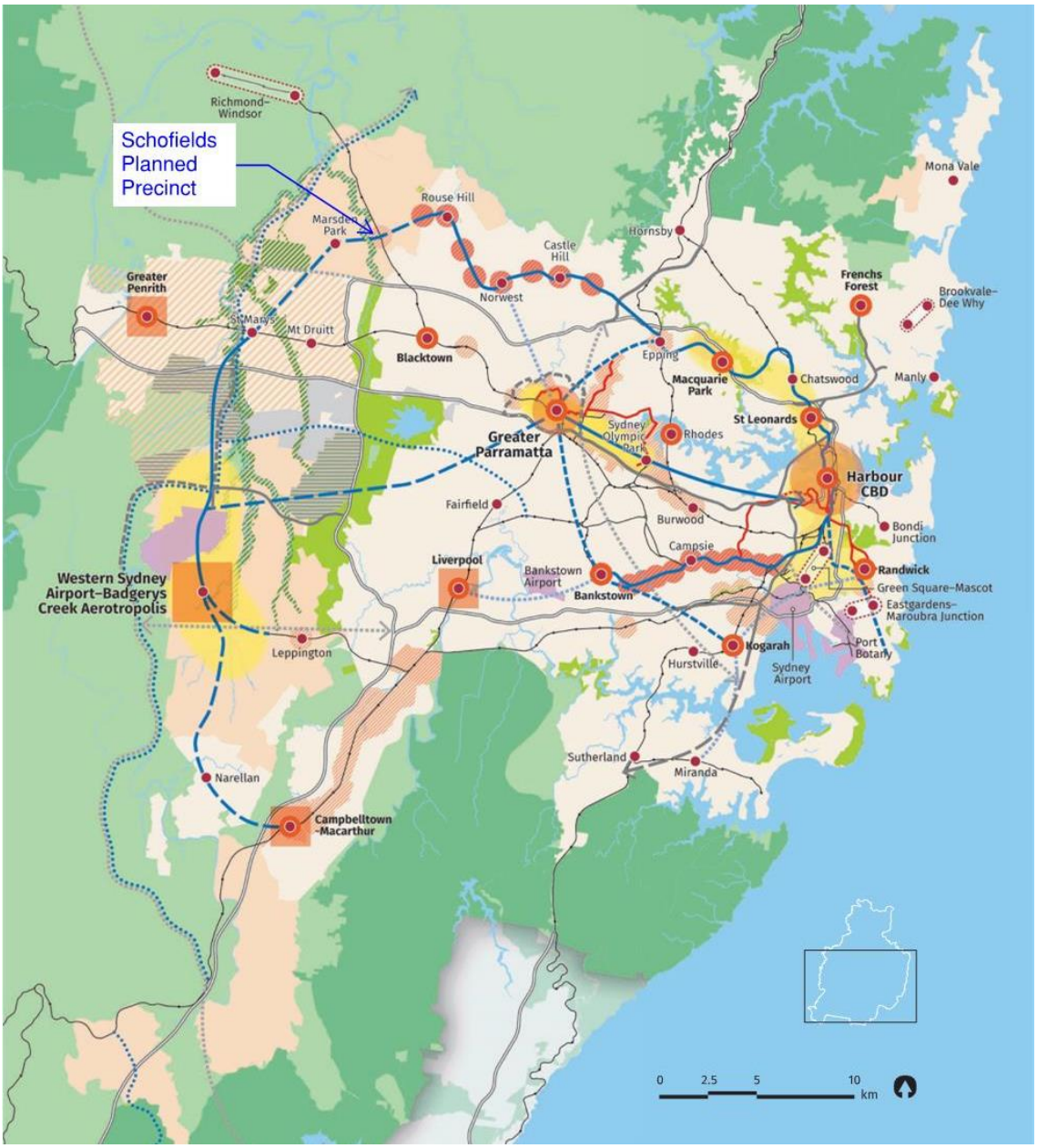
Figure 2: South West Growth Area



Source: NSW Department of Planning & Environment (2017)

In March 2018 the Greater Sydney Commission (GSC) released the *Greater Sydney Region Plan* (refer **Figure 3**), which identified Leppington Town Centre as a Strategic Centre. These centres are identified in the plan as priorities for job creation and play a key role in achieving the 30-minute city concept, where residents can access jobs, shops, and services within 30-minutes by public transport.

Figure 3: Greater Sydney Region Plan



Source: Greater Sydney Region Plan – A Metropolis of Three Cities – Greater Sydney Commission (2018)

1.2 Leppington Town Centre

The Leppington Town Centre is centered over the Leppington Train Station, which is on the on the T2 Airport, Inner West, and South train lines. Bringelly Road is located approximately 400m North of the station and runs parallel to the rail line.

1.2.1 Initial Rezoning

The Precinct comprises of the area formerly located within the Austral & Leppington North Precincts and adjacent the Leppington Precinct. These Precincts were rezoned in 2013. Following the rezoning, a range of land uses including business, industrial, mixed use, residential and open space make up current town centre.

1.2.2 Future Zoning (Purpose of this Study)

Since 2013, the strategic function of the Leppington Town Centre has been reassessed in relation to the whole of the SWGA. The Precinct will no longer act as the major business centre of the region, instead this area will operate as a predominantly mixed-use residential centre hub. Unlike the neighbouring growth centres in the South West Growth Area, such as Oran Park and Edmondson Park, LTC has been very slow to develop to date. There are several reasons contributing to this, including fragmentation of land ownership and the lack of a lead developer to establish a town centre with a range of retail services and amenity. Other factors include development uncertainty and project feasibility relating to land value expectations and development standards.

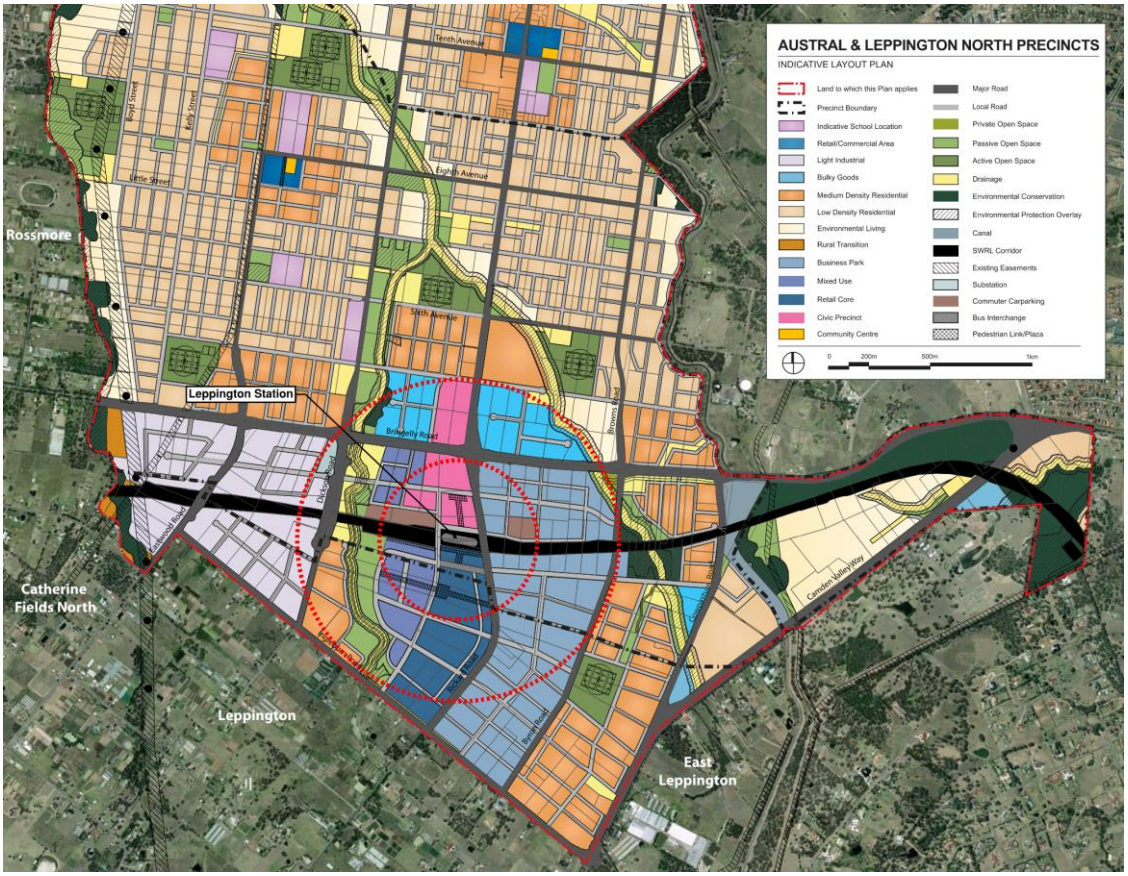
1.3 Adjacent Precincts

1.3.1 Austral & Leppington North Precinct

In 2013 the Austral and Leppington North Precincts were rezoned to provide 17,350 new homes, a major centre, three neighbourhood centres, 220 ha of employment land, 135 ha of open space and recreational areas as well as new primary and high schools.

The South West Rail Link was delivered in 2015 and included a station at Leppington. The employment lands are primarily located around the station, with residential land uses to the North and East. The Indicative Layout Plan (ILP) for Austral and Leppington North Precinct is shown in **Figure 4** below.

Figure 4: Austral & Leppington North ILP



Source: NSW Department of Planning & Environment (2013)

1.3.2 Leppington Precinct

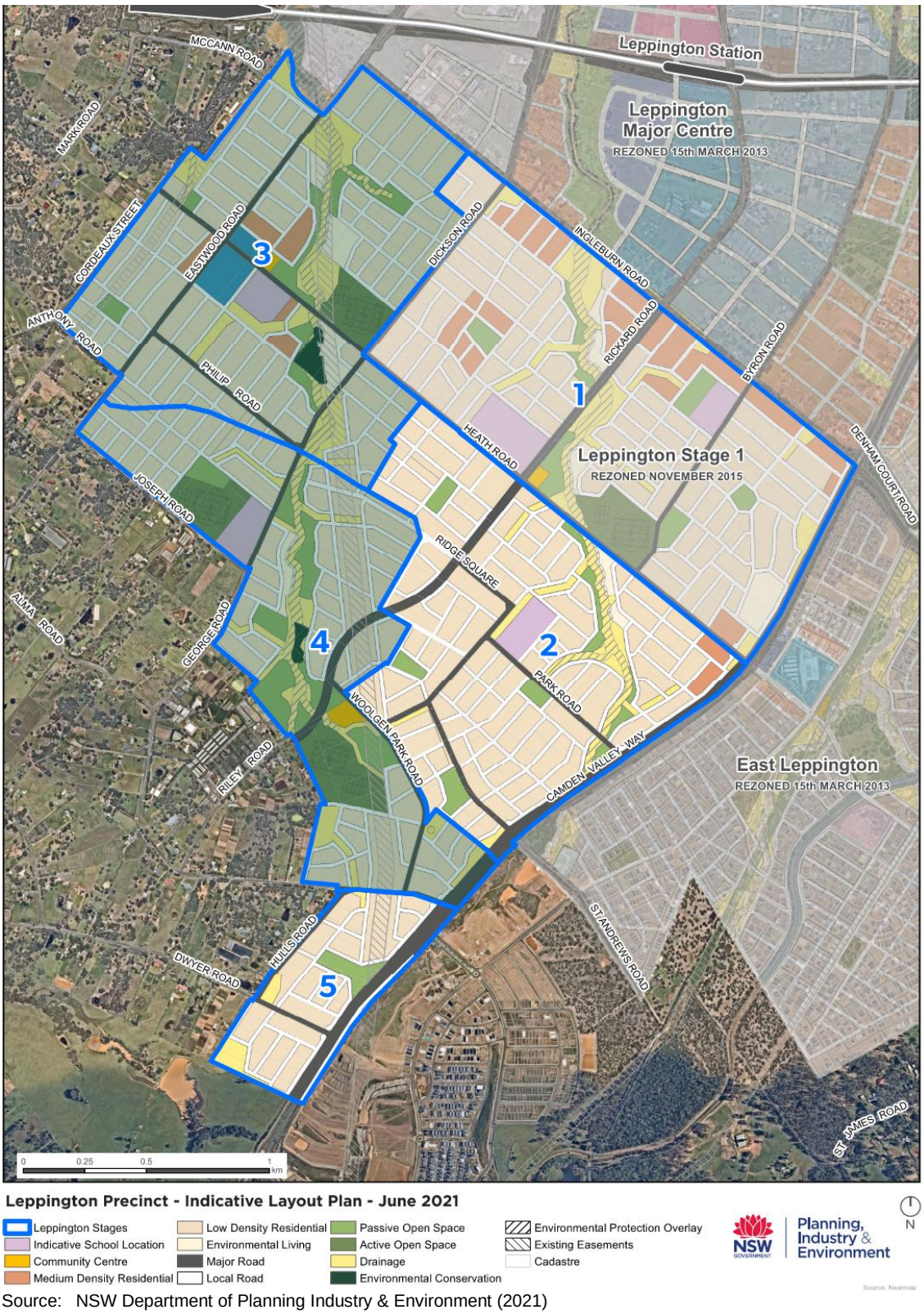
The Leppington Precinct consists of the area bordered by Ingleburn Road to the North, Camden Valley Way to the East, Cordeaux Street to the West and various roads to the South. The new land uses will provide 7,190 dwellings, a local centre and five new schools.

The Precinct was divided into five stages due to infrastructure constraints. As it was unknown when water, sewer and electrical infrastructure would be available for the entire Precinct, only Stage 1 was rezoned in November 2015. Stage 1 will create 2,500 new homes, a new primary and K-12 school, sports fields, and recreational land.

Leppington Stage 2 and 5 were rezoned in July 2021. Both stages combined will enable up to 2,400 new homes, land for a new school, 8.32 ha of open space, 7.6 ha for Leppington Park, and 23.18 ha of

land to be set aside for other infrastructure purposes yet to be announced. The ILP for Leppington Stage 2 & 5 is shown on **Figure 5** below.

Figure 5: Leppington Stage 2 & 5 ILP

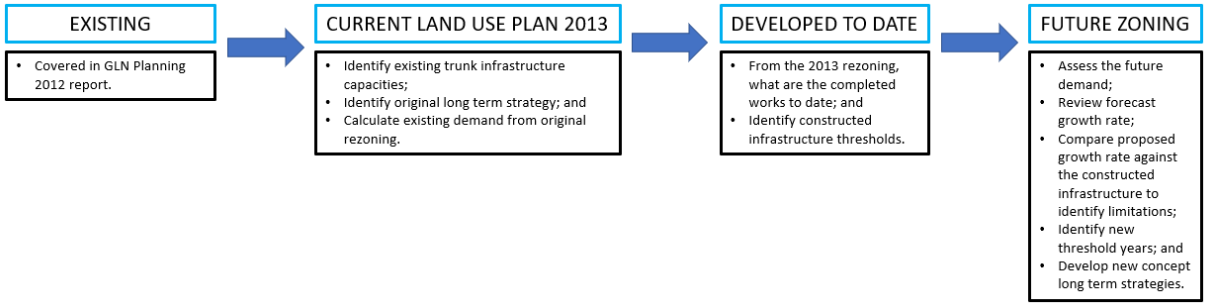


Source: NSW Department of Planning Industry & Environment (2021)

1.4 Purpose of Report

The purpose of this report is to assess existing trunk servicing infrastructure in the precinct and outline requirements for new trunk infrastructure to service the proposed growth of the Leppington Town Centre. The review of the Leppington Town Centre presents a unique situation in which the complete build out of the 2012 strategy has not yet occurred however, some partial infrastructure has already been provided towards this strategy. In this instance the assessment methodology identified in **Figure 6** has been provided.

Figure 6: Assessment Flow Chart



1.5 Scope of Works

To assist in the preparation of the precinct plan, Mott MacDonald has undertaken the following tasks:

- Ordered spatially referenced GIS digital files from Sydney Water and Endeavour Energy to facilitate mapping of the existing networks. Both Sydney Water and Endeavour Energy were unresponsive when the latest (2021) existing data was requested. Therefore, this assessment assumes the 2018 is the latest constructed infrastructure,
- Researched Dial Before You Dig (DBYD) information for the surrounding Jemena, Telstra and NBN Co assets to facilitate mapping of their existing networks and approximate locations,
- Researched publicly available growth servicing plans by the relevant authorities. It is particularly relevant that the Leppington Town Centre is part of the broader South West Growth Area (SWGA) that has been subject to infrastructure planning recently,
- Undertaken a site inspection to confirm the desktop information where necessary,
- Calculation of “per dwelling” and “per square metre” service loads to estimate the overall loads and distribution of the services load within the study area,
- Compare increases in service loads with capacities of existing networks as provided to us by the utility authorities,
- Based on the projected services loads and growth, undertake a critical review of the Service Authorities strategies for the study area,
- Meet with and liaise with the Service Authorities to negotiate and agreed position on the services provision including staging, alignments, and funding,
- Identify lead-ins required to bring infrastructure to the study area,
- Provide advice on timing, staging, approximate sizing, and sub catchment prioritisation of identified infrastructure items; and
- Document a conceptual infrastructure servicing strategy to cater for new demand in the Planned Precinct highlighting trunk utility upgrades.

1.6 Limitations

The nature of rezoning existing greenfield land such as the LTC means it is currently unclear which lots will be amalgamated by developers first and developed based on the new zoning. Consequently, staging

of the Precinct is currently unknown. This means our report will suggest a form of the future ultimate utilities network that could feasibly be achieved. However initial developments are likely to influence initial upgrades which may deviate the ultimate network from what is proposed in this report.

The utility authorities operate under regulatory environments that require them to apply for funding to their regulator based on a business case. In some cases, this has led to a reactive planning response to development as it proceeds, and stagnant plans based on funding cycles. Consequently, they may be reticent to commit to upgrades to their networks in advance of development progressing.

Generally, they are also required to undertake network planning studies to facilitate their funding and delivery applications which include the yields provided to them as part of this study. The findings and recommendations of their more detailed network planning studies may eventually supersede this report.

2. Background Review

We acknowledge that DPE and various authorities have undertaken significant planning for the surrounding precincts prior to our engagement for the project. The following documents have been reviewed to inform this utilities assessment for the Leppington Town Centre.

- Austral and Leppington North Infrastructure Delivery Plan – GLN Planning (2012),
- Leppington Precinct Infrastructure Delivery Plan – APP (2014),
- Sydney Water Growth Servicing Plan 2014-2017 – Sydney Water (2014),
- Endeavour Energy Growth Servicing Strategy 2015 – Endeavour Energy (2015),
- Screening for Non-Network Options in North Leppington and Leppington Precincts – Endeavour Energy (2016),
- Endeavour Energy Directions Paper 2019-2024 – Endeavour Energy (2017),
- Sydney Water Growth Servicing Plan 2017-2022 – Sydney Water (2017),
- Endeavor Energy Growth Servicing Plan 2018 – Endeavour Energy (2018), and
- Sydney Water Growth Servicing Plan 2020-2025 – Sydney Water (2020).

3. Water

3.1 Current Long-Term Strategy

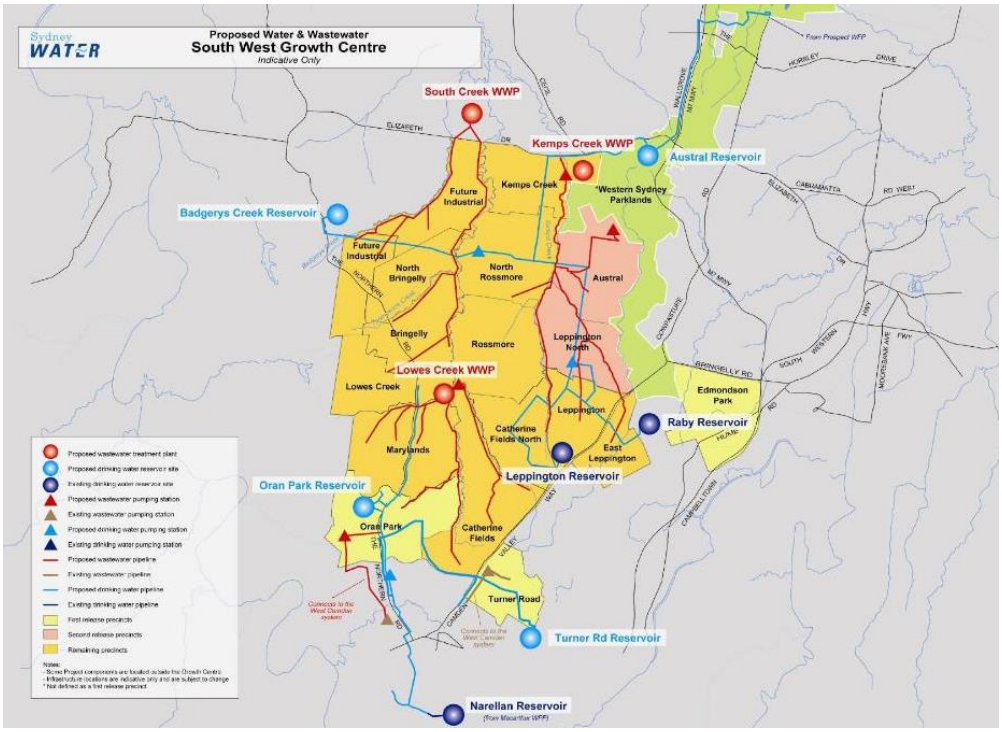
The following section provides a brief chronology of the publicly available servicing strategies for the region. The strategy has evolved as greater clarity around development has occurred since 2012, however generally the underlying bulk servicing concept has largely remained constant.

2012 - Austral & Leppington North Precincts Infrastructure Delivery Plan

The Infrastructure Delivery Plan was prepared in September 2012 and at this time, Sydney Water had prepared a short-term strategy for potable water supply to the first stages in Austral and the major centre in Leppington North.

Figure 7 identifies a series of proposed trunk mains to service the LTC, which originate from the Leppington and Raby reservoirs and connect to a proposed pump station located to the North-West of the Precinct. This long-term strategy whilst now superseded provided the original basis for servicing the initial release precincts a concept for the longer-term servicing strategy. Many longer-term components of this strategy are still under investigation particularly relating to Sewerage treatment.

Figure 7: Proposed Water & Wastewater – South West Growth Centre



Source: *Austral & Leppington North Precincts Infrastructure Delivery Plan* – Sydney Water & GLN Planning (2012)

2014 - Leppington Precinct Infrastructure Delivery Plan

The Leppington Infrastructure Delivery Plan was prepared in June 2014. At the time of this plan, Sydney Water advised there was capacity to service the Precinct up to 2017 via the Raby and Leppington reservoirs and that new trunk infrastructure would be required post 2017 to support the proposed growth. This plan assumed that 7,190 new dwellings would be delivered within the Leppington Precinct. No specific details of the required infrastructure upgrades were provided in this study.

2014 - Sydney Water Growth Servicing Plan

In November 2014 Sydney Water published a Growth Servicing Plan (GSP) for 2014-2019 which outlined their strategy to provide water and wastewater infrastructure to service the urban growth across Greater Sydney.

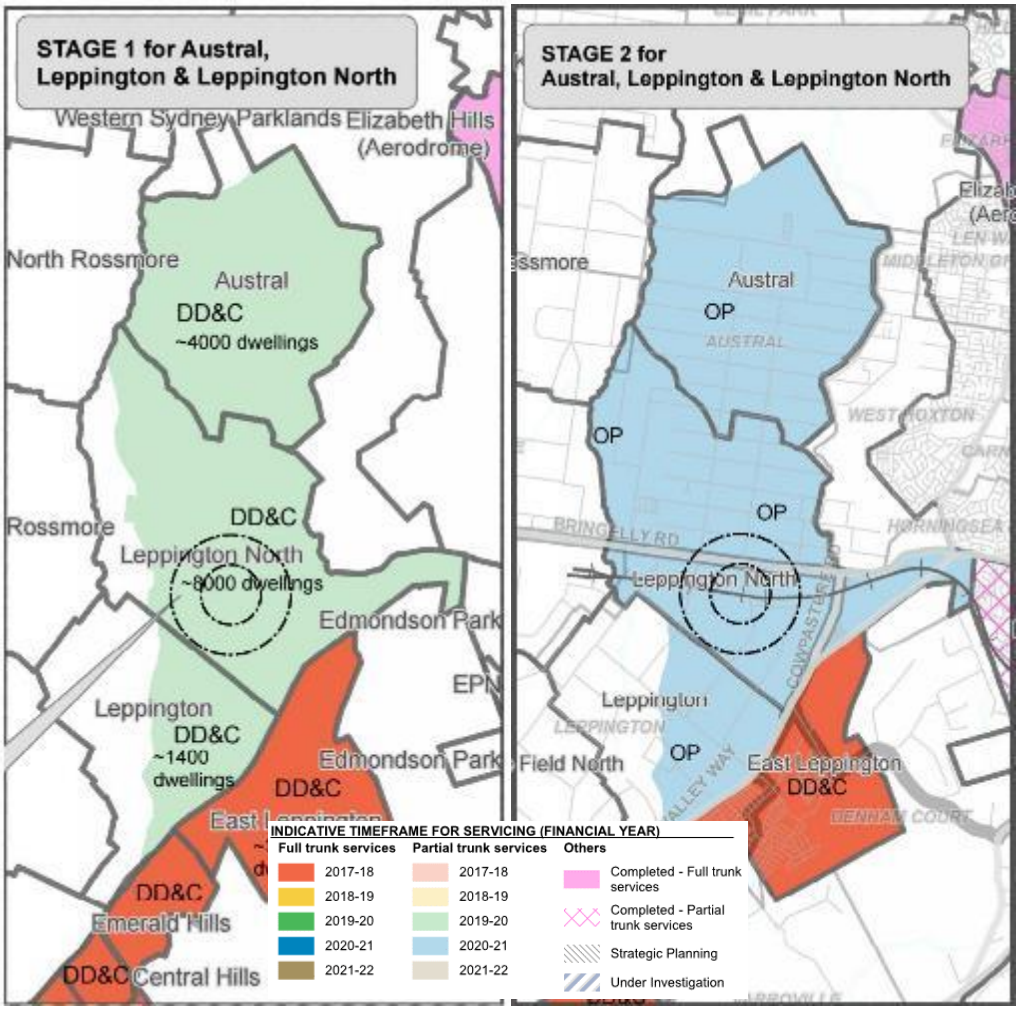
At the time of this plan, Sydney Water planned for 9,000 new greenfield dwellings within Leppington North and 9,000 within Leppington by 2025. The plan identified that initial development may be serviced by the existing water infrastructure. In the short term, Sydney Water estimated that 250 lots would be constructed by 2019/20.

Detailed planning had also commenced for trunk water infrastructure to service parts of the Leppington North, Austral, Leppington and East Leppington precincts. A planned delivery date of January 2018 was listed, however no committed delivery date was provided at that time.

2017 - Sydney Water Growth Servicing Plan

In November 2017 Sydney Water published an updated GSP, which assessed the infrastructure required to service development between 2017-2022 (refer **Figure 8**). The GSP identified that detailed design and construction had commenced for partial trunk infrastructure to service up to 8,000 dwellings in Leppington North and 1,400 dwellings in Leppington by the 2019/20 financial year. These works form Stage 1 in the servicing strategy for Austral, Leppington North and Leppington Precincts. Partial trunk services were proposed, as part of Stage 2, for the remainder of these precincts by 2020/21. It should be noted that only partial trunk services are expected to be provided by 2021/22 (to be confirmed with Sydney Water) with further works required post 2022 to service the remainder of the precinct.

Figure 8: Sydney Water Servicing Strategy for Austral, Leppington & Leppington North



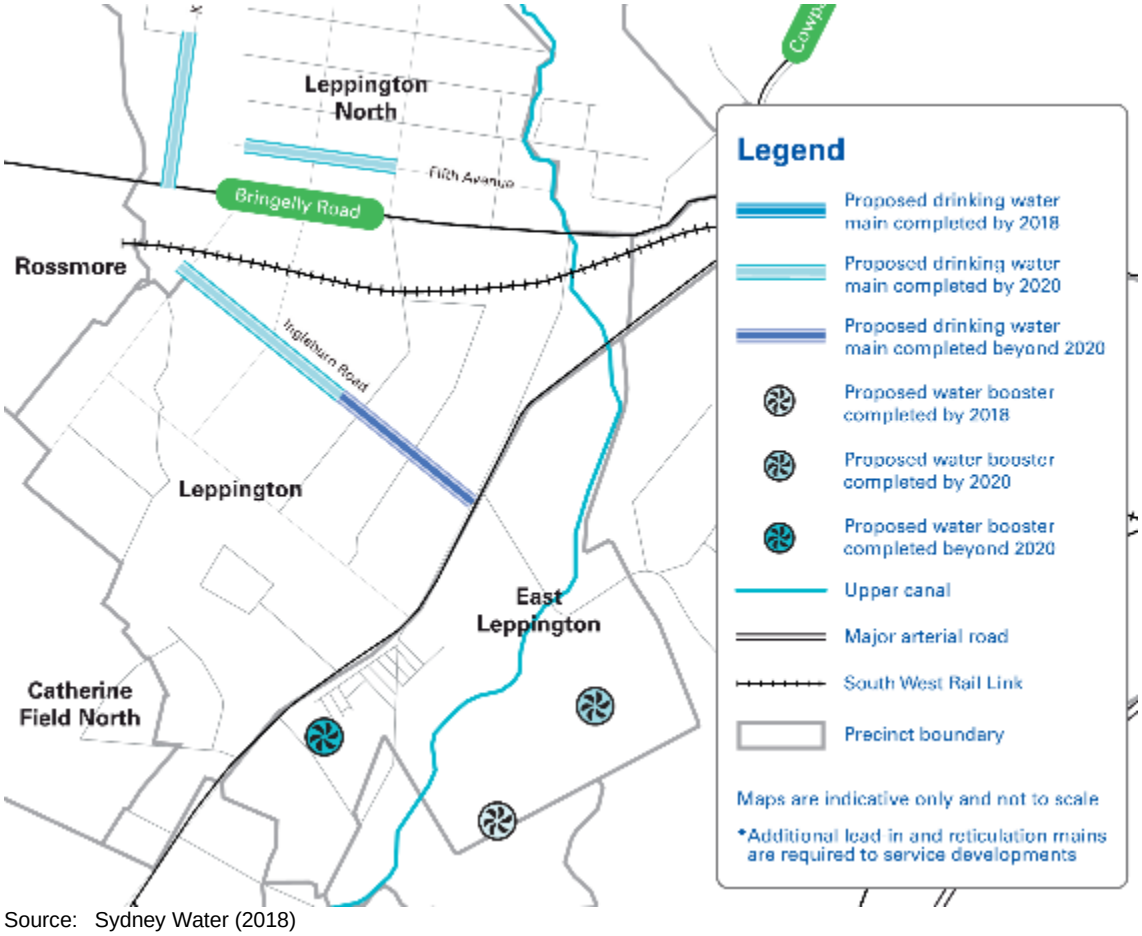
Source: Sydney Water Growth Servicing Plan 2017-2022 (2017)

2018 - Sydney Water Servicing Strategy

An update to the proposed water servicing strategy for the Austral, Leppington, Leppington North and East Leppington Precincts has been provided by Sydney Water for 2016-2020 (refer **Figure 9**) and identifies several potable water mains and water boosters required to meet the demand generated by development in these precincts. The following are of relevance to the LTC:

- Proposed drinking water main upgrades to be completed by 2020 along Ingleburn Road between Eastwood Road and Rickard Road and along Fifth Avenue between the western end and Edmondson Avenue (unable to be confirmed as part of this assessment),
- Proposed drinking water main to be completed beyond 2020 along Ingleburn Road between Rickard Road and Camden Valley Way, and
- Water booster to be completed by 2020 within East Leppington (unable to be confirmed as part of this assessment), approximately 1km south of the Raby reservoirs.

Figure 9: Austral & Leppington – Proposed & Current Water Servicing 2016-2020



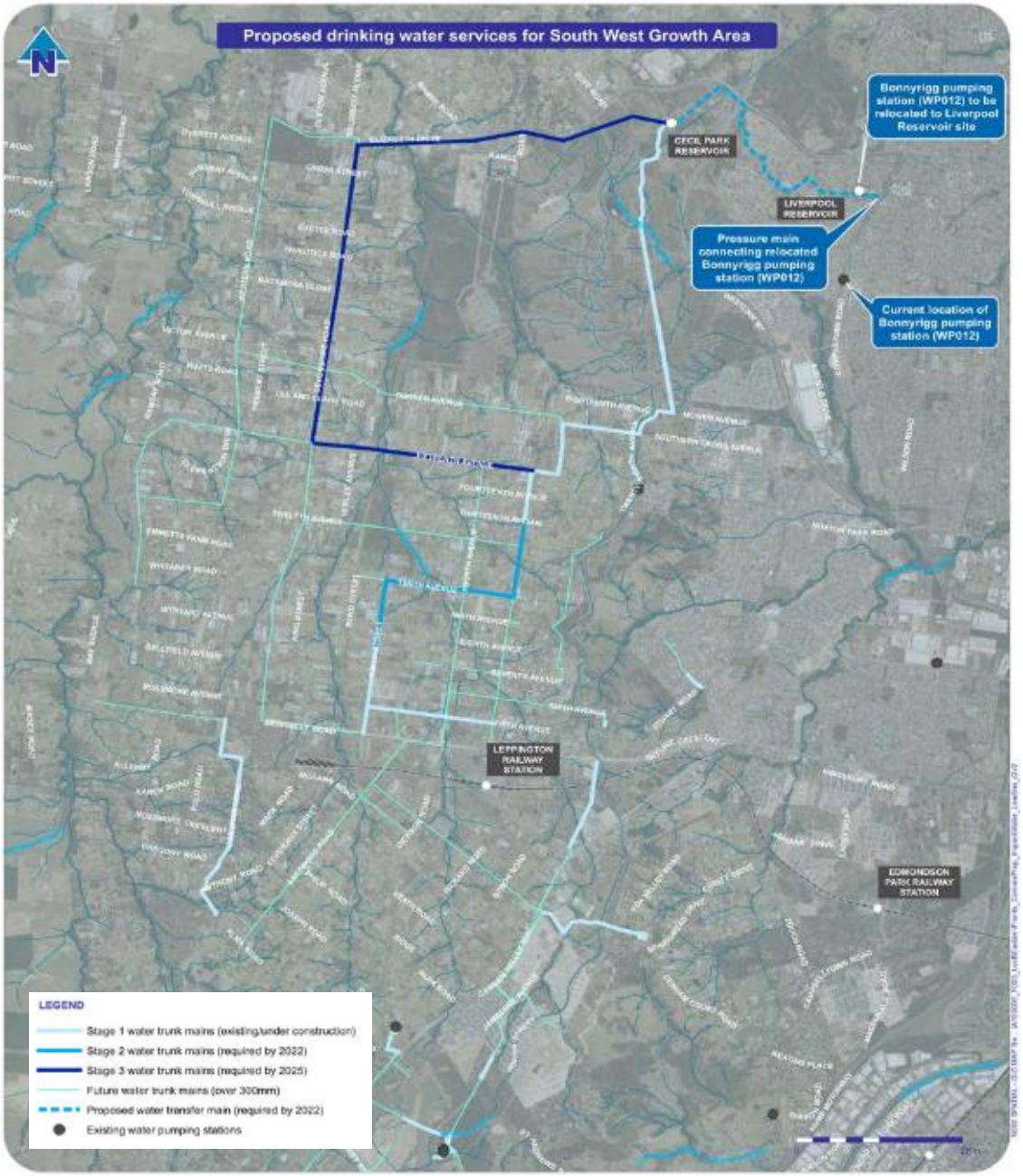
Source: Sydney Water (2018)

2018 - Sydney Water Advice

Advice obtained from Sydney Water in May 2018 concluded that the trunk potable water system locally may approach capacity in 2020. Sydney Water are progressing planning projects to optimize existing infrastructure such as reservoirs, trunk mains and pumping stations. Sydney Water have also advised that reticulation water mains will also need to be upgraded given the scale of development.

Sydney Water's 2018 drinking water short term upgrade strategy is shown on **Figure 10** below. Trunk water mains are under construction on Fifth Avenue and Kelly Street, on the northern side of the rail corridor. By 2025 the Kelly Street main will extend to the Cecil Park Reservoir, approximately 8.7 km north east of the Leppington station. Additional water mains are also under construction between the Raby Reservoirs and Camden Valley Way. These mains could be used to supply development within the LTC; however it is likely that further upgrades will be required for the long term servicing of the precinct.

Figure 10: Sydney Water Proposed Drinking Water Strategy



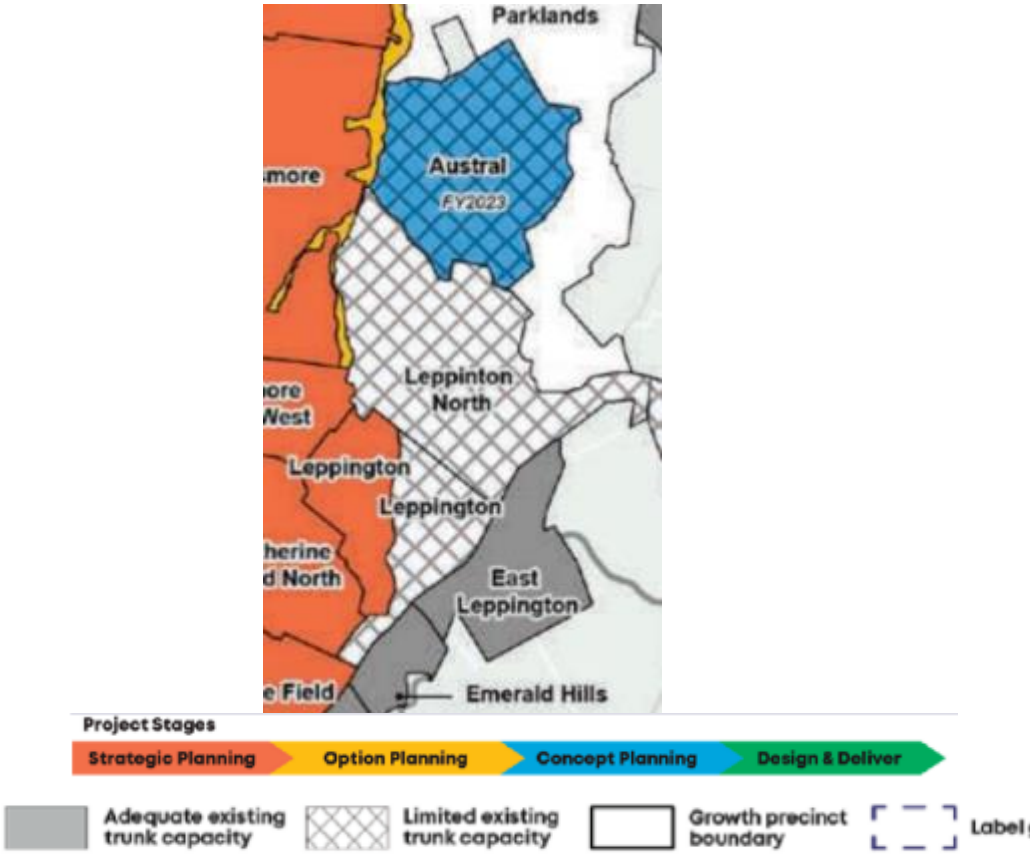
Source: Sydney Water (2017)

An updated feasibility application has been lodged with Sydney Water to confirm the servicing strategy for the site. This section of the report will be updated with the results of this investigation.

2020 - Sydney Water Growth Servicing Plan

In March 2020, Sydney Water published an updated GSP which assessed the infrastructure required to service development between 2020-2025. There does not appear to be any additional assets planned for delivery within the subject period (refer **Figure 11**).

Figure 11: Sydney Water Servicing Strategy for Austral, Leppington & Leppington North



Source: Sydney Water Growth Servicing Plan 2020-2025 (2021)

3.2 Existing Constructed Network

The LTC is located within the Raby Water Supply Zone, which forms part of the Macarthur Delivery System. The Raby reservoirs are located approximately 2.6 km south east of the Leppington train station and have a combined capacity of 12 ML.

Two additional potable water reservoirs are located within the vicinity of the study area. The Carnes Hill reservoir is located approximately 1.5 km north-east of the train station and the Leppington elevated and surface reservoirs are located approximately 3.3 km south of the train station. Further details of these reservoirs are provided in **Table 1** below. Additionally Sydney Water has provided advice regarding the future servicing of Leppington Town Centre, this can be seen in **Section 3.4**.

Table 1: Potable Water Reservoirs

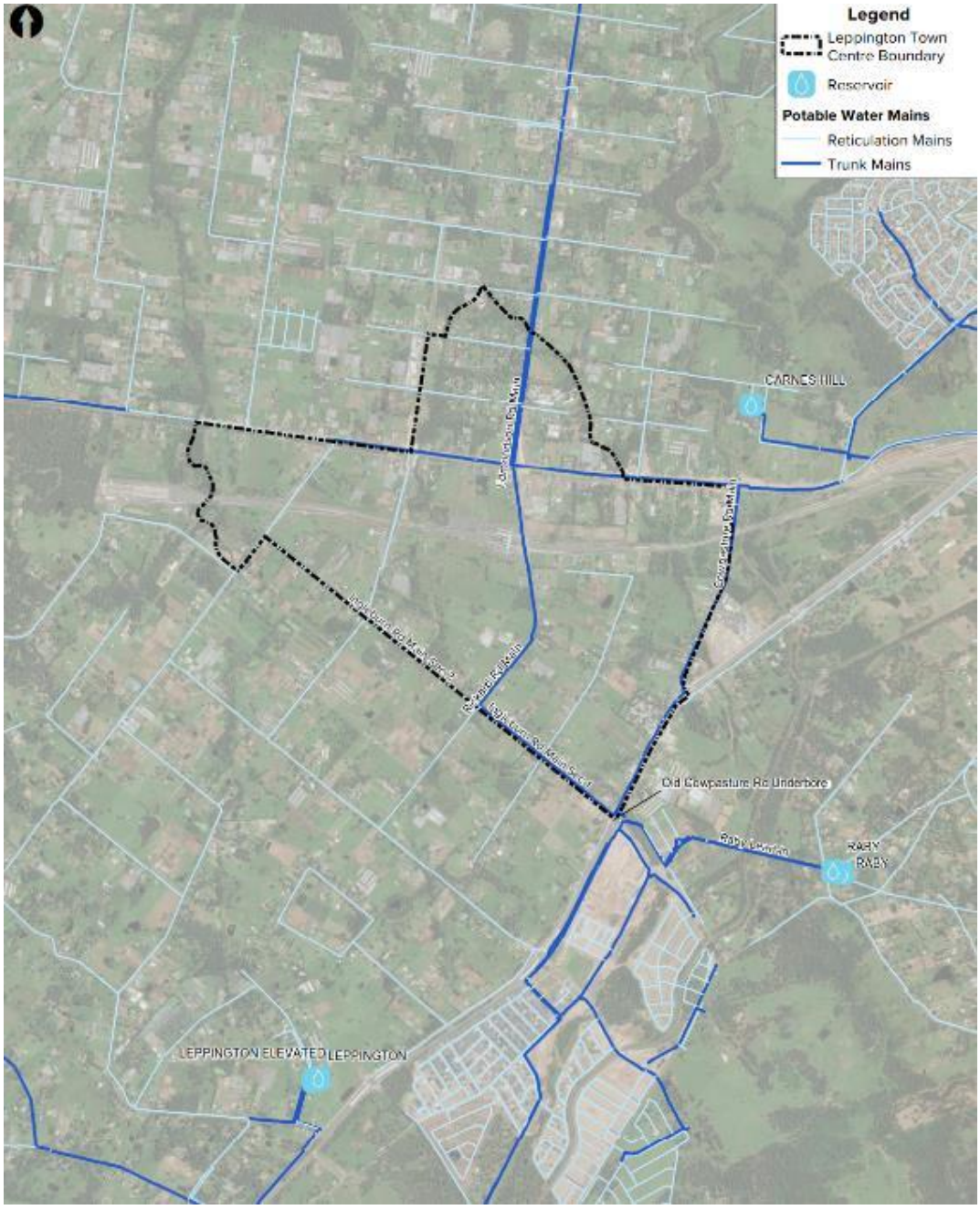
Reservoir Name	Reservoir Number	Capacity (ML)	Approximate Distance from Precinct (km)
Raby	WS0100	2.69	2.65
Raby	WS0164	9.35	2.65
Carnes Hill	WS0264	20.0	1.5
Leppington (surface)	WS0315	14.97	3.3
Leppington (elevated)	WS0344	0.57	3.3

Source: Sydney Water Hydra data (2018)

The LTC receives potable water supply via a 450mm diameter trunk main from the Raby reservoirs. The trunk main crosses the creek to the west of the reservoirs and then follows Denham Court Road. Properties south of the rail corridor are supplied via 250mm diameter mains located on Ingleburn and Rickard Roads. A series of smaller 100-150mm diameter reticulation mains are located along the nearby roads.

Properties to the north of the rail corridor are supplied either from the 250mm main on Rickard Road, or via a 375mm trunk main on Camden Valley Way and Cowpasture Road. This main reduces in size to 300mm and traverses Bringelly Road and Edmondson Avenue. The existing trunk potable water network is shown on **Figure 12** below and **Appendix A**.

Figure 12: Existing Potable Water Network



3.3 Concept Supply Assessment

The following water analysis will mirror the assessment approach outlined in **Section 1.4**. The two main components of the assessment are to determine if/when/how the existing constructed infrastructure may need to be upgraded to match proposed yields and growth profiles. Secondly for infrastructure yet to be constructed, evaluate the future servicing options for the precinct and identify broader network limitations that may impact either the ability for new development to occur or require acceleration/augmentation for the ultimate yield.

In reference to the assessment approach stipulated in **Section 1.4**, the potable water analysis will follow the procedure detailed below.

- Identify the current ultimate long-term strategy for the region/network. Determine current interim strategies or current planned rollout of infrastructure.
- Identify the existing constructed trunk infrastructure and the existing residual capacities available for additional development (if any).
- Estimate future demand generated from the new land use yield scenarios.
- Determine the ultimate infrastructure requirements for the new development yield scenarios and based on a future growth forecast, estimate the when either new infrastructure will be require or at what point upgrades will be required. This process will highlight where amendments may need to be made to the current authority strategies as well as identify risks to development rollout.
- Develop, if required, interim servicing options for the Precinct to mitigate the identified issues. Within the strategies identify opportunities for alternative servicing options.

3.3.1 Existing Infrastructure Capacities and Limitations

The focus of the study will be on reservoirs, trunk mains and major reticulation mains servicing the precinct. Refer to **Figure 12** for the infrastructure under investigation. Sydney Water had indicated that the major potable water infrastructure in the area was designed around the original precinct yields in mind.

The following analysis has been undertaken to estimate the theoretical capacity of the currently constructed potable water mains in the vicinity of the site. It is noted that a number of factors effect the pipe capacities such as head loss and only desktop analysis has been undertaken at this stage.

Table 2 contains the capacities of the existing potable water infrastructure servicing the Precinct, assuming a target design velocity of 0.8-1.2 m/s. The capacity in dwellings was determined using a rate of 0.8 kL/dwelling/day. This is expected to yield conservative results.

Table 2: Existing Estimated Potable Water Infrastructure Capacities

Infrastructure Items	Constructed Size (mm)	Capacity (L/s)	Estimate Capacity (dwellings)
Raby Lead-in	450	175	6300
Old Cowpasture Rd Crossing	500	216	7700
Ingleburn Rd Main Section 1	250	54	1950
Ingleburn Rd Main Section 2	100	9	325
Rickard Rd Main	250	54	1950
Edmondson Ave Dual Main	300 + 300	156	5600
Old Cowpasture Rd Main	375	122	4400

The estimated capacities provided above provide an indication of the available capacity in the network and once exhausted upgrades will be required.

The capacities tabulated will then be compared against the proposed growth demand to assess if the constructed infrastructure may have sufficient capacity to accommodate the proposed development.

Should there not be sufficient capacity, estimates will need to be made for the size of upgrades required for each scenario.

3.3.2 Future Demand Assessment

A high-level assessment of the new potable water demands for the Precinct has been undertaken using the Water Supply Code of Australia (WSA). Peak hourly demands for the Precinct have been estimated. Refer to **Table 3** for the proposed land use yields analysed. The maximum water demand rates for each land use were extracted from Table 2.1 of the WSA, these form the basis for estimating proposed demands. It is noted that these rates may vary and are generally conservative.

Table 3: Potable Water Demand Rates per Land Use Type

Land Use	Max Day Demand Rate (kL/Ha)
<30 dwellings/ha	41
30-60 dwellings/ha	60
61-100 dwellings/ha	80
101-140 dwellings/ha	100
>140 dwellings/ha	0.8/dwelling
Commercial*	41
Industrial	66
School	90/day

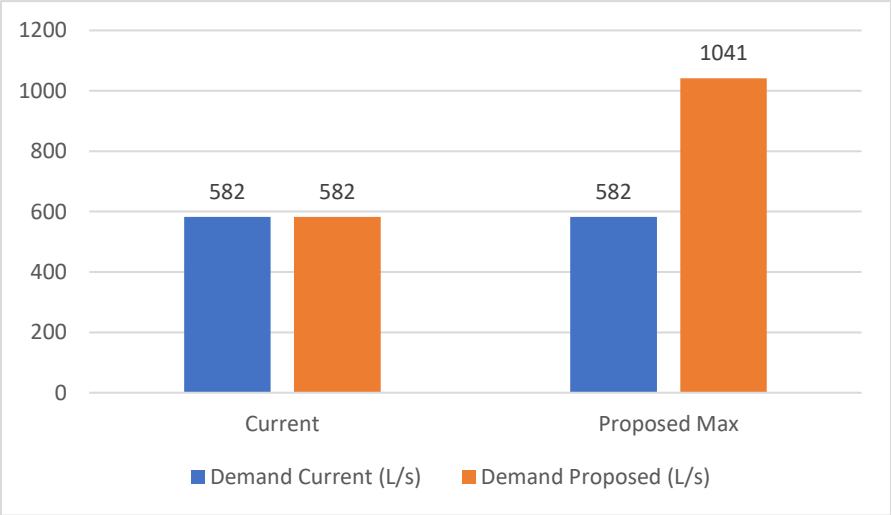
*Retail, civil uses and bulky goods stores assumed to have same demand rate as commercial

The average daily demands and subsequently peak day factor were then calculated for each area for residential, commercial, industrial and retail land uses. A peak day factor of 1.5 was adopted for all land uses.

The peak hourly demand was then calculated using the average hourly demand from the peak day. A peak hour factor of 2.0 was used in this analysis. The results of assessment are provided in **Figure 13**.

Subject to further advice from Sydney Water, it is assumed that there will be insufficient capacity within Raby Reservoir to service the Precinct on its own. Additional potable water will likely be sourced from Leppington Reservoir.

Figure 13: Future Water Peak Demand per Scenario



The results contained in **Figure 13** above highlight that, an increase of up to 100 percent in potable water demand could be generated in the proposed scenario. The implications of this increase on the existing infrastructure is explored in the following section. It should be noted that that the above demands are based on a range of land use types. Daily demand profiles will vary throughout the time of day for different land use types. For example, Office / Commercial / Retail peak use times will differ to residential peak use times, as such the above estimates should be seen as a worst-case scenario. It can be observed that whilst there is a substantial increase in residential yield over the current scenario the higher proportion of office/commercial in the existing scenario led to high demands in the base case.

The total precinct average daily demands have been estimated as follows.

- Current: 16.7 ML a day
- Proposed: 30.0 ML a day

3.3.3 Ultimate Infrastructure Requirements

The following assessment is provided to estimate the minimum infrastructure sizes required to service the Precinct. It should be noted that a wider assessment of the Macarthur Delivery System and detailed modelling has not been undertaken. Further detailed analysis will need to be undertaken to confirm the strategies and bulk supply of water to the precinct. The assessment is based on the assumption that whilst there are two different yield/density scenarios, the forecast growth profile for all two scenarios will be the same with the higher density scenarios extending further into the future until full build out is achieved. In addition, it is assumed that both residential and commercial uptake will be developed at a similar pace. As noted above, in reality, peak demand times for residential and commercial land uses will be different and this may reduce the minimum pipe size required for the development.

Assuming a target design velocity of 0.8-1.2 m/s for the pipes, the minimum trunk piped infrastructure required to meet the demand of the Precinct is summarised in **Table 4**, noting that further network modelling will be required to confirm sizing. Potable water demand for external developments has not been included in the calculations and should be considered over & above these estimates however, it is likely that the surrounding growth in Leppington north could also be accommodated in these pipe sizes. The pipe diameters calculated are equivalents only and would be more appropriately provided as a number of cross connections through a series of pipes rather than single large connections. It is assumed that the Precinct will be serviced via a combination of reservoirs discussed further below.

Table 4: Water Infrastructure Upgrades (total equivalent diameter)

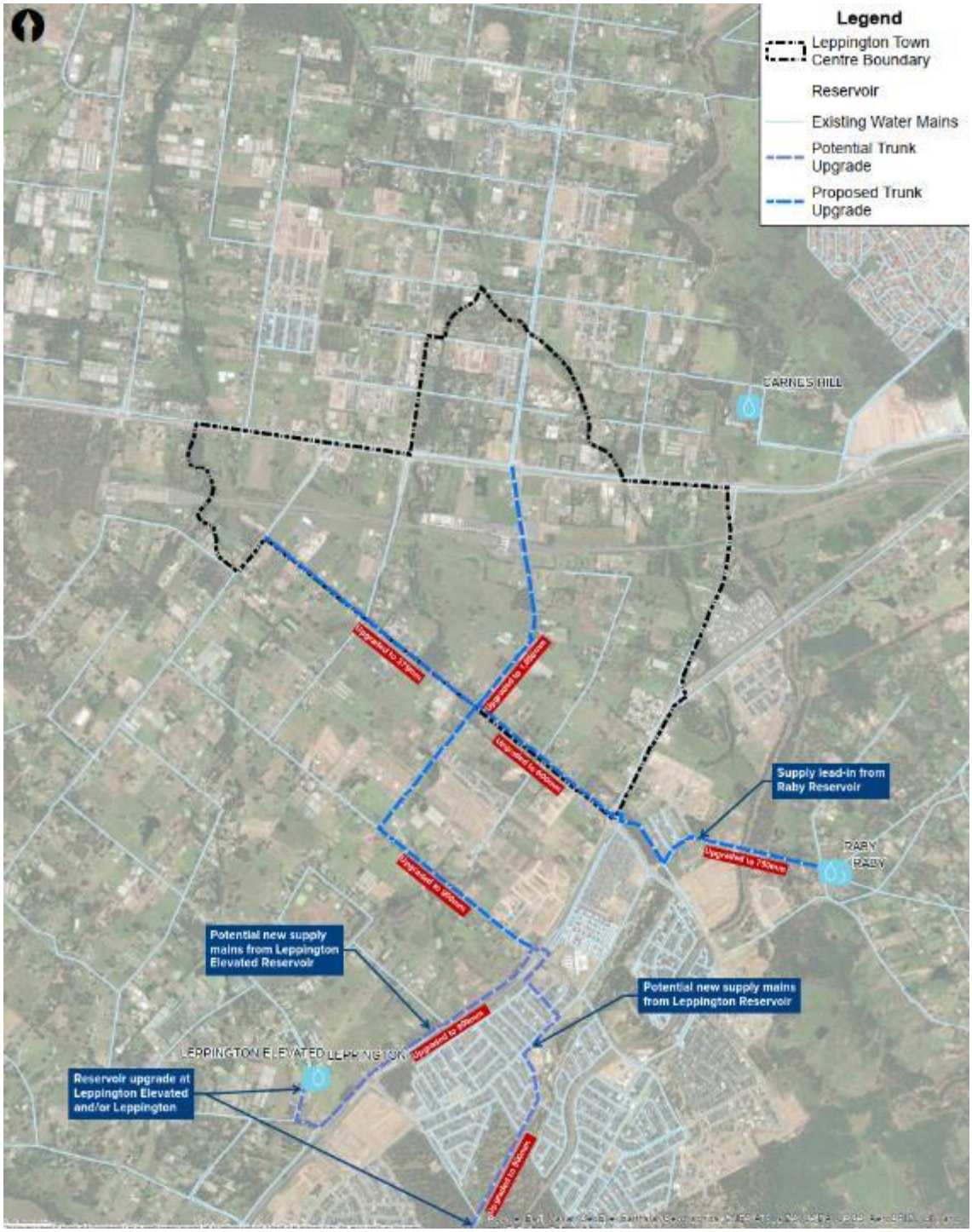
Infrastructure Items	Proposed
Supply Lead in for Raby	750mm
Supply Lead from Leppington Ele/Leppington	750mm
Ingleburn Rd Main Section 1	900mm
Ingleburn Rd Main Section 2	450mm
Rickard Rd Main	900mm

Based on the information above, all the trunk infrastructure servicing the Precinct will require upgrading no matter the available capacity, with the exception of the Old Cowpasture Rd main and the Edmondson Ave mains. The final upgrade requirements will be subject to the capacity available within the existing pipes.

It should be noted that the above recommendations are for additional pipes, in some instances it may be more efficient to upgrade the existing pipe, as opposed to providing duplicate pipes.

Refer to **Figure 14** and **Appendix B** for the potential upgrades required for the LTC.

Figure 14: Potential Potable Water Servicing Upgrades



Reservoir Capacity and Bulk Supply

Sydney Water's proposed drinking water strategy indicates that prior to 2025, the Austral Precinct will receive potable water upgrades and additional supply from the Cecil Park Reservoir. It is understood that longer term, Austral will receive its supply from Cecil Park, easing the strain on Raby Reservoir.

It is assumed that there is approximately 12 ML capacity at Raby Reservoir a combined 15.5 ML at Leppington (and Elevated), totalling 27.5 ML in storage capacity to service Leppington, Leppington North (including the LTC), and Leppington East precincts. The proposed development of Leppington Town Centre in isolation is expected to generate up to 30.0 ML a day in the fully developed Precinct, as such there will ultimately be a deficiency in reservoir storage to supply the region in the long term, particularly when the demands of Leppington, Leppington East and the remaining Leppington north are also included.

- Current: 16.7 ML a day
- Proposed: 30.0 ML a day
- Raby and Leppington Reservoir Current Capacity: **27.5ML**

It is expected that either additional new reservoirs and/or an upgrade to Leppington Reservoir could be provided to supply the longer-term shortfall in storage capacity. As an example, it has been assumed that approximately 33 percent of the water supply for the proposed scenario could be provided by Raby Reservoir with the remaining 67 percent provided by the current Leppington Reservoirs and finally an upgrade to Leppington reservoirs. This analysis would need to be confirmed through options testing and modelling with Sydney Water, however there appears to be sufficient capacity in the reservoirs to supply the forecast growth in the area for a number of years, dependant on the rate of development.

3.4 Sydney Water Advice (30 May 2022)

Sydney Water provided advice in relation to the proposed development plans and growth data for the Leppington Town Centre review. Sydney Water highlighted that they support Government growth initiatives within its servicing area and endeavours to provide services to new, rezoned or uplifted growth areas in line with its Growth Servicing Plan. Sydney Water's proposed services are dependent upon robust growth data, layout plans and supporting demand intelligence to support the investment, planning and delivery for new or amplified assets and infrastructure.

Sydney Water has provided the below regarding the future servicing of Leppington Town Centre:

3.4.1 Water Servicing

- Water is supplied via the Leppington and Raby Water Supply Zones (WSZs). Amplifications are required to the networks within both WSZs to service the proposed 10,500 dwellings. Hydraulic modelling work to identify the required amplifications and timeframes is in progress and scheduled for completion in October 2022.
- Until these amplifications are delivered the system capacity is forecast at approximately 1,000 dwellings or equivalent dwelling/employment mix.
- To support the timely delivery of required amplifications, Sydney Water ask that Council assist by providing any updates to development information.
- Understanding growth and development locations will allow Sydney Water to identify any interim water servicing issues for these developments. Developer led amplifications (e.g larger pipes and pressure boosters) may provide options to support additional capacity while the WSZ works occur.

3.4.2 Recycling Water Servicing

- Sydney Water supports the use of recycled water and/or harvested stormwater to meet non-drinking demands for the proposed development plan. We believe these measures would contribute to meeting liveability, productivity and a sustainability vision for Western Sydney.

- In light of the Upper South Creek Advanced Water Recycling Centre and future amplifications in the WSZs, Sydney Water is currently reviewing recycled water opportunities in the area. It is anticipated that recycled water provision will form part of a future solution.
- To future-proof the proposed development plan, design for the water supply could include provision for dual plumbing/recycled water connection. There may be an opportunity to mandate dual pipe through provisions in Council's DCP.

3.5 Conclusions

Given the presence of existing water mains throughout the Precinct, as shown in **Figure 12**, it is likely that there will be some spare potable water capacity in the network for the initial stages of development. Ultimately existing mains will need to be upgraded to support the future growth. Additionally, under the proposed scenario, there will not be sufficient capacity for the local Reservoirs at Raby and Leppington to supply the ultimate development, as such upgrades to Leppington Reservoir are recommended but are not expected to be required before 2040 and are subject to detailed network modelling and growth estimates for the precinct.

4. Sewer

4.1 Current Long-Term Strategy

This section provides a brief chronology of the publicly available servicing strategies for the region. The strategy has evolved as greater clarity around development has occurred since 2012 however generally the underlying bulk servicing concept has largely remained the constant.

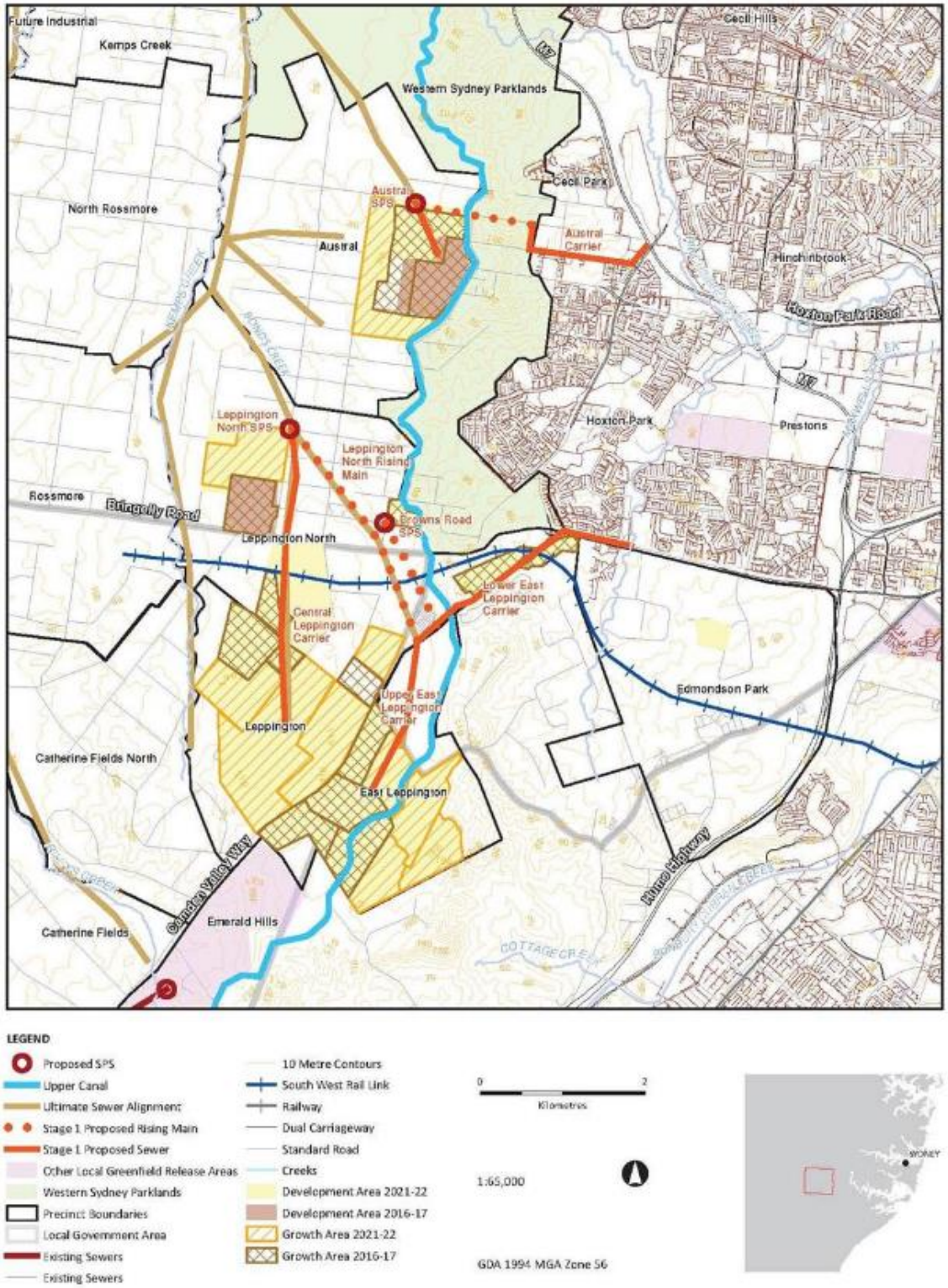
2012 - Austral & Leppington North Precincts Infrastructure Delivery Plan

At the time the Infrastructure Delivery Plan was prepared, Sydney Water were considering three WWTPs to service the South West Growth Area located at Kemps Creek, Lowes Creek and South Creek.

Sydney Water prepared a short-term wastewater strategy to service East Leppington and Leppington as well as the early stages of Leppington North and Austral. The strategy provides capacity for approximately 4,000 lots by transferring the wastewater to the Liverpool WWTP. The short-term strategy is shown on **Figure 15** below.

The plan also estimated that the Lowes Creek WWTP would be commissioned in 2018, however due to reduced flows to the existing sewer systems, these facilities will not reach capacity as early as originally anticipated. Consequently, there will be further capacity available in these facilities to service areas outside the natural catchment, further deferring the need for additional WWTPs to be constructed. However, there is no detail on the updated estimates for when this threshold will be reached.

Figure 15: Short-Term Wastewater Strategy



Source: *Austral & Leppington North Precincts Infrastructure Delivery Plan* - GLN Planning (2012)

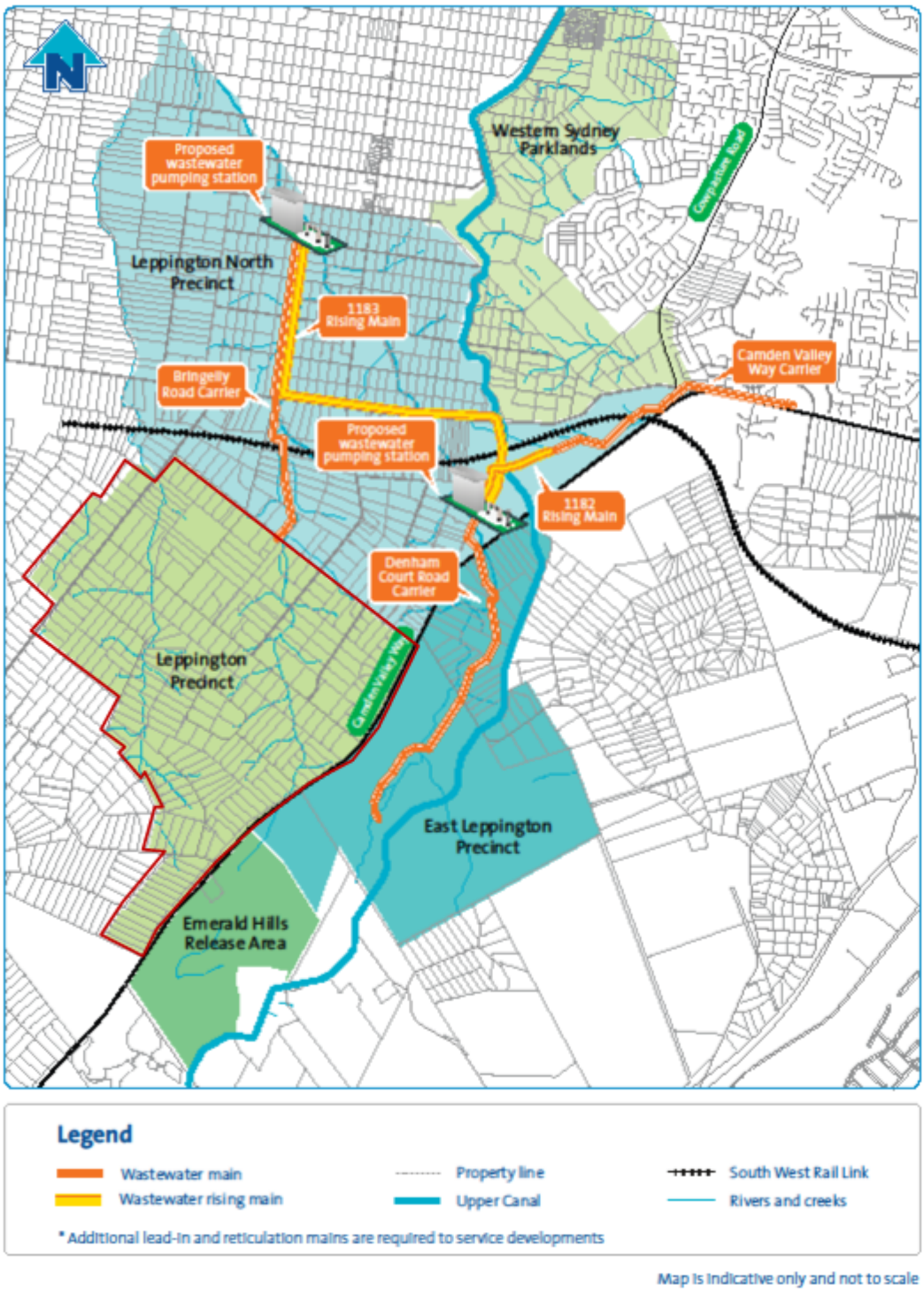
2014 - Leppington Precinct Infrastructure Delivery Plan

The Leppington Infrastructure Delivery Plan was largely based on information available in Sydney Water's GSP for 2014-2019. At the time of this plan, Sydney Water had committed to delivering wastewater trunk infrastructure servicing initial lots in the Precinct by June 2016. This infrastructure was connected to the Liverpool WWTP.

At the time the Plan was published, it was envisaged that the Leppington and Leppington North Precincts would be serviced by gravity mains draining to a WWTP at Kemps Creek. In the short-term, these gravity mains would drain to a temporary pump station where flows would be transferred via a rising main to the Liverpool WWTP until the proposed plant at Kemps Creek was built.

The Denham Court Road Carrier, Camden Valley Way Carrier, SP1182 located on Cowpasture Road and SP1182 rising main were flagged for completion by June 2015. The Bringelly Road Carrier and SP1183 were flagged for completion in June 2016. These works have now been completed. An extension of the Bringelly Road Carrier will form part of a future package of works dependent on demand and timing of rezoning.

Figure 16: Short Term Wastewater Strategy



Source: *Leppington Precinct – Infrastructure Delivery Plan* – APP (2014)

2014 - Sydney Water Growth Servicing Plan

As discussed in **Section 1**, Sydney Water's 2014 GSP assumed that the Leppington and Leppington North Precincts would include 9,000 dwellings each by 2025. Wastewater trunk infrastructure to service 2,100 dwellings in the central and southern portions of the Leppington North Precinct and 1,900

dwellings in the Northern portion of the Leppington Precinct by June 2016. Sydney Water advised that the developer would be responsible for delivering the lead in works.

Sydney Water had also begun detailed planning for wastewater lead in mains to service a portion of the Leppington North Precinct to be delivered by December 2018.

2017 - Sydney Water Growth Servicing Plan

The 2017 GSP confirmed that the above-described works were completed for the western catchment. These works appear to include SP1182, the 1182 rising main, SP1183 and the Bringelly Road Carrier. Construction of these works have been completed. Sydney Water delivered a new wastewater pumping station and the first section of the Bringelly Road carrier to service initial development in the Leppington North precinct in 2015.

Leppington and Leppington North Wastewater Stage 2 was anticipated to be completed between 2016-2019. The new wastewater infrastructure is the second section of the Bringelly Road carrier and the Bonds Creek carrier including 2 km of gravity main and 2.5 km of lead-in pipes. These works were completed in 2019/20.

2016 - Sydney Water Growth Servicing Plan

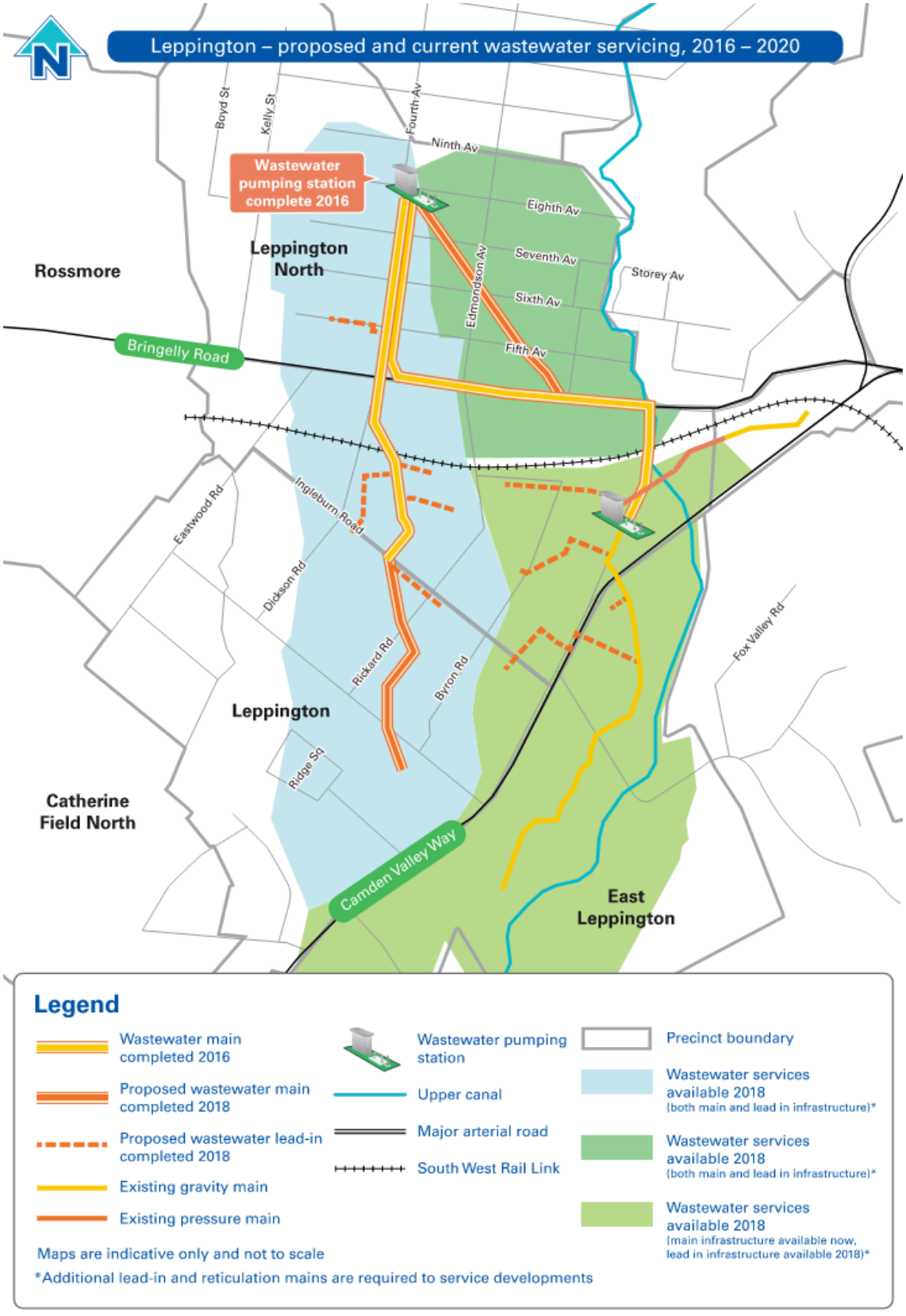
Sydney Water have developed a 2016-2020 wastewater servicing plan. The plan is shown on **Figure 17** below and aligns with the strategies outlined in Sydney Water's GSPs.

The 2016-2020 sewer strategy shows that both the eastern and central catchments to have the new sewer services available by 2018 and highlights several wastewater mains completed in 2018, such as an extension to the Bringelly Road Carrier to the south and the Bonds Creek Carrier connecting SP1182 and SP1183.

The western catchment will drain to SP1183 via the Bringelly Road Carrier and associated lead-in mains (indicated by orange dashed lines on the figure below). Within the Eastern catchment the area North of the rail line will also drain to SP1183 via the proposed Bonds Creek Carrier. To the South of the rail line, properties will drain to SP1182 via proposed lead-ins and an existing gravity main. The proposed wastewater servicing is shown on **Figure 17**.

Due to the unexpected growth within the Leppington and Leppington North precincts, Sydney Water had further planned to deliver interim wastewater services within the Austral and Leppington precinct for around 1,700 new development lots in December 2021. Due to the predicted number of homes and businesses for the Austral & Leppington precincts had not been anticipated where the wastewater catchment has more than doubled. This places Stage 3 Phase One for delivery by mid-2022 with larger and more complex infrastructure to be designed and detailed for future wastewater services, it is yet to be confirmed by Sydney Water whether the delivery of this phase is on schedule. Final wastewater infrastructure for the whole catchment is now expected to be completed by 2026. The indicative wastewater servicing plan is shown on **Figure 18**.

Figure 17: Leppington – Proposed & Current Wastewater Servicing 2016-2020



Source: Sydney Water

2018 - Sydney Water Advice

Sydney Water advised that the current servicing approach for the SWGA is to leverage existing system capacity to serve development until a new WWTP can be delivered. The following infrastructure items had been delivered to date or were committed for delivery:

Delivered: The Bringelly Road Carrier Section 1 and SP1183 were delivered in 2015. The Carrier has capacity for approximately 6,000 dwellings and SP1183 has capacity for 3,800 dwellings. SP1182 is designed for its own natural catchment to the ultimate condition, and able service spare capacity for SP1183 until approximately 2025/26 based on the current forecasts. There are also capacity constraints at the Liverpool Water Recycling Plant (WRP) and the Malabar system, to which most of the treated wastewater from Liverpool WRP is discharged.

2018/19: Two new trunk mains were to be delivered in 2018-19. The Bringelly Road Carrier 2 and the Bonds Creek Carrier Section 2. The Bringelly Road Carrier section 2 will service the local catchment. This carrier has been designed to cater for approximately 7,000 dwellings in Leppington Stage 1 and 2. It is noted that whilst the Bringelly Road Carrier Section 2 is designed for 7,000 dwellings, the current capacity of the downstream Bringelly Rd Carrier Section 1 is only designed for 6,000 dwellings and subsequently SPS1183 for 3,800 dwellings. As such the Bringelly Road carriers will initially be limited initially by SPS1183's capacity.

2020/21: One of the most critical packages of work has recently been programmed by Sydney Water providing wastewater availability to the remaining Leppington North and Austral precincts. The works consist of a new Kemps Creek Carrier, Bonds Creek North Carrier, Austral Carrier 2, new Pump Station at Kemps Creek and associated rising main, ultimately, all connecting to the Liverpool WTP. This large package of works lays the foundation for development to occur in all the rezoned precincts. Sizing of the Infrastructure is yet to occur and integration of new projects such as the review of the Town Centre could be incorporated. It is understood that this package of works will be delivered in stages as needed.

2026: Liverpool WWTP currently has approximately 10 ML of spare capacity however under current forecasts Sydney Water have estimated that the residual capacity could be exhausted by approximately 2026. Boarder network limitations also signal the need for a new treatment to be provided in the region by 2026. Such facilities could include interim decentralised systems such as packaged treatment plants, irrigation systems (although would require large irrigation areas), optimisation of existing assets such as Liverpool WWTP or providing a new WWTP (Kemps Creek). The development of a new treatment facility is a significant hurdle due to the capital expense and EPA discharge regulations.

Post 2026: Augmentations and upgrades to existing infrastructure would need to occur as development progresses. For example, the Bringelly Road Carrier is not designed for the ultimate capacity and would require an upgrade or duplication at some stage in the future.

2020 - Sydney Water Community Update

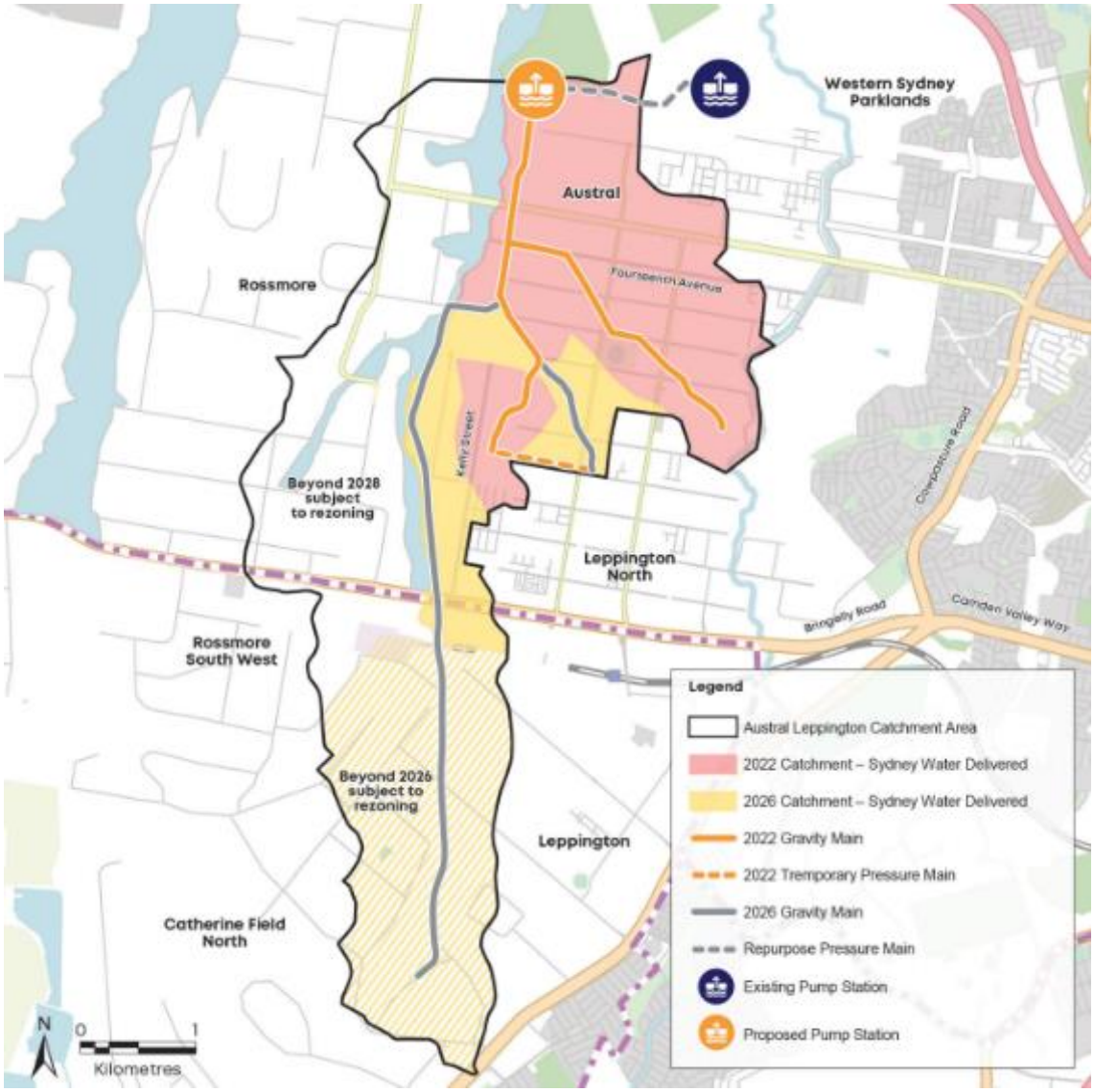
In alignment with previous revisions to the GSP, Sydney Water, as part of Stage 3, have proposed the following infrastructure assets for delivery:

- A new wastewater pumping station on the northern side of Gurner Avenue,
- A new pressure main transferring wastewater from the new pumping station to existing pumping station SP1190 in Austral, and
- New wastewater gravity mains along Kemps Creek, Bonds Creek and a natural drainage channel in Austral.

To meet the increased forecast for the Rossmore and Kemps Creek precinct, Sydney Water recognised the need to revise designs to include more infrastructure. As indicated in the 2016 GSP, Stage 3 will be constructed in two phases. Phase 1 will involve the construction of wastewater services for up to 1,700 new development lots in the pink areas on **Figure 18**. Construction was expected to start late December 2021 with wastewater services available in mid-2022, however the delivery of these works has not been

confirmed by Sydney Water. Phase 2 involves constructing the remaining wastewater infrastructure for the entire catchment. This will include, extension of the wastewater gravity mains, expansion of the capacity of the pump station on Gurner Avenue, Austral and connection of the pump station to a new Upper South Creek Advanced Water Recycling Centre that will be operational during 2025 and that we are delivering as a separate project. Sydney Water expect that by 2026, the network will have been expanded to service the entire catchment.

Figure 18: Sydney Water Stage 3 Indicative Wastewater Servicing Infrastructure

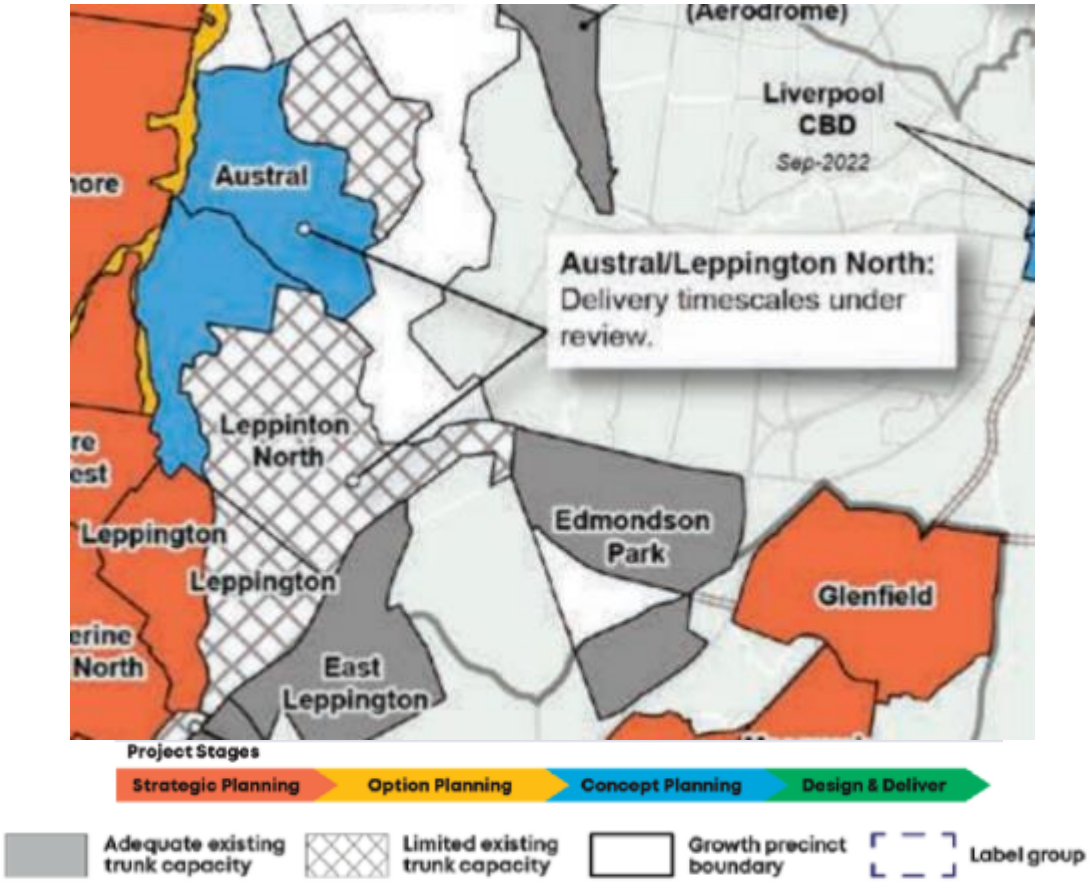


Source: Sydney Water

2020 - Sydney Water Growth Servicing Plan

The 2020-2025 update of the Sydney Water GSP update shows that the proposed wastewater infrastructure to cater for parts of Austral and Leppington that are not yet serviced, refer **Figure 19.** Delivery timescales for some of this infrastructure are under further review. The infrastructure downstream to Leppington North appears to be further advanced and may therefore reduce lead-ins required.

Figure 19: Sydney Water Servicing Strategy for Austral, Leppington & Leppington North



Source: Sydney Water (2021)

4.2 Drainage Catchments

The LTC study area lies within three key drainage catchments, separated by two ridge lines which runs north south through the Precinct. Each catchment presents a unique set of opportunities and constraints based on the infrastructure constructed to date and how the site fits into the overall long-term servicing strategy.

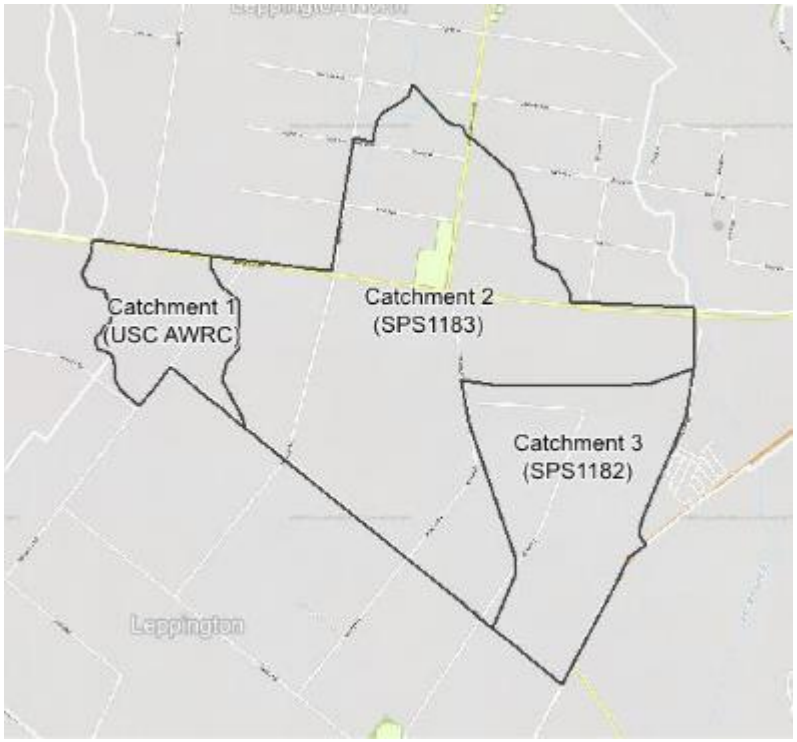
Eastern Catchment (Catchment 3): The eastern catchment drains to Bonds Creek, located approximately 800m east of the train station. This catchment also includes properties to the east and south east of the study area.

Central Catchment (Catchment 2): The central Catchment drains to the Bringelly Road Carrier and creek.

Western Catchment (Catchment 1): The western catchment drains to Kemps Creek. Kemps creek currently has limited wastewater services available and development in this catchment is very restricted.

The catchments are shown in **Figure 20**.

Figure 20: Sewer Catchments



Source: Sydney Water (2022)

4.3 Existing Network

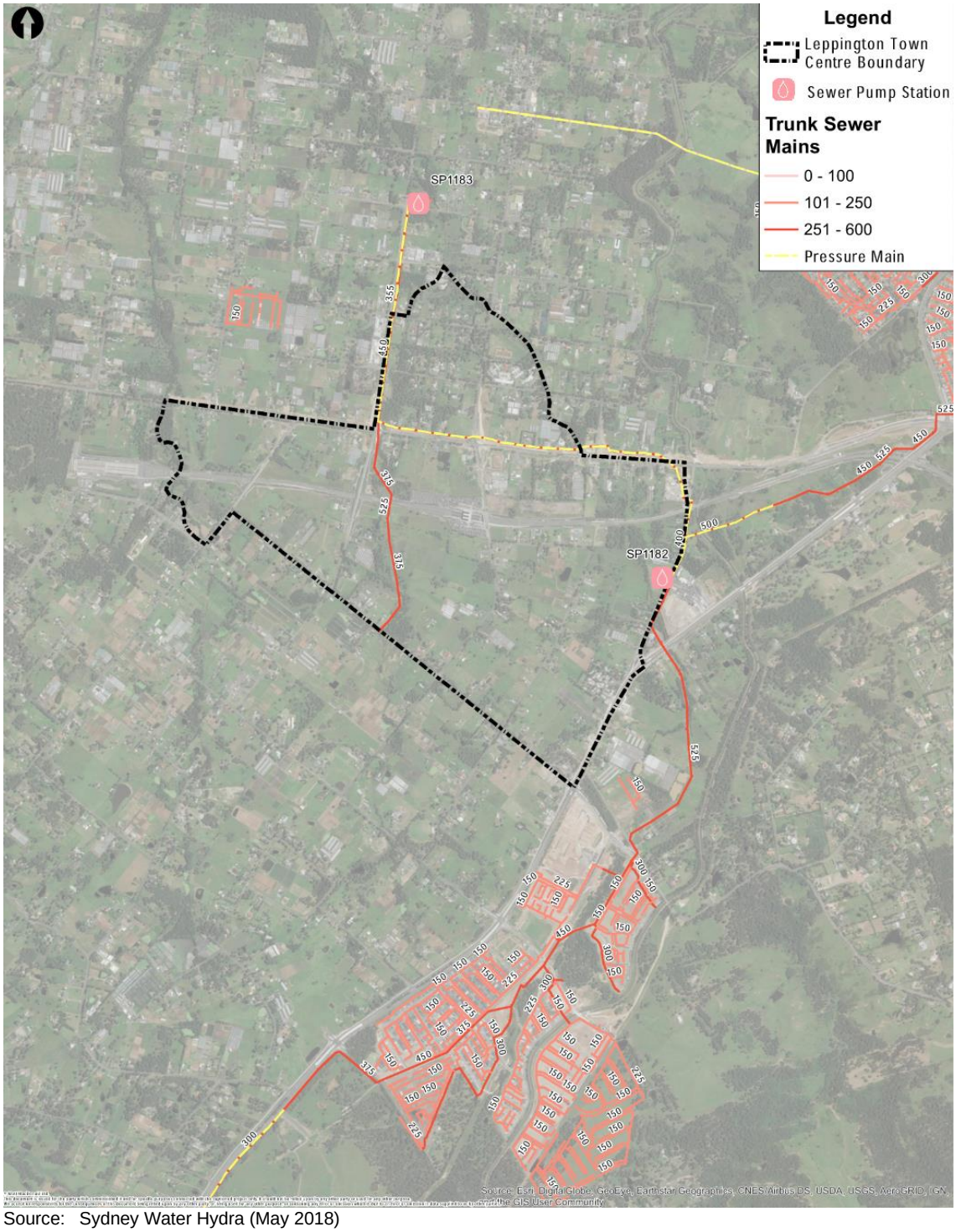
As mentioned earlier, at the time of writing, Sydney Water had only provided existing constructed data up to 2018. A request has been submitted, however, no response has been received. Taking this into consideration, the existing infrastructure provided in this assessment is assumed to be a worst-case minimum.

At present there are two trunk sewer mains located within the study area. The Bringelly Road Carrier is 375mm in diameter and is located within Catchment 2. This carrier drains to a sewer pump station (SPS) located approximately 1.9km north of the train station. The SP1183 pump station was constructed in 2016 to service the central catchment within the Leppington North and Leppington Precincts.

Flows are then transferred to SP1182 located approximately 1.2km east of the train station, adjacent Cowpasture Road. A 355mm diameter rising main is located on the northern side of Bringelly Road. This rising main follows Fourth Avenue, Bringelly Road and Cowpasture Road and connects to SP1182. Wastewater is then transferred to Liverpool WWTP via a series of gravity and rising mains.

Existing rural properties within the study area are likely using a septic tank system for collection and treatment of wastewater. The existing constructed sewer network within the Leppington Town Centre is shown on **Figure 21** below and **Appendix A**.

Figure 21: Existing Sewer Network



Source: Sydney Water Hydra (May 2018)

4.4 Infrastructure Assessment

The following wastewater analysis will mirror the assessment approach outlined in **Section 1.4**. The two main components of the assessment are to determine if / when / how the existing constructed infrastructure may need to be upgraded to match proposed yields and growth profiles. Secondly for infrastructure yet to be constructed, evaluate the future servicing options for the precinct and identify

broader network limitations that may impact either the ability for new development to occur or require acceleration/augmentation for the ultimate yield.

In reference to the assessment approach stipulated in **Section 1.4**, the wastewater analysis will follow the procedure detailed below.

- Identify the current ultimate long-term strategy for the region/network. Determine current interim strategies or current planned rollout of infrastructure.
- Identify the existing constructed trunk infrastructure and the existing residual capacities available for additional development (if any).
- Determine the ultimate infrastructure requirements for the new development yield scenarios and based on a future growth forecast, estimate when either new infrastructure will be requiring or at what point upgrades will be required. This process will highlight where amendments may need to be made to the current authority strategies as well as identify risks to development rollout.
- Develop, if required, interim servicing options for the Precinct to mitigate the identified issues. Within the strategies identify opportunities for alternative servicing options.

4.4.1 Existing Infrastructure Capacities and Limitations

This assessment will focus on WWTPs, pump stations, trunk mains servicing the Precinct. Minor reticulation mains are assumed to be provided as required. Sydney Water have indicated that the major sewerage infrastructure in the area was designed around the original precinct rezoning and expected yields based on the 2012 plan. The total capacities of the existing trunk infrastructure servicing the LTC were calculated to provide an indication of the population that can be serviced by each main constructed. The results are provided in **Table 5**.

Table 5: Existing Infrastructure Capacities

Infrastructure Items	Dimensions	Capacity (dwellings)	Catchment
Bringelly Road Carrier	375mm	6000	Central
East Leppington Truck Main	525mm	7000	Eastern
Distribution mains from SPS1182 to Liverpool WWTP	450mm	N/A	Central/Eastern
Liverpool WWTP (Current forecast at capacity in 2026)	-	10ML Circa 15,000-18,000	All
SPS1183	-	3,800	Central

4.4.2 Future Demand Assessment

To determine the net increase in sewerage demand for the Precinct, the Sewerage Code of Australia (SCA) was used to determine the additional demand generated by the STC.

Table 6 outlines the equivalent population (EP) rates adopted for each land use. These rates were used to determine the population and associated sewer demand for the Precinct. It is acknowledged that the below values are conservative and should be seen as a worst-case scenario.

Table 6: Equivalent Population Rates

Land Use	Unit	EP/Unit
Single occupancy lots	Dwelling	3.5
Medium density dwelling units	Dwelling	3.0

Land Use	Unit	EP/Unit
High density dwelling units	Dwelling	2.5
Commercial	Ha	75
Industrial	Ha	150

Source: Sewerage Code of Australia

As discussed in **Section 4.2**, the precinct is split into three main sewer catchments. To determine the servicing demand for individual infrastructure items within the precinct, the total flow rates for each catchment have been calculated. The estimated demand rates for each catchment are presented in **Table 7** below.

Table 7: Future Sewerage Demand by Catchment

Catchment	Current Zoning (L/s)	Proposed Demand (L/s)	Demand Change (L/s)
Catchment 1	190	19.15	**-170**
Catchment 2	192	313.09	**+121**
Catchment 3	21	845.09	**+866**

The results of the above assessment highlight that, a significant increase of up to 354 percent in sewerage demand could be generated as a result of the Precinct development. The implications of this increase on the existing infrastructure is explored in the following section. The Western catchment is noted to have a reduction in demand however the overall quantum of demand is comparatively small in relation to the central catchment.

4.4.3 Ultimate Infrastructure Requirements

Existing Pipe Upgrades

The following assessment has been undertaken to evaluate the upgrades required to existing constructed infrastructure to service the Ultimate developments. The increased demand requiring servicing has been converted to an equivalent pipe size. These pipes could be provided as new mains running in parallel to existing infrastructure. Or alternatively the existing pipe could be upgraded to include the equivalent additional capacity to those identified below.

Assuming a minimum target grade of 1% for the pipes, the minimum additional pipes required to meet the growth of the Precinct is tabulated in **Table 8**.

Table 8: Equivalent Sewer Pipe Upgrades Required

Infrastructure Items	Catchment	Proposed
Bringelly Road Carrier	2	600mm
East Leppington Trunk Main	1	350mm

In some instances, it may be more efficient to upgrade the existing pipe, as opposed to providing duplicate pipes.

The remaining LTC will need to be serviced by new infrastructure. As this infrastructure is not yet constructed it can be appropriately planned and sized to accommodate the Precinct. The following is a list of additional infrastructure required to service the ultimate development scenario.

- New WWTP at Kemps Creek and/or Decentralised Treatment System. Liverpool WWTP will not be able to cater for the whole development as such a new treatment system is required. Interim development can be treated at Liverpool WWTP until such time as a WWTP is provided. These options are discussed further below.
- New Kemps Creek Carrier to service the Western precinct.

- New Bonds Creek Carrier (North).
- New Pump Station at Kemps Creek.

The above is a short list of the key ultimate upgrades required to service the Precinct. It is important to consider how and when these items will be delivered in order to ensure that development will not stagnate due to lack of infrastructure provision. Many of the above items are already being considered by Sydney Water and indicative timeframes for the delivery of these items are based on the current zoning plan and forecasts. However, DPE as part of this assessment, reviewed and provided a new potential development forecast profile for the Town Centre up to 2037. This forecast indicates that development could occur at a quicker pace than originally planned. This results in existing infrastructure reaching its capacity quicker, requiring upgrades or augmentations earlier than expected.

Using these forecast profiles and the existing capacities of the major infrastructure items, an estimation for the dates whereby infrastructure items will require upgrading has been determined. For comparison the current anticipated upgrade dates have been provided against the new assessed dated based on the revised forecasts.

Table 9: Estimated Trigger Dates for Major Sewer Infrastructure Upgrades

Infrastructure Items	Original Anticipated Year Infrastructure would reach Capacity	Revised Anticipated Year Infrastructure would reach Capacity	Potential Constraint for development
Bringelly Road Carrier	2028	**2029**	**No**
SP1183	2026	**2026**	**No**
Liverpool WWTP (10ML exhausted)	2026	**2028**	**No**

As previously indicated, Sydney Water have advised that the Kemps Creek WWTP or an interim treatment strategy is anticipated to be brought online by approximately 2026. **Table 9** highlights however highlights that all existing major infrastructure should have sufficient capacity to service the proposed ILP based on the additional demand generated from the development. There is a potential risk that development could slow during this period should there not be appropriate measures in place to manage this risk. Alternative options for servicing the Precinct have been explored in the following section. These are subject to detailed modelling and options analysis. It should be noted that the anticipated deliver years are very sensitive to the growth forecasts and as greater details become available these should be reviewed.

Sydney Water also advised that the East Leppington trunk main has been constructed for the ultimate scenario and it is therefore assumed that there will generally be sufficient capacity in the infrastructure to accommodate the LTC demand scenarios. This will need to be confirmed by Sydney Water with detailed modelling. Additional lead-ins could be constructed directly to SP1182, if capacity is an issue.

4.4.4 Sydney Water Advice (30 May 2022)

As identified in **Section 3.4**, Sydney Water have provided updated advice related to the proposed LTC Precinct.

Sydney Water have confirmed that Leppington Town Centre is currently serviced by 3 different wastewater catchments (refer **Figure 20**). The excerpt below is from this advice (refer **Appendix C**);

> *For context, we have provided our summary growth forecast data across the 3 catchments in Attachment 2.*
>
> - *Catchment 1 – within the Eastern Front Catchment to be serviced by Sydney Water's Upper South Creek Advanced Water Recycling Centre (USC AWRC)*

  - *Wastewater services will not be available in Catchment 1 until the USC AWRC facility and associated trunk infrastructure are operational. This is anticipated to occur by mid-2025. Developments with earlier timeframes may investigate other interim options for earlier wastewater services.*
- *Catchment 2 – serviced by sewer pump station SPS1183 that currently transfers to the Liverpool treatment plant, however the SPS1183 catchment will ultimately be serviced by USC AWRC in mid-2025.*
  - *Sydney Water is confident that the forecast growth of up to 748 dwellings and 944 jobs to 2025 can be serviced in this catchment. Attachment 2 details the dwellings and job number forecasts based on Council DA data, DPE information and applications to Sydney Water.*
  - *Sydney Water requests that Council continues to follow the standard concurrence DA referral process for development in Catchment 2. This will ensure system resilience is maintained, in the period until mid-2025, when wastewater flows will be connected to USC AWRC. In preparation for this, Sydney Water has commenced work to expedite an additional tranche of the Bonds Creek carrier that enables the trunk mains connection to USC AWRC.*
- *Catchment 3 is currently serviced and will continue to be serviced by SPS1182 that is connected to the Liverpool wastewater treatment facility.*
  - *Sydney Water modelling shows that the portion of Leppington Town Centre serviced by SPS1182 can support currently forecasted growth up to 2026 and into the future.*

4.4.5 Servicing Options

The requirement for servicing options to be implemented will be subject to development rollout and availability of Sydney Water's ultimate servicing strategy. Each option presents a unique set of challenges and opportunities with regard to staging, construction difficulty, agreements with third parties, cost and minimising redundant infrastructure. These option assessments have been provided in relation to the risk that Liverpool WWTP capacity could be exhausted earlier than the current planned 2026 date.

Central and Eastern Catchments

The existing major infrastructure currently servicing the central catchment will not have sufficient capacity to service any of the Precinct demand. However, the Bonds Creek Carrier and Kemps Creek pump station are estimated to be online by 2022. Sydney Water have also advised that Liverpool WWTP has approximately 10 ML of spare capacity to accommodate growth in the area. Taking this into consideration, three strategies have been explored to service the precinct until Kemps Creek WWTP or Sydney Water's interim strategy is brought online.

- Option 1 (refer **Appendix B**):
  1. A new gravity transfer pipe to be constructed to bypass SP1183 and connect directly into the new Bonds Creek Carrier (North). This will avoid the need to upgrade SP1183 and allow excess wastewater to flow onto the new Kemps Creek SPS and ultimately transfer to Liverpool WWTP until it too reaches capacity. (Proposed Kemps Creek pump station will be required to have capacity to pump the additional flow that cannot be serviced from SP1183 to Liverpool WWTP.)
  2. Kemps Creek WWTP or interim strategy brought forward from 2026. This option poses significant challenges particularly with timing, approvals and funding. Alternatively a decentralised, packaged system or third party operator could be explored to provide an interim solution. Irrigation systems could be explored however the irrigation areas required and the fragmented land ownership may not make this option viable.

- Option 2 (refer **Appendix B**):
  1. A new gravity transfer pipe to be constructed to bypass SP1183 and connect directly into the new Bonds Creek Carrier (North). This will avoid the need to upgrade SP1183 and allow excess wastewater to flow onto the new Kemps Creek SPS and ultimately transfer to Liverpool WWTP

until it too reaches capacity. (Proposed Kemps Creek pump station will be required to have capacity to pump the additional flow that cannot be serviced from SP1183 to Liverpool WWTP.)

2. Assuming the Kemps Creek WWTP cannot be brought online prior to 2026, explore options to upgrade Liverpool WWTP to increase operational efficiency and capacity.

- Option 3 (refer **Appendix B**):
  1. Again, A new gravity transfer pipe to be constructed to bypass SP1183 and connect directly into the new Bonds Creek Carrier (North). This will avoid the need to upgrade SP1183, and allow excess wastewater to flow onto the new Kemps Creek SPS and ultimately transfer to Liverpool WWTP until it too reaches capacity. (Proposed Kemps Creek pump station will be required to have capacity to pump the additional flow that cannot be serviced from SP1183 to Liverpool WWTP.)
  2. Assuming the Lowes Creek WWTP or decentralised solution is operational by 2024, the existing rising main from SP1183 could be diverted from Liverpool WWTP to Lowes Creek WWTP prior to Liverpool reaching full capacity. This would allow 3,800 dwellings to be diverted away from Liverpool WWTP and provide a buffer to until Kemps Creek WWTP is brought online. This option whilst not ideal, could provide a low cost buffer provided a Lowes Creek treatment solution is available.

Western Catchment

As noted in **Section 4.2** the Western Catchment does not currently have access to sewer services. The catchment will be required to be serviced via a connection to the Kemps Creek Carrier which drains to the Kemps Creek pump station. Capacity of the pump station would have to take into consideration the demand generated from this western catchment of the LTC, however, the demand generated from the LTC is minor.

A summary of the potential servicing requirements for all catchments is illustrated in **Appendix B**.

4.5 Conclusions

Given the presence of existing wastewater mains throughout the Precinct, as shown in **Figure 21**, it is likely that there will be some spare sewer capacity in the network for the initial stages of development. However, given the significant increase in land use yields from the current zoning to the proposed Precinct, a number of infrastructure items likely require upgrading.

Bringelly Road Carrier is estimated to require upgrading in 2029-2030, the equivalent size of the pipe will be dependent on the growth rate for the Precinct.

The long-term strategy for the precinct will potentially require one following three strategies. Each of these strategies will require detailed modelling and assessment to be undertaken to assess the most viable option. Sydney Water are currently exploring treatment alternatives and are aware of the potential increased yield the new LTC Could deliver.

- Option 1: Kemps Creek WWTP or interim strategy brought forward from 2026 to 2024. Transfer gravity pipe is constructed in 2023 from the Bringelly Road Carrier to bypass SP1183 and connect directly into the Bond Creek Carrier. Proposed Kemps Creek pump station will be required to have capacity to pump the additional flow that cannot be serviced from SP1183 to Liverpool WWTP. New connection into Kemps Creek Carrier to service the western catchment.
- Option 2: Upgrade Liverpool WWTP to increase capacity or efficiency in order to service the Precinct and surrounding precincts until at least 2026. Transfer gravity pipe is constructed in 2023 from the Bringelly Road Carrier to bypass SP1183 and connect directly into the Bond Creek Carrier. Proposed Kemps Creek pump station will be required to have capacity to pump the additional flow that cannot be serviced from SP1183 to Liverpool WWTP. New connection into Kemps Creek Carrier to service the western catchment.

- Option 3: Pending if the Lowes Creek WWTP is operational by 2024, the rising main from SP1183 is diverted from Liverpool WWTP to Lowes Creek WWTP. Transfer gravity pipe is constructed in 2024 from the Bringelly Road Carrier to bypass SP1183 and connect directly into the Bond Creek Carrier. Proposed Kemps Creek pump station will be required to have capacity to pump the additional flow that cannot be serviced from SP1183 to Liverpool WWTP. New connection into Kemps Creek Carrier to service the western catchment.

Should Sydney Water indicate that there is additional spare capacity in the network, these upgrades may be reduced or eliminated.

5. Electricity

5.1 Current Long-Term Strategy

The following section provides a brief chronology of the publicly available servicing strategies for the region. The strategy has evolved as greater clarity around development has occurred since 2012 however generally the underlying bulk servicing concept has largely remained the constant.

Austral & Leppington North Precincts Infrastructure Delivery Plan

The Infrastructure Delivery Plan identified that a substation would be required to supply lots within the Austral and Leppington North Precincts. Capacity for 700 to 1,400 lots within Austral could be provided via a connection to the Hinchinbrook ZS. A substation site on Fifteenth Avenue adjacent the proposed light industrial area was noted as being the preferred location due to proximity to existing transmission lines. This substation would supply lots in the northern portion of the Precinct.

The study identified no existing capacity would be available to supply development within the Leppington North Precinct, and a new substation would therefore be required to allow development to occur. The ILP identified an indicative location for the substation on the corner of Bringelly and Dickson Roads, adjacent the light industrial area. This substation would supply lots in the southern portion of the Precinct. A portable substation was proposed to provide a short-term supply strategy before a permanent substation could be constructed.

Leppington Infrastructure Delivery Plan

The Leppington Infrastructure Delivery plan focused on Endeavour Energy's 2014 Growth Servicing Strategy. The Strategy identified that the Precinct could be serviced by two planned zone substations at South Leppington and Leppington North.

Phase one of a staged ZS was constructed in 2014/15 at South Leppington, located east of Camden Valley Way. The ZS was constructed with half of the proposed transformers and was provided to service East Leppington as a full substation would require additional investment and not be utilised for some years. Once the complete substation is delivered, it would have sufficient capacity to supply the southern half of the Leppington Precinct. Construction of this Leppington North ZS was completed mid-2021

Endeavour Energy Growth Servicing Strategy 2015

Endeavour Energy's 2015 Growth Servicing Strategy was compiled assuming the following dwellings would be provided in the Precincts by 2025:

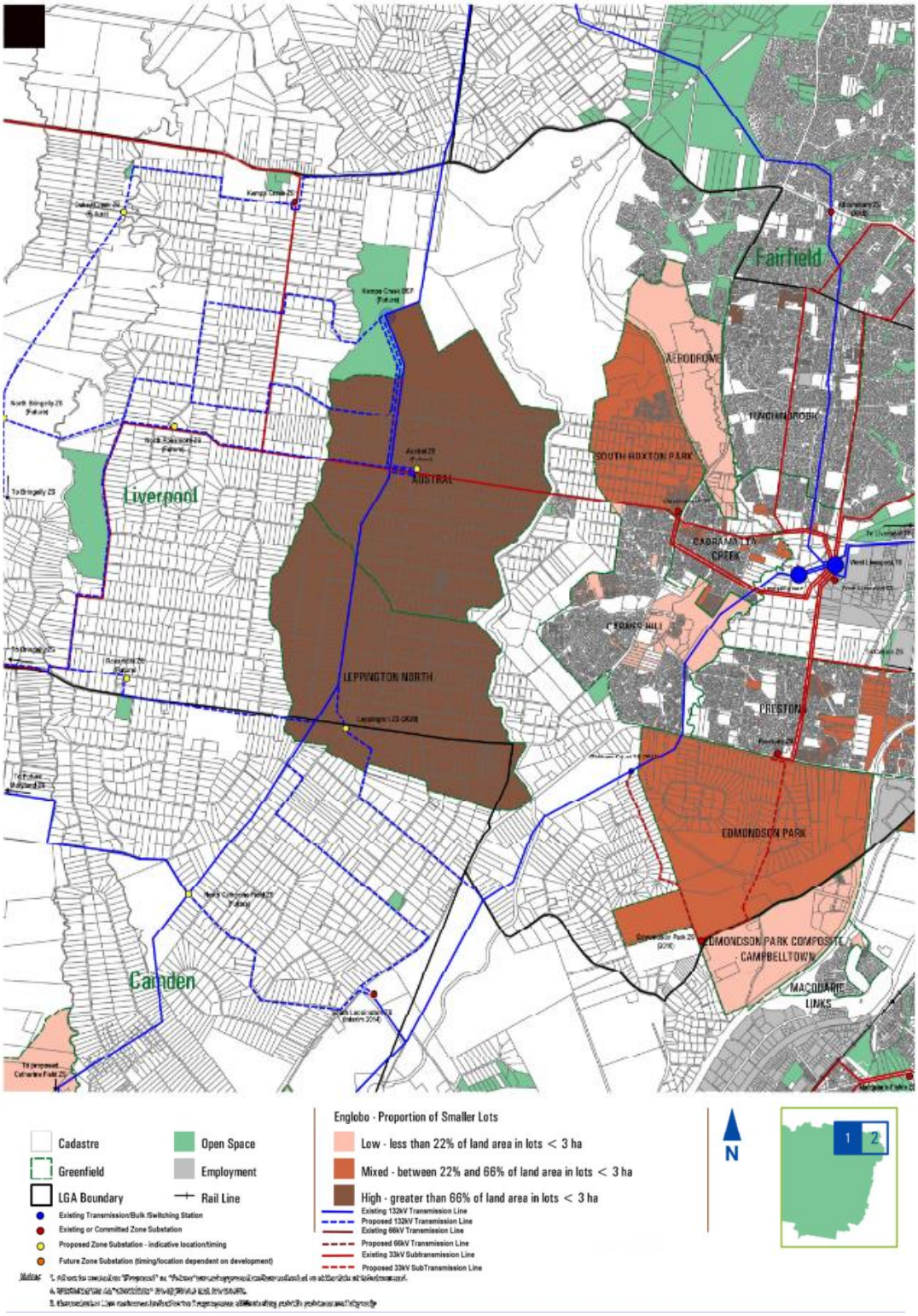
- 6,700 dwellings in Austral
- 9,000 dwellings in Leppington North
- 9,000 dwellings in Leppington

As discussed above, the proposed initial servicing strategy for Austral involved providing lead-ins from the Hinchinbrook ZS. The Precinct will ultimately receive electrical supply from a new Austral ZS.

Initial servicing for Leppington North would require distribution feeders from Prestons ZS and South Leppington ZS. These works were anticipated for delivery in 2015/16. A new zone substation would be required for the ultimate servicing strategy.

The proposed servicing strategy is shown on **Figure 22** and highlights the proposed new substations and transmission lines.

Figure 22: Southwest Sector Greenfield Servicing Strategy



Source: Endeavour Energy Growth Servicing Strategy (2015)

Endeavour Energy Screening for Non-Network Options – North Leppington and Leppington Precincts

In February 2016 Endeavour Energy prepared a report which explored non-network options to address the limitations of the 11 kV network between the South Leppington and Prestons zone substations.

The study assumed the following yields, provided by DPE, would be provided in each of the precincts:

- 8,500 dwellings in Austral
- 7,500 dwellings in Leppington North
- 7,000 dwellings in Leppington
- 4,500 dwellings in East Leppington

The study area and assumed yields as shown on **Figure 23** below.

The existing high voltage network in the Leppington and Leppington North Precincts consists of overhead wiring of a rural standard. The network extends from South Leppington and Prestons ZSs, located 6km and 7km respectively from the Precincts. Large voltage drops are experienced due to the distance which makes it economically challenging to service large scale developments within the above-mentioned Precincts.

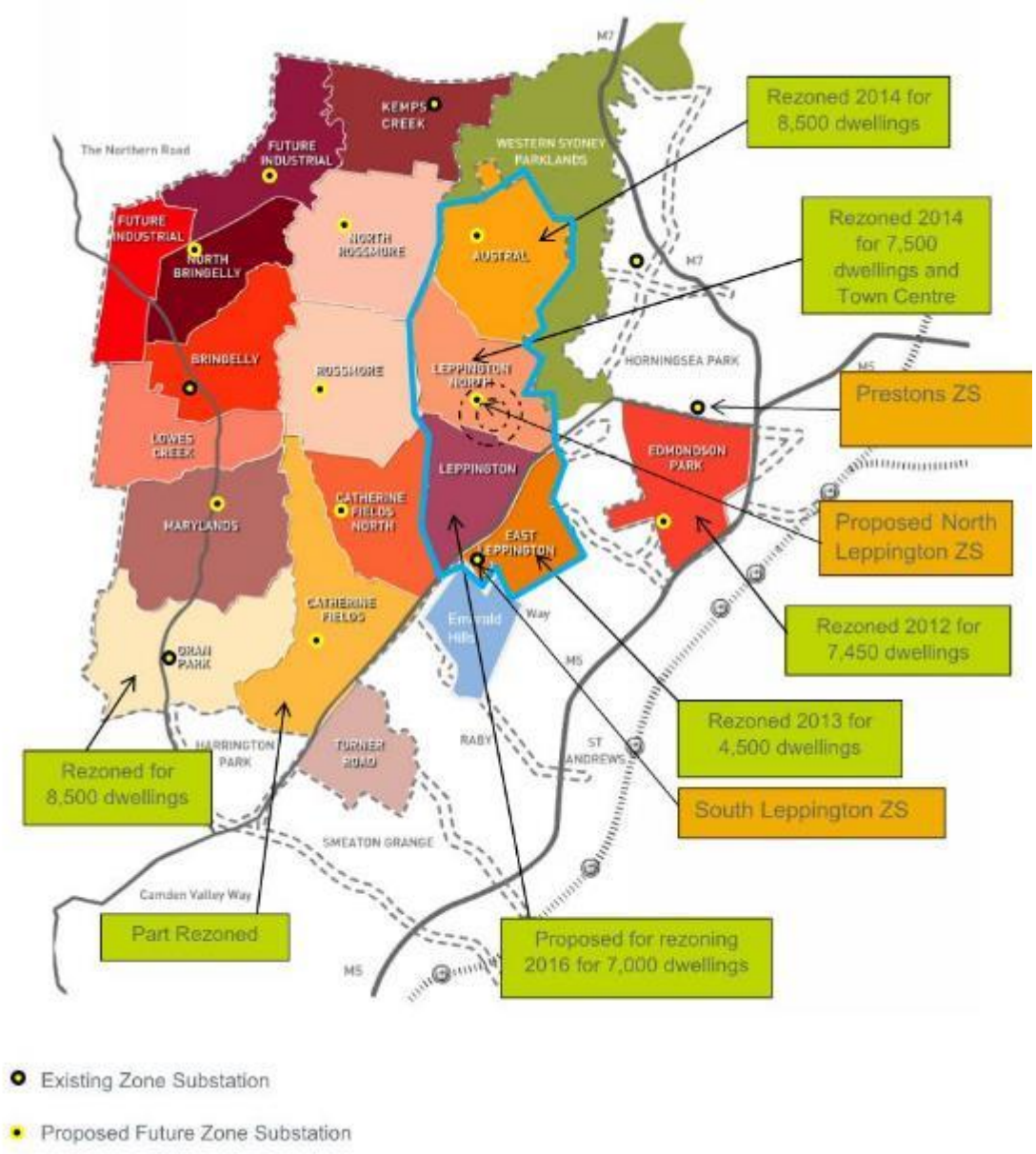
South Leppington ZS has been commissioned to support development in East Leppington. This substation consists of a single transformer and sub transmission feeder substation. Due to the distance to the North Leppington Precinct, it is economically challenging to extend feeders from the South Leppington ZS to service development.

While some initial capacity could be provided from the Prestons and South Leppington ZSs, there would be insufficient supply to match the rate of development by 2017.

The North Leppington ZS will supply the Precinct in the long term and is expected to cost $20 million. This substation would be constructed in a staged fashion, initially with a single transformer with space provided for a second transformer to be constructed when required. Construction of this substation will enable the South Leppington and Prestons ZSs to service the growth in their respective precincts.

EE explored the potential to defer construction of the proposed substation by reducing the overall demand from existing customers on the 11 kV feeders. To defer construction of the substation by one year a reduction of 1.2 MVA (equivalent to the electrical demand of 300 dwellings) would be required by 2017/18. This was found to be technically unfeasible, and therefore a new zone substation will be required to service development in the Precinct.

Figure 23: Endeavour Energy Assumed Yields for WSGA



Source: Screening for Non-Network Options – North Leppington and Leppington Precincts – Endeavour Energy (2016)

Endeavour Energy Directions Paper 2019-2024

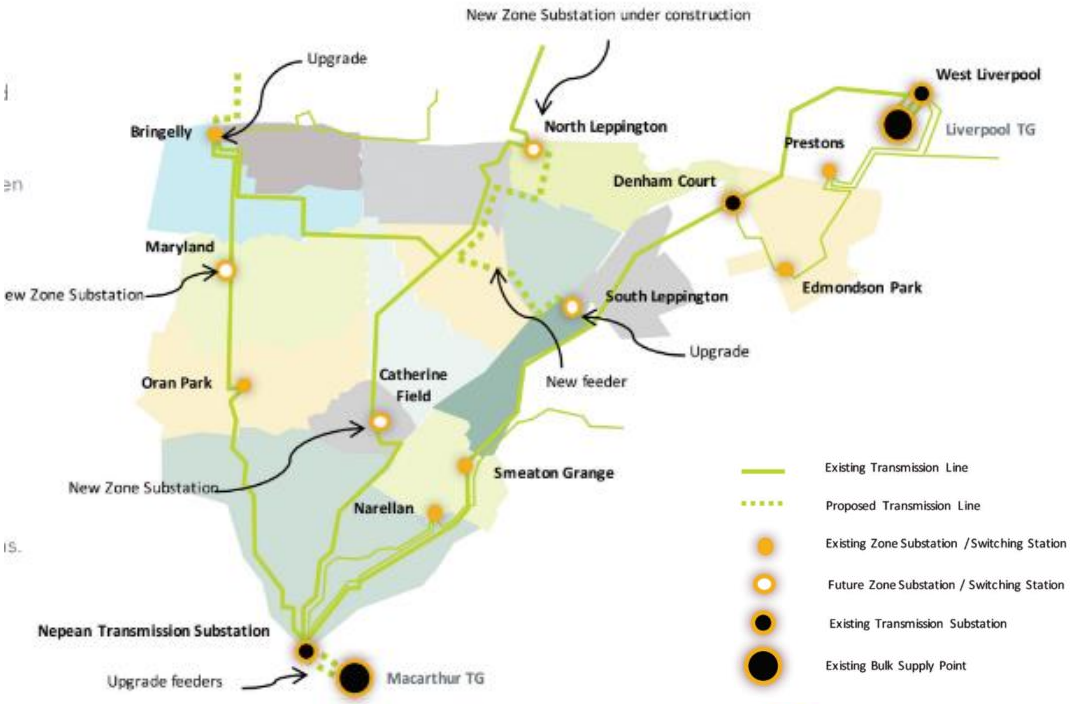
In 2017 Endeavour Energy published their directions paper for 2019-2024. The strategy for the South West Growth Area is shown on **Figure 24** below. The figure confirms that the strategies discussed in the sections above have largely remained unchanged.

EE identified that despite prudent investment in the past, capacity constraints for greenfield development remains in specific locations. As new precincts are rezoned and higher densities are provided around transport corridors and town centres than previously anticipated, planned infrastructure is increasingly becoming insufficient to meet the demand generated.

Endeavour Energy will invest approximately $85 million on growth projects to support development in the South West Growth Area between 2019 and 2024. Endeavour Energy have also committed to

upgrading the existing temporary substation at South Leppington. New transmission lines will be provided between the new substations.

Figure 24: Endeavour Energy South West Growth Area Strategy



Source: Endeavour Energy Directions Paper 2019-2024 (2017)

5.2 Existing Constructed Network

As mentioned earlier, at the time of writing, Sydney Water had only provided existing constructed data up to 2018. A request has been submitted, however, no response has been received. Taking this into consideration, the existing infrastructure provided in this assessment is assumed to be a worst-case minimum.

The LTC is serviced by the Endeavour Energy (EE) electrical network. At present, there is minimal trunk electrical infrastructure located within the study area. A 132kV and a 330kV transmission line are located approximately 1.6km west of the Leppington train station. These transmission lines have an associated easement width of 45m and 60m respectively.

No construction can occur within the easement area however, this space may potentially be used for purposes including public recreation and open space, gardening and landscaping and roads. These uses are subject to TransGrid approval.

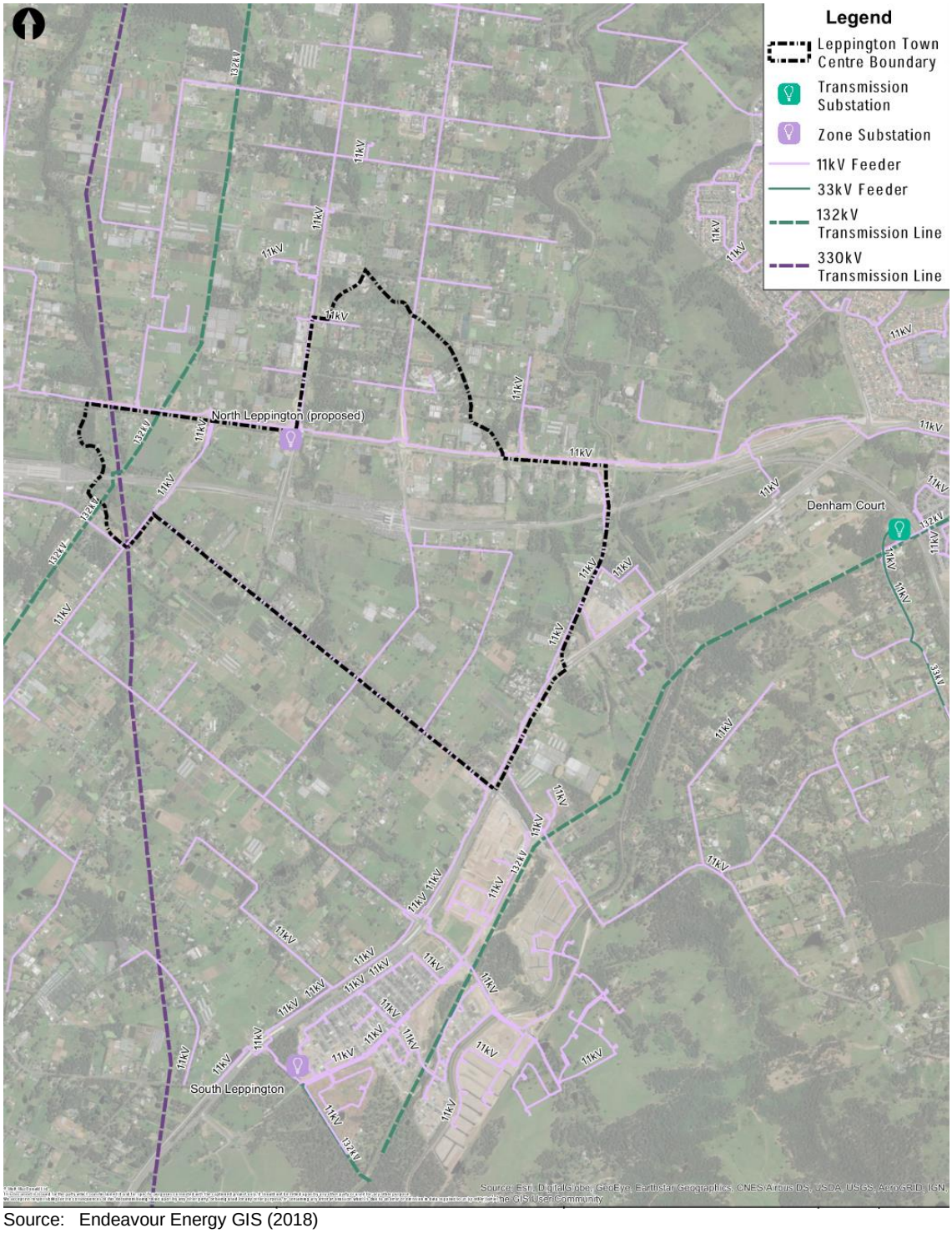
There are several existing ZSs in the vicinity of the study area. The closest is the North Leppington ZS, located approximately 1.2km North West of Leppington train station. This substation is connected to the surrounding substations and bulk supply points via a series of transmission lines.

The Denham Court Transmission Substation is located approximately 2.9km East of the train station and is situated adjacent the rail line. The Prestons ZS is located on the Northern side of Camden Valley Way, approximately 5km from the station.

Existing dwellings in the study area receive power supply via a series of overhead cables located within the road reserve. 11kV feeders have been constructed along most major roads. Feeders traverse the

Northern side of Bringelly Road and extend north along Fourth and Edmondson Avenues. To the South of the rail corridor feeders are located along Eastwood, Dickson and Rickard Roads. The existing electrical network is shown on **Figure 25** below and **Appendix A**.

Figure 25: Existing Electricity Network



Source: Endeavour Energy GIS (2018)

5.3 Concept Supply Assessment

The following electrical analysis will mirror the assessment approach outlined in **Section 1.4**, The two main components of the assessment are to determine if/when/how the existing constructed infrastructure may need to be upgraded to match proposed yields and growth profiles. Secondly for infrastructure yet to be constructed, evaluate the future servicing options for the precinct and identify broader network limitations that may impact either the ability for new development to occur or require acceleration/augmentation for the ultimate yield.

- Identify the current ultimate long-term strategy for the region/network. Determine current interim strategies or current planned rollout of infrastructure.
- Identify the existing constructed trunk infrastructure and the existing residual capacities available for additional development (if any).
- Estimate future demand generated from the new land use yield scenarios.
- Determine the ultimate infrastructure requirements for the new development yield scenarios and based on a future growth forecast, estimate the when either new infrastructure will be require or at what point upgrades will be required. This process will highlight where amendments may need to be made to the current authority strategies as well as identify risks to development rollout.
- Develop, if required, interim servicing options for the Precinct to mitigate the identified issues. Within the strategies identify opportunities for alternative servicing options.

5.3.1 Existing Infrastructure Capacities and Limitations

Endeavour Energy's latest advice identified that the substation will be constructed in stages, with Stage 1 due for completion in June 2019 (now completed). This stage included two 45 MVA transformers yielding a firm capacity of 45 MVA. Endeavour Energy have indicated that the substation could be augmented at a later date to include an additional 45 MVA transformer (increasing the available firm capacity to 90 MVA) and three 11kV switchboards, should it be required to meet future demands.

An updated feasibility application has been lodged with Endeavour Energy to confirm the servicing strategy for the site. This section of the report will be updated with the results of this investigation when they become available.

As the major electrical infrastructure was planned around the original precinct yields, an assessment has been undertaken to determine if this infrastructure can adequately supply the proposed increase in density within the LTC. This is outlined in the following sections.

5.3.2 Future Demand Assessment

A high-level assessment of the electrical demands for future Precinct ILP has been undertaken. This included a calculation of the expected electrical demand for the existing planned land uses to assess the change in demand associated with the proposed changes in land use. This was based on electrical demand rates provided by Endeavour Energy, which are provided in **Table 10** below.

Table 10: Electricity Load Assumptions

Land Use	Unit Load (VA/sqm or VA/dwelling)
Medium Density Residential	3,000
Low Density Residential	10,000
Civil Uses	25
Commercial	100
Retail	100
Light Industrial/ Bulky Goods	15
Car Park	5

Endeavour Energy has provided an evaluation of the expected electrical demands. This was undertaken using the rates provided above and included the application of a diversification factor of 0.8 to account for overestimation of the peak period demand. The results are tabulated in **Table 11** below. These demands are indicative only and should be further refined as more information becomes available regarding final built forms.

Table 11: Future Electrical Demand

Scenario	Diversified Demand (MVA)	Net Increase (MVA)	Number of 11kV Feeders Required
Current Planned Growth	93.1	+0	21
Proposed Growth	192.24	+99	45

5.3.3 Ultimate Infrastructure Requirements

As discussed in **Section 5.3.1**, the North Leppington ZS will have a total firm capacity of 45 MVA, with potential to augment the substation to include an additional transformer which would increase the total firm capacity to 90 MVA. It is anticipated that this augmentation will be required by 2028 to support growth within the LTC and surrounding precincts.

The Precinct is not expected to be completely supplied by the Leppington North Zone Substation and additional network support is required in the long term.

While bulk supply in the town centre will be available, new 11kV feeders will also need to be rolled out from the ZSs as development occurs. Where appropriate EE may decide to provide some feeders into the town centre, where viable this would assist with the land fragmentation in the Town Centre.

5.4 Conclusions

The existing electrical strategy for the area involves the creation of a new zone substation at North Leppington. Endeavour Energy have indicated that there is potential to augment this substation to increase the available capacity as development occurs.

After augmentation, the North Leppington ZS will have sufficient capacity to support a large proportion of development with further supply being reliant on shedding power to neighbouring zone substations to address the long term shortfall. There are not envisaged to be any hurdles to supplying the Precinct and these strategies support the potential rezoning of a number of scenarios in the Town Centre.

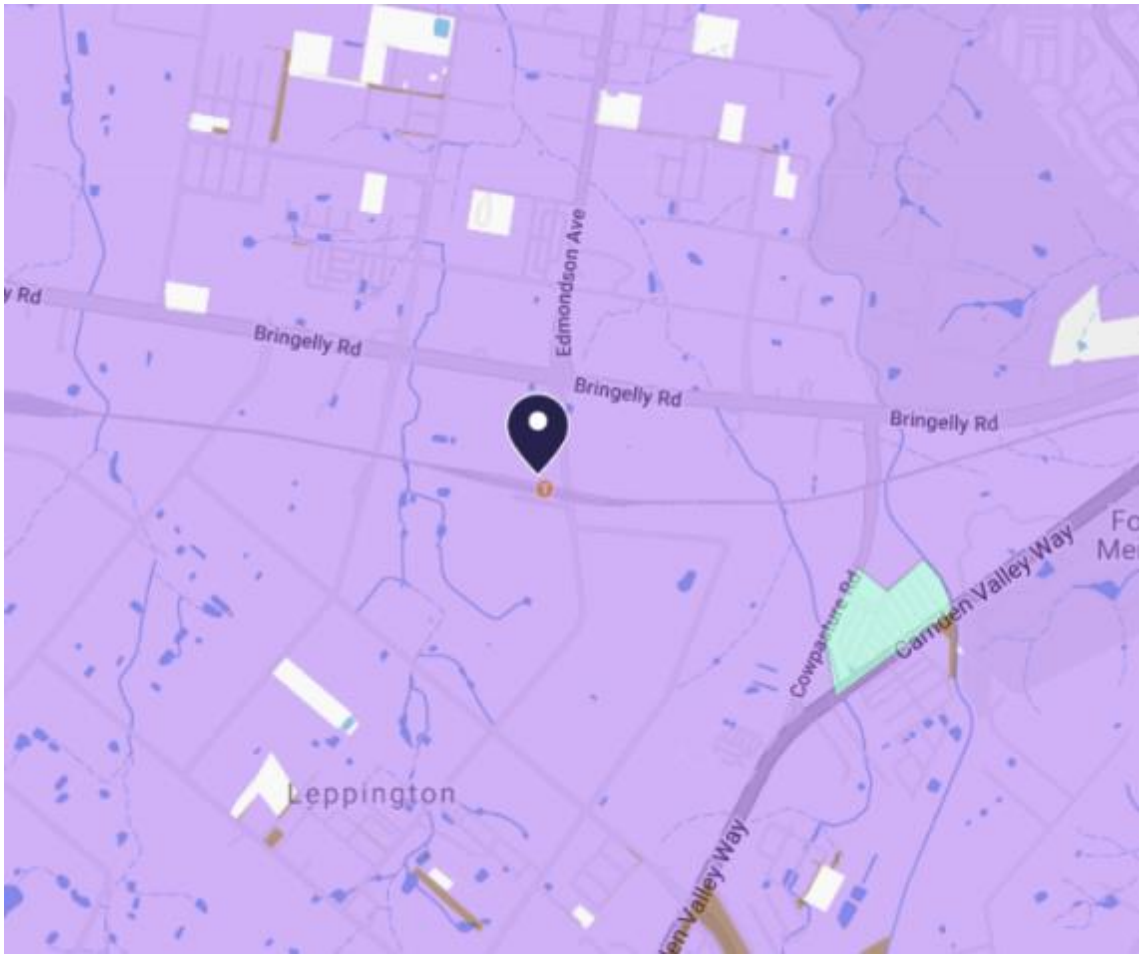
It should be noted that capacity cannot be reserved for specific developments. Should external developments proceed ahead of the Precinct, the available supply will be used to service these projects first. Further engagement with Endeavour Energy should be prioritised to ensure future planning takes into consideration the density and growth projections of the LTC.

6. Telecommunications

6.1 Existing Network

NBN currently provide telecommunications servicing to the study area. Many of these assets are underground fibre optic cables. Fibre optic assets can prove challenging to relocate and add significant costs to a project. Where possible, relocation of these assets should be avoided. Telstra's existing network is shown on **Figure 26** below.

Figure 26: Existing NBN Network



6.2 Servicing Strategy

NBN Co. will utilise existing ducts within the shared trench of existing roads to install new telecommunications infrastructure. Developers will be expected to provide pit and pipe infrastructure, and any other required infrastructure within the site boundary. This includes providing ducts for any new roads.

New connections to the NBN network incur a charge of $600 per single dwelling unit and $400 for each multi dwelling unit. It is not anticipated that any backhaul charges will be applicable for the development.

7. Gas

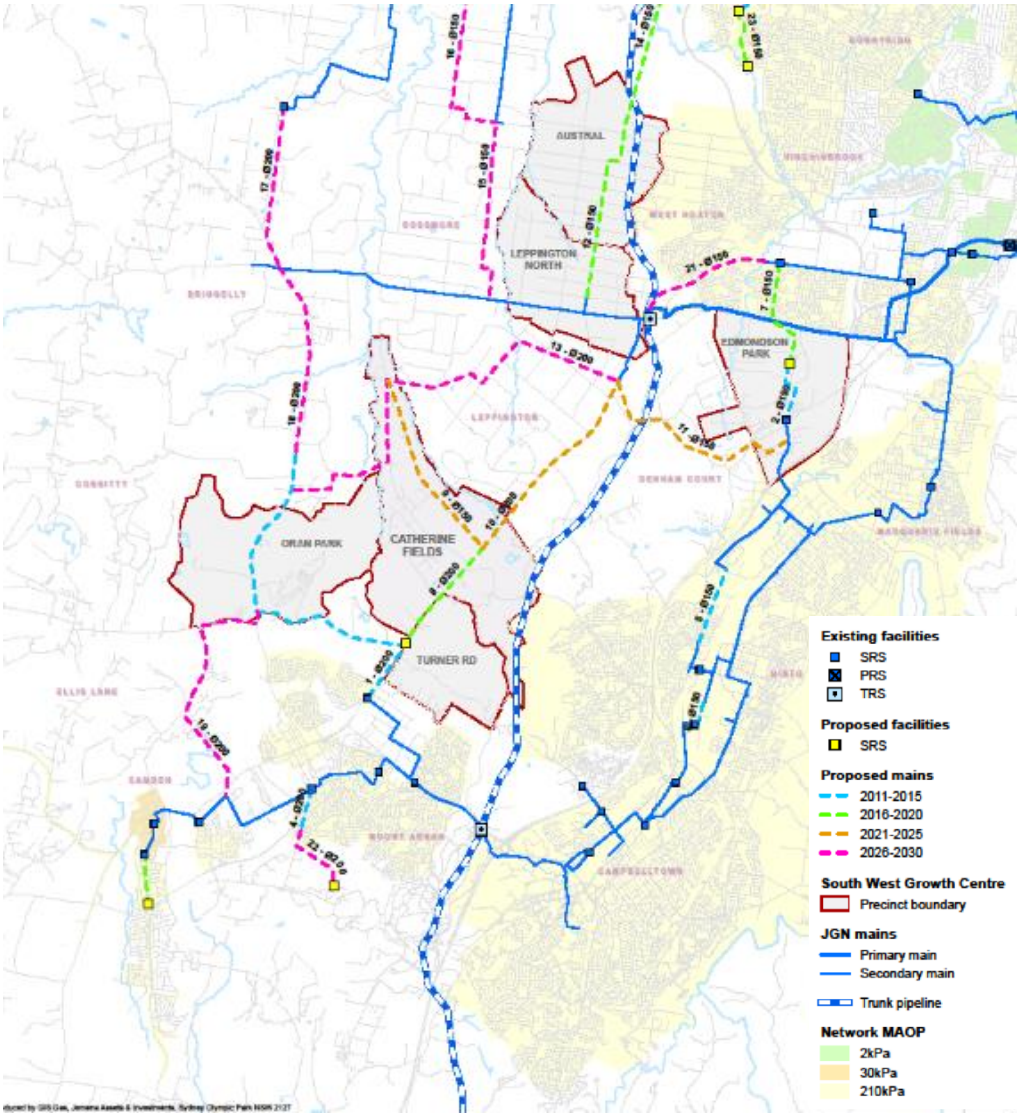
7.1 Current Long-Term Strategy

7.1.1 Austral & Leppington North Precincts Infrastructure Delivery Plan

During preparation of the Infrastructure Delivery Plan in 2012 no specific requirements relating to the provision of gas for the Precincts were identified. Jemena advised the development could be serviced by their gas network and that minimal capital contributions would be required for infrastructure augmentation.

The planned gas network is shown on **Figure 27** below. The existing secondary main along Cowpasture Road will be extended southwards between 2021-2025. A gas main is also proposed on Ingleburn Road in the south of the study area. This main is expected to be delivered by 2026-2030.

Figure 27: South West Growth Centre Gas Network Planning



Source: *Austral & Leppington North Precincts Infrastructure Delivery Plan* - GLN Planning (2012)

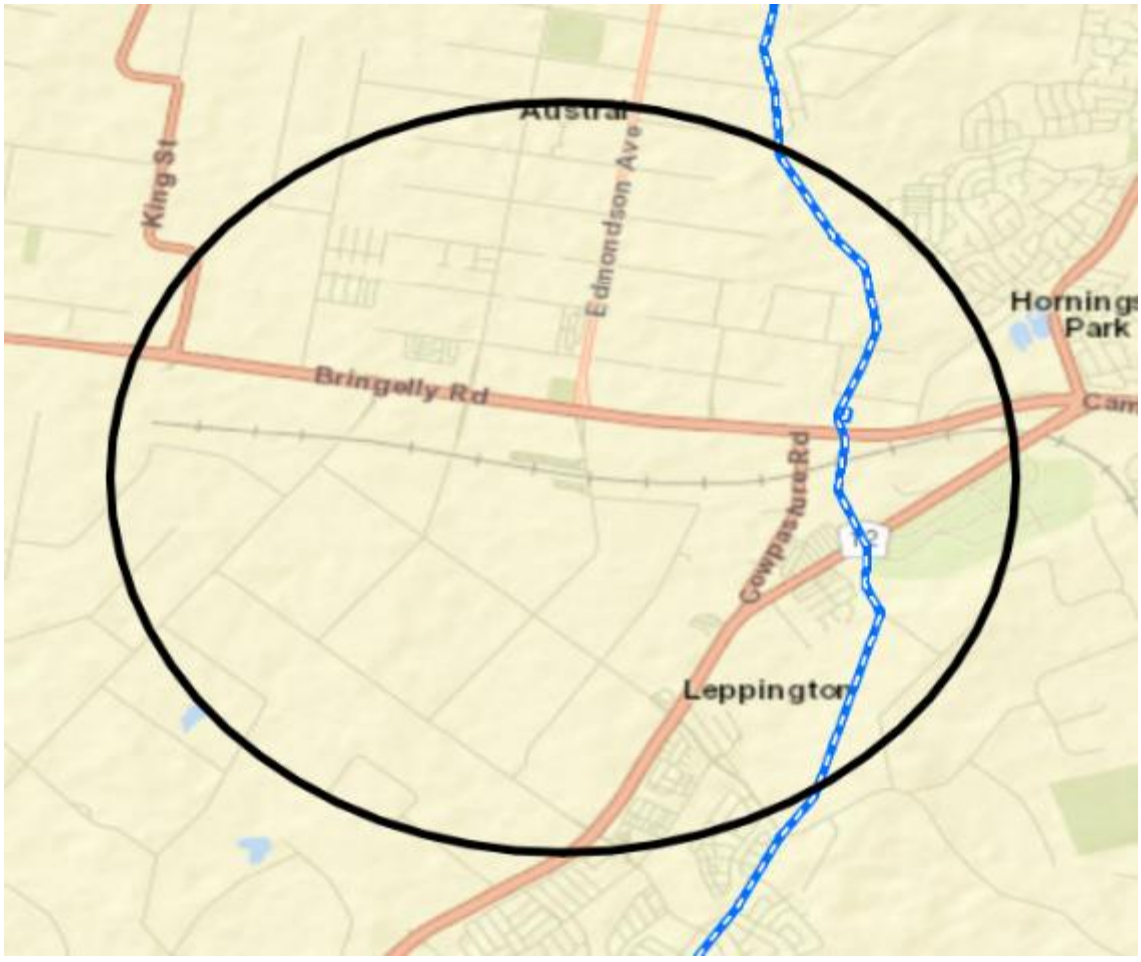
7.1.2 Leppington Precinct Infrastructure Delivery Plan

The Infrastructure Delivery Plan for the Leppington Precinct confirmed the strategy outlined on **Figure 27**. The feeder main along Cowpasture Road will be extended further south to a proposed pressure reduction station at the intersection of Camden Valley Way and Heath Road. Jemena concluded that the precinct would be adequately serviced by gas given its proximity to existing and proposed infrastructure.

7.2 Existing Network

Gas is supplied to the area by Jemena. A 7,000 kPA high pressure trunk pipeline is located to the east of Camden Valley Way. A 1,050 kPa secondary main extends from the trunk pipeline along Bringelly Road, north of the rail line. A secondary main also extends southwards along Cowpasture Road. New dwellings to the east of Cowpasture Road are serviced with gas via a series of 210 kPa network mains located within the road reserve. The existing gas network is shown on **Figure 28** below.

Figure 28: Existing Gas Network



Source: DBYD (2021)

7.3 Servicing Strategy

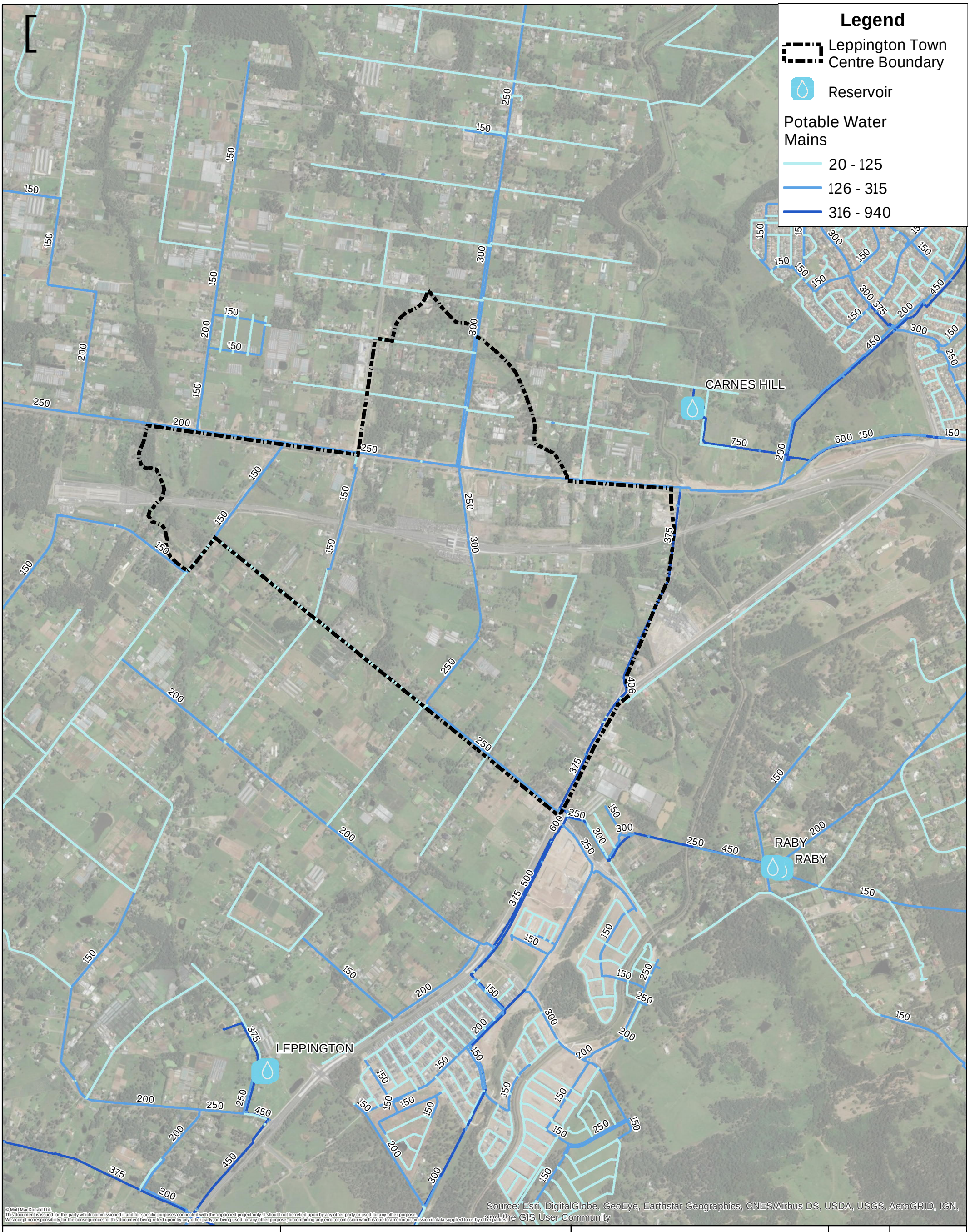
The Precinct is generally well serviced by existing gas trunk infrastructure. There is currently a primary gas main running along Bringelly Road, and this will be the key feeder for the Leppington Town Centre. Secondary and reticulation gas mains will be provided from the primary main. At present there are few major connections. Jemena have indicated that a new trunk main is also proposed for Ingleburn road

and delivery is expected between 2026-2030 and will increase the Precincts gas connectivity. Under both scenarios it is not expected that there will be any gas supply issues and it is noted that Jemena is required to ensure that any connection to the natural gas distribution system is commercially viable and therefore must assess each request for supply on an individual basis (as gas supply is a non-essential service). It is expected that with an increase in residential yield, gas supply will become more favourable and will also help reduce electrical demand in the precinct. Additional pipe upgrades will be required as development occurs but are expected to be monitored and managed by Jemena.

Gas mains will be constructed within the standard trench allocation of the road reserve. Any truck mains required will likely be extended from the existing gas network in Leppington.

Appendices

A. Existing Services Plans



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Client
NSW Department of Planning & Environment

Rev	Date	Drawn	Description	Ch'k'd	App'd
TA	02/11/18	TA	FOR INFORMATION	GL	CA

Title
Leppington Planned Precinct
Existing Potable Water Network

0 250 500 750 1,000 Metres

Scale at A3
1:20,000

Drawn	T Abbot
Checked	G. Lee
Approved	C. Avis

Drawing Number
397165-MMD-S-U-GIS-0103

Security	Status	Rev
STD	PRE	P2

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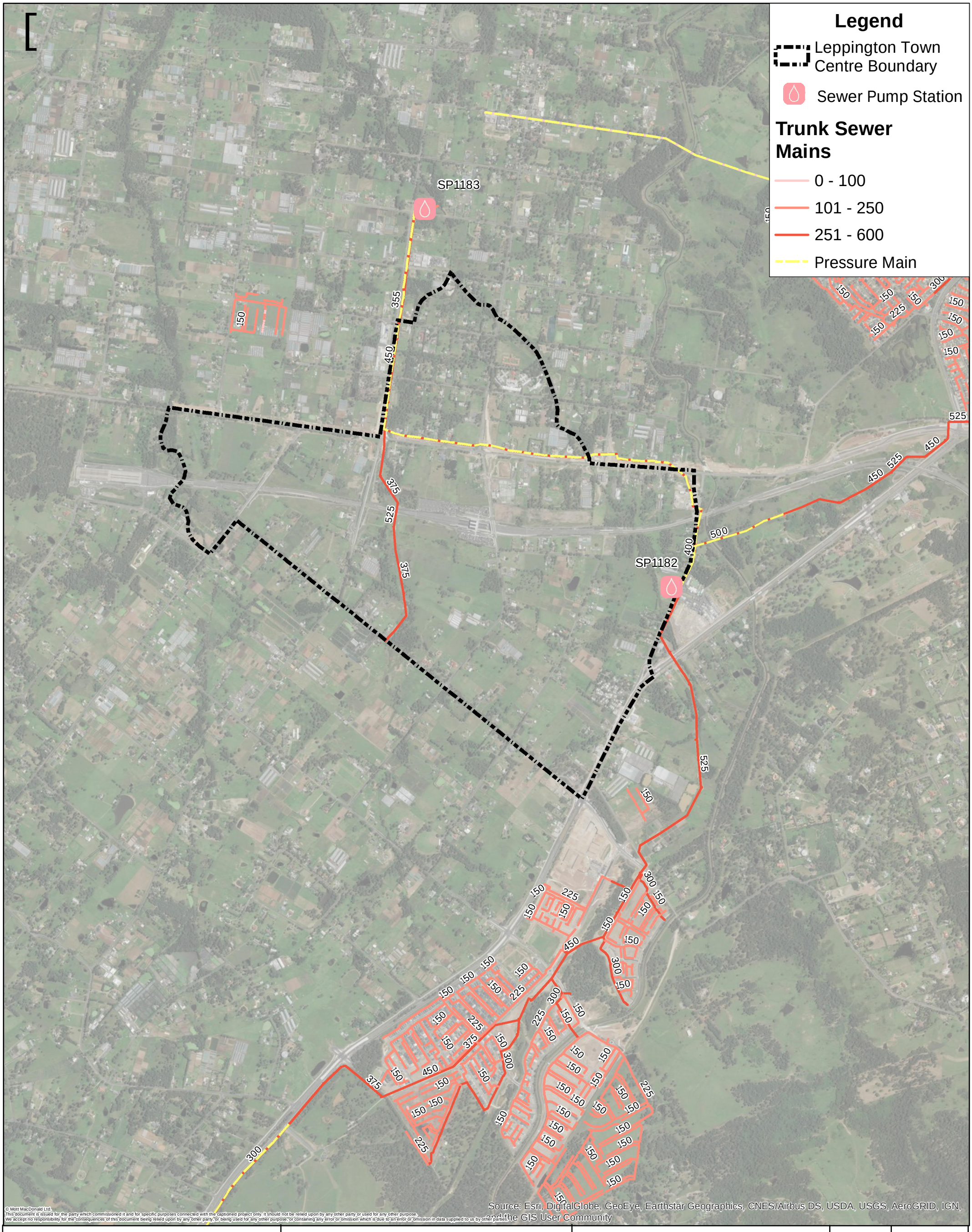

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NSW Department of Planning & Environment

Rev	Date	Drawn	Description	Ch'k'd	App'd
TA	02/11/18	TA	FOR INFORMATION	GL	CA

Title
Leppington Planned Precinct
Existing Sewer Network

Metres
0 250 500 750 1,000

Drawn	T Abbot
Checked	G. Lee
Approved	C. Avis
Scale at A3	1:20,000

Drawing Number
397165-MMD-L-U-GIS-0200

Security	Status	Rev
STD	PRE	P2

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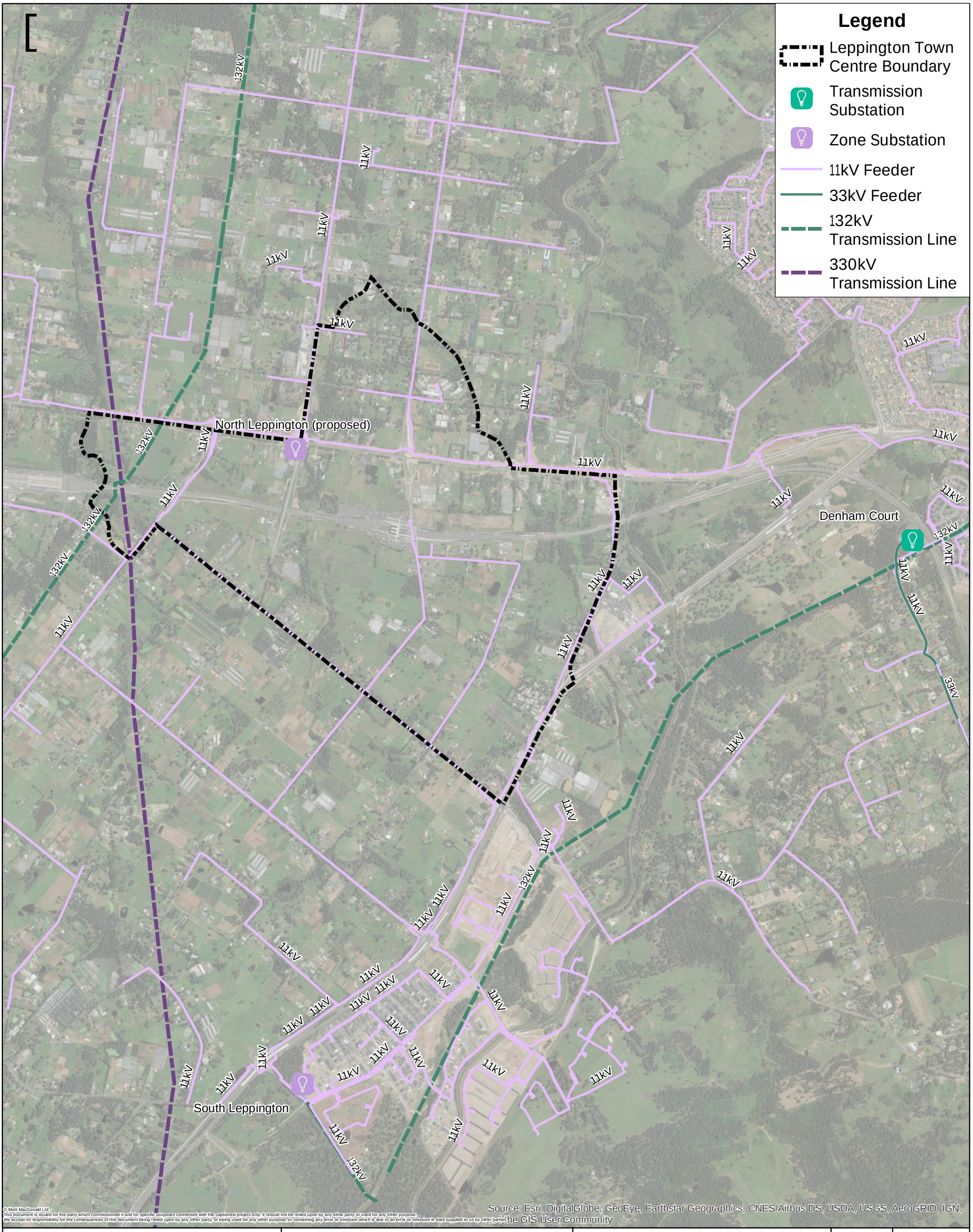

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Client: NSW Department of Planning & Environment

Rev	Date	Drawn	Description	Ch'k'd	App'd
TA	02/11/18	TA	FOR INFORMATION	GL	CA

Title: Leppington Planned Precinct Existing Electrical Network

0 250 500 750 1,000 Metres

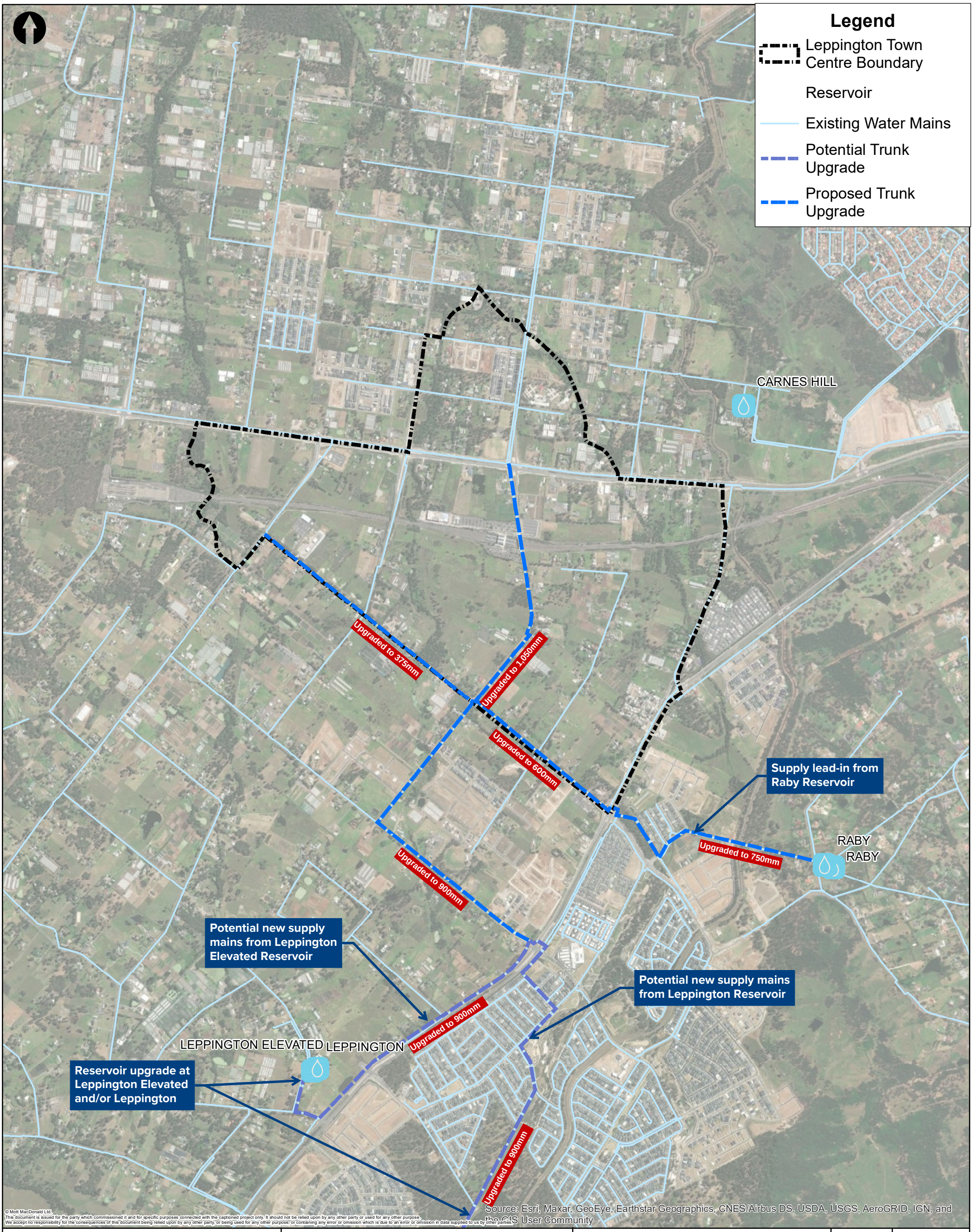
Drawn	T Abbot
Checked	G. Lee
Approved	C. Avis
Scale at A3	1:20,000

Drawing Number: 397165-MMD-L-U-GIS-0301

Security	Status	Rev
STD	PRE	P2

P:\Sydney\Projects\39xxxx\397165\04 Working\1. ArcGIS\1. MXD's\Leppington\397165-MMD-L-U-GIS-0301-P2 - Leppington - Existing Electrical.mxd

B. Proposed Services Plans



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Client: NSW Department of Planning & Environment

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	16/11/18	RH	FOR INFORMATION	GL	CA
P2	16/09/21	TL	FOR INFORMATION	JW	JW

Title: Leppington Town Centre Proposed Potable Water Network

Scale at A3: 1:20,000

0 250 500 750 1,000 Metres

Drawn	T Loder
Checked	J Wukowic
Approved	J Wukowic

Drawing Number: 397165-MMD-S-U-GIS-0110

Security	Status	Rev
STD	PRE	P2

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To possible future Kemps Creek WWTP (subject to confirmation)

Kemps Creek Pump Station

SP1190

Kemps Creek Carrier

Austral Carrier 2

Bonds Creek Carrier

Gravity connection to Bonds Creek Carrier to be constructed

SP1183

Liverpool WWTP predicted to reach full capacity in 2028

Disuse rising main

SP1182

Upgraded to 600mm

Legend

- Leppington Town Centre Boundary
- Existing Pump Station
- Proposed Pump Station
- Potential Pump Station Upgrade
- Existing Gravity Main
- Proposed Gravity Main Duplication
- Proposed Gravity Main
- Proposed Pressure Main
- Existing Pressure Main
- Potential Pressure Main Upgrade

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Rev	Date	Drawn	Description		App'd
P1	16/11/18	RH	FOR INFORMATION	GL	CA
P2	16/09/21	TL	FOR INFORMATION	JW	JW

Title: Leppington Town Centre Proposed Sewer Option 1

0 250 500 750 1,000 Metres

Drawing Number: 397165-MMD-L-U-GIS-0210

Drawn	T Loder
Checked	J Wukowic
Approved	J Wukowic
Scale at A3	1:25,000

Security	Status	Rev
STD	PRE	P2

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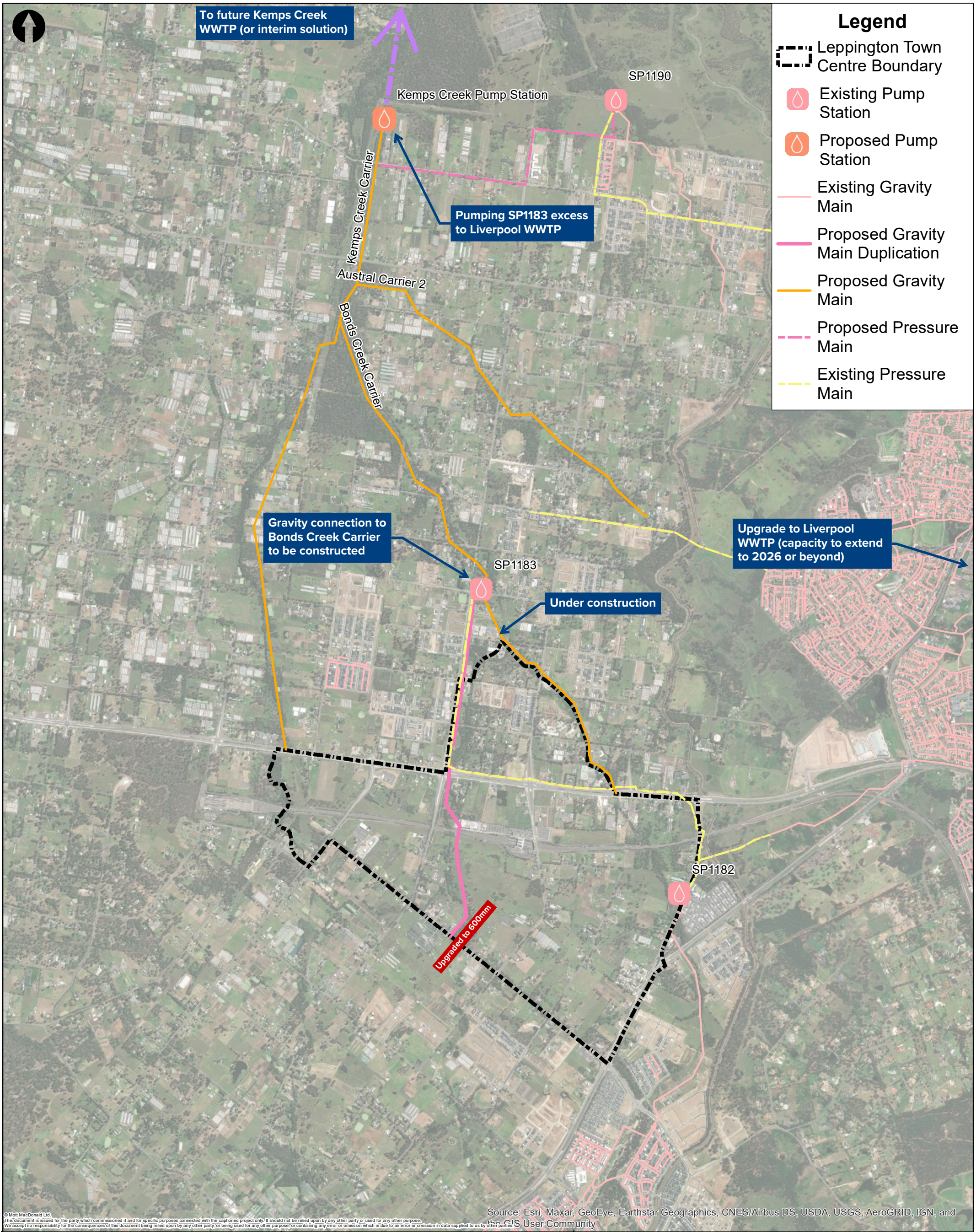

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Rev	Date	Drawn	Description	C	App'd
P1	16/11/18	RH	FOR INFORMATION	GL	CA
P2	16/09/21	TL	FOR INFORMATION	JW	JW

Title: Leppington Town Centre Proposed Sewer Option 2

0 250 500 750 1,000 Metres

Drawing Number: 397165-MMD-L-U-GIS-0211

Drawn	T Loder
Checked	J Wukowic
Approved	J Wukowic
Scale at A3	1:25,000

Security	Status	Rev
STD	PRE	P2

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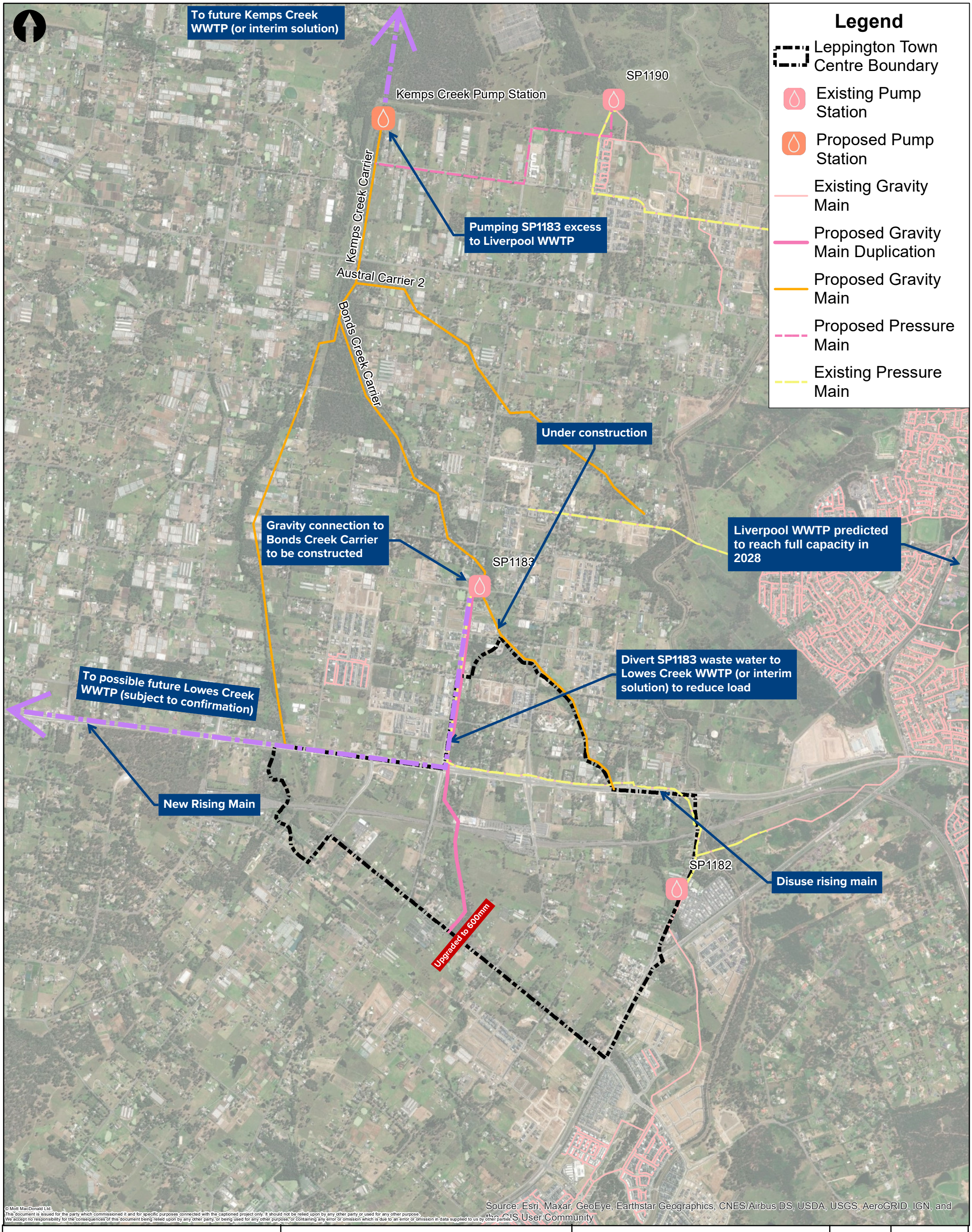

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Rev	Date	Drawn	Description	C	App'd
P1	16/11/18	RH	FOR INFORMATION	GL	CA
P2	16/09/21	TL	FOR INFORMATION	JW	JW

Title: Leppington Town Centre Proposed Sewer Option 3

Drawn	T Loder
Checked	J Wukowic
Approved	J Wukowic
Scale at A3	1:25,000

Drawing Number: 397165-MMD-L-U-GIS-0211

Security	Status	Rev
STD	PRE	P2

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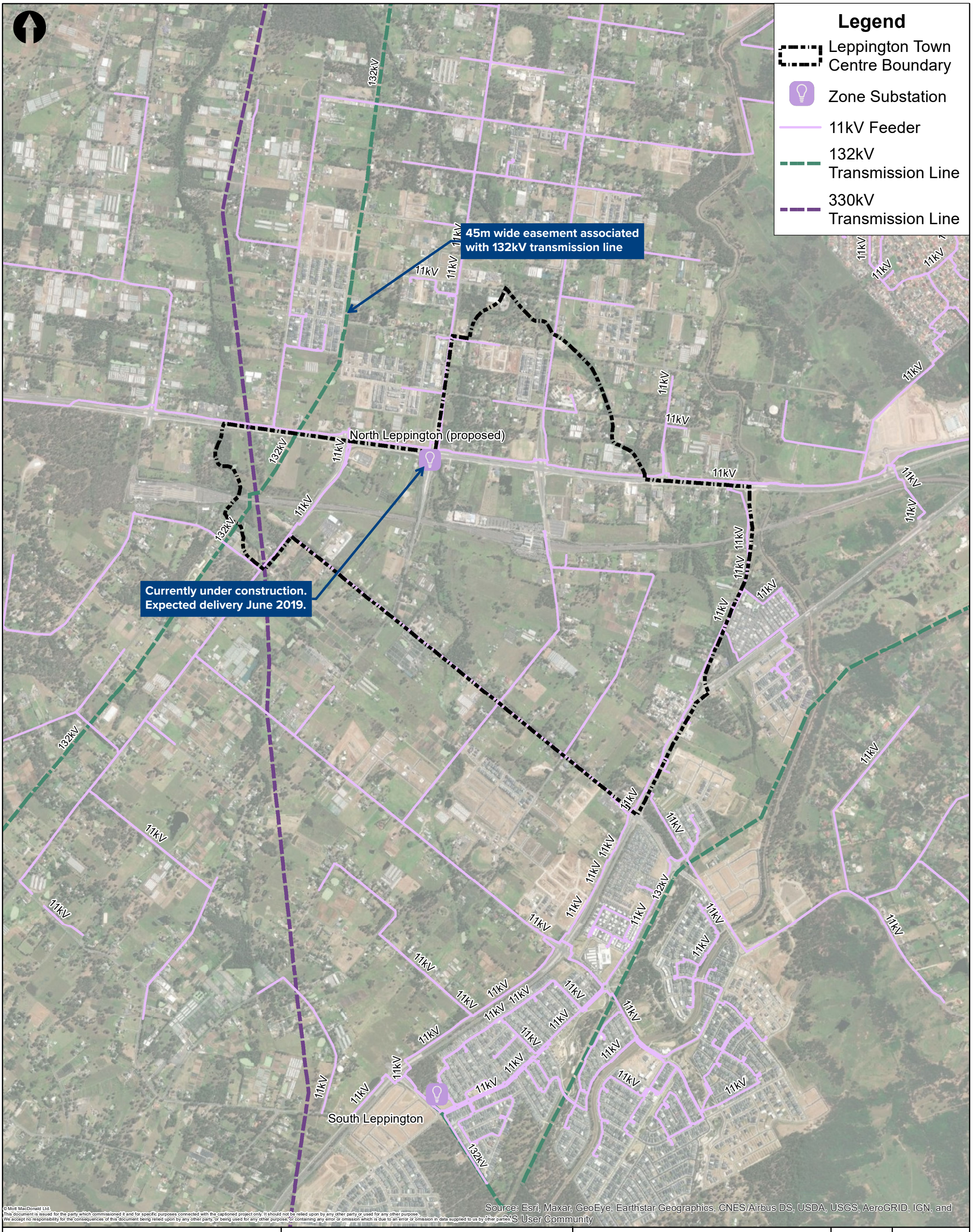

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Client: NSW Department of Planning & Environment

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	16/11/18	RH	FOR INFORMATION	GL	CA
P2	16/09/21	TL	FOR INFORMATION	JW	JW

Title: Leppington Town Centre Proposed Electrical Network

0 250 500 750 1,000 Metres

Drawn	T Loder
Checked	J Wukowic
Approved	J Wukowic

Scale at A3: 1:20,000

Drawing Number: 397165-MMD-L-U-GIS-0310

Security	Status	Rev
STD	PRE	P2

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C. Sydney Water Advice

30 May 2022 Our Ref: 194324

[redacted]

Dear Martin,

RE: Leppington Town Centre Review, Leppington

Thank you for providing Sydney Water with the proposed development plans and growth data for the Leppington Town Centre Review. We understand that the plan aims to create approximately 10,500 dwellings by 2041 and develop the area surrounding Leppington station.

Sydney Water supports government growth initiatives within its servicing area and endeavours to provide services to new, rezoned or uplifted growth areas in line with its Growth Servicing Plan. Sydney Water's proposed services are dependent upon robust growth data, layout plans and supporting demand intelligence to support the investment, planning and delivery for new or amplified assets and infrastructure.

For the future servicing of Leppington Town Centre, Sydney Water provides the following advice;

Wastewater Servicing

Leppington Town Centre is serviced by 3 different wastewater catchments (see Attachment 1). For context, we have provided our summary growth forecast data across the 3 catchments in Attachment 2. Note that our forecast based on the sources we have available does not align completely with the Mott Macdonald forecast of 500 dwellings per annum from FY 2022.

- Catchment 1 – within the Eastern Front Catchment to be serviced by Sydney Water's Upper South Creek Advanced Water Recycling Centre (USC AWRC)
    - Wastewater services will not be available in Catchment 1 until the USC AWRC facility and associated trunk infrastructure are operational. This is anticipated to occur by mid-2025. Developments with earlier timeframes may investigate other interim options for earlier wastewater services.
- Catchment 2 – serviced by sewer pump station SPS1183 that currently transfers to the Liverpool treatment plant, however the SPS1183 catchment will ultimately be serviced by USC AWRC in mid-2025.

- Sydney Water is confident that the forecast growth of up to 748 dwellings and 944 jobs to 2025 can be serviced in this catchment. Attachment 2 details the dwellings and job number forecasts based on Council DA data, DPE information and applications to Sydney Water.

- Sydney Water requests that Council continues to follow the standard concurrence DA referral process for development in Catchment 2. This will ensure system resilience is maintained, in the period until mid-2025, when wastewater flows will be connected to USC AWRC. In preparation for this, Sydney Water has commenced work to expedite an additional tranche of the Bonds Creek carrier that enables the trunk mains connection to USC AWRC.

- Catchment 3 is currently serviced and will continue to be serviced by SPS1182 that is connected to the Liverpool wastewater treatment facility.
  - Sydney Water modelling shows that the portion of Leppington Town Centre serviced by SPS1182 can support currently forecasted growth up to 2026 and into the future.

Water Servicing

- Water is supplied via the Leppington and Raby Water Supply Zones (WSZs). Amplifications are required to the networks within both WSZs to service the proposed 10,500 dwellings. Hydraulic modelling work to identify the required amplifications and timeframes is in progress and scheduled for completion in October 2022.
- Until these amplifications are delivered the system capacity is forecast at approximately 1000 dwellings or equivalent dwelling/employment mix.
- To support the timely delivery of required amplifications, Sydney Water ask that Council assist by providing any updates to development information.
- Understanding growth and development locations will allow Sydney Water to identify any interim water servicing issues for these developments. Developer led amplifications (e.g larger pipes and pressure boosters) may provide options to support additional capacity while the WSZ works occur.

Recycled Water Servicing

- Sydney Water supports the use of recycled water and/or harvested stormwater to meet non-drinking demands for the proposed development plan. We believe these measures would contribute to meeting liveability, productivity and a sustainability vision for Western Sydney.
- In light of the Upper South Creek Advanced Water Recycling Centre and future amplifications in the WSZs, Sydney Water is currently reviewing recycled water opportunities in the area. It is anticipated that recycled water provision will form part of a future solution.

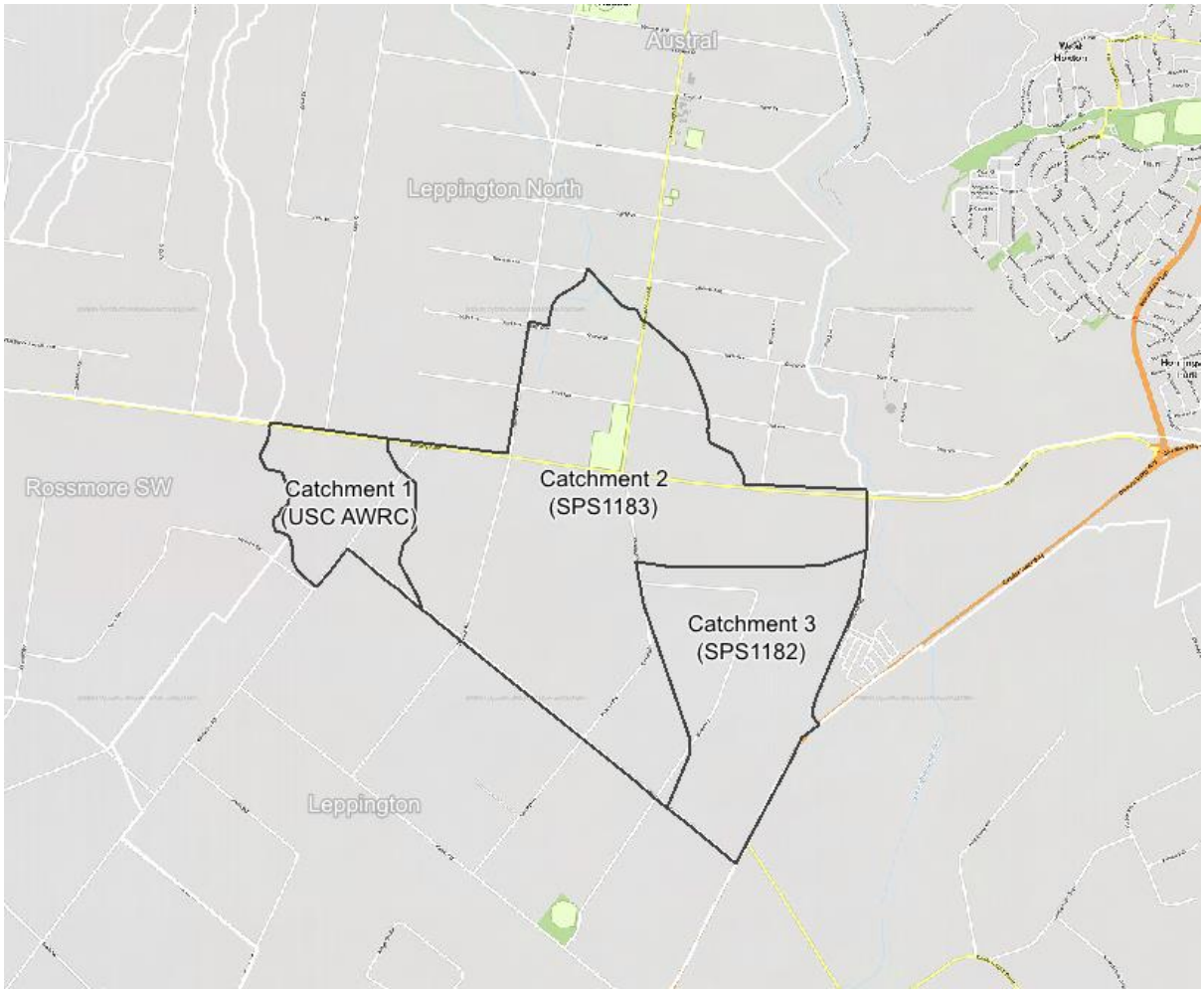
- To future-proof the proposed development plan, design for the water supply could include provision for dual plumbing/recycled water connection. There may be an opportunity to mandate dual pipe through provisions in Council's DCP.

To progress, Sydney Water will continue with our servicing investigations and delivery plans and continue to share regular updates with Council/DPE. We also commit to continue to work with Council to monitor current, in flight and future growth uptake in the three wastewater sub catchments. In understanding growth, Sydney Water will continue to work with developers in the area to get detailed growth plans and timescales and look at best solutions for interim and ultimate servicing.

[redacted]

[redacted]

Attachment 1:



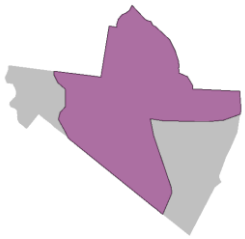
Wastewater catchments across Leppington Town Centre

Attachment 2:

Excerpts from Sydney Water's growth dataset based on consolidated Council DA data, DPE information and applications to Sydney Water. The tables below show dwelling and job numbers apportioned within each catchment boundary.

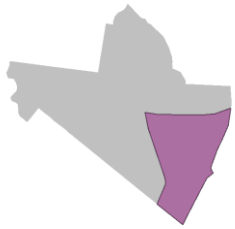
Catchment 1

Growth	FY2022	FY2023	FY2024	FY2025	Total by FY2025
Total dwellings	0	0	0	0	0
Job no	0	0	21	12	33



Catchment 2

Growth	FY2022	FY2023	FY2024	FY2025	Total by FY2025
Total dwellings	0	29	281	438	748
Job no	0	115	364	465	944



Catchment 3

Growth	FY2022	FY2023	FY2024	FY2025	FY2026	Total by FY2026
Total dwellings	0	4	223	195	205	627
Job no	0	0	241	0	0	241