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SMEC INTERNAL REF. 3002795

South Jerrabomberra Regional Job Precinct

# Infrastructure Assessment – Utility Infrastructure Technical Report

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## Important Notice

This Report considers current infrastructure network constraints and potential augmentation required to support land use intensification and master planning as it relates to hydrogeology and water demand. This report is generally qualitative in nature and design has not been undertaken to inform the study findings. Future studies will be necessary to provide a detailed demand analysis and to provide additional clarity around the infrastructure needs of the study area.

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# Executive Summary

The objective of the Regional Job Precincts (RJP) program is to provide a more streamlined planning process to drive investment and development in regional NSW. The RJP program focuses specifically on targeted locations that are ready for development and will support thriving industries and job creation. SMEC has been engaged by Department of Regional NSW (DRNSW) to prepare an assessment of infrastructure needs to help attract new business to the South Jerrabomberra region, and support job growth.

The focus of this report is to disseminate a technical assessment of the utilities demand of the South Jerrabomberra RJP into plain English. The objectives of the report are to:

- Assess the potential increased demand for power, telecommunications, water and sewage as a result of development within the RJP
- Identify expansion to utility infrastructure that is needed to support the preferred Master Plan, including the land required for infrastructure
- Provide recommendations for a coordinated, precinct-wide approach to utilities provision
- Provide recommendations for updates to existing infrastructure contribution plans to support the cost-effective, equitable and timely provision of key utilities infrastructure for the RJP
- Recommend Development Control Plan provisions for consideration by Queanbeyan Palerang Regional Council.

**Electricity and Gas**

The energy demands of the RJP may vary depending on what industries choose to establish in the precinct. It is suggested to stage the development of the RJP in a way that allows for future additions to the network as required load materialises. The adoption of a predominantly customer funded substation will support the short term (Stage 1) energy demands of early movers to the RJP. The medium term option (Stage 2) presents a network where energy demand is managed through a new substation and augmented by rooftop solar panels. Additional network capacity could be supported by a grid battery or Better Energy Storage System (BESS). It is suggested that in the long term (Stage 3 and 4) the provision of a second substation with 2 x approximately 40 MVA Transformers would deliver the base power needs for the RJP and provide opportunities to accommodate a range of industries.

**Telecommunication and Internet Services**

A number of suggestions are provided to ensure that stakeholder expectations for modern industrial and business precincts are met. Suggestions include increasing the capacity of the 5G network through the allocation of land to the three major mobile operators or a shared tower operator. Further recommendations include the installation of a public Wi-Fi network and Internet of Things (IoT), smart street poles, electric vehicle (EV) charging stations, copper and fibre networks, and supporting the development of datacentres. When developing a Development Control Plan for the precinct, it is recommended Council consider requesting larger width verges to provide sufficient area for the installation of telecommunications infrastructure to support the intended nature of the innovation precinct.

**Potable Water Supply**

An upgrade to the Jerrabomberra Reservoir is likely to be required to support the development of Stages 2 to 4 of the RJP and it is noted that council is planning an upgrade to this reservoir which will likely be a duplication of the existing 22.5ML. Modelling has been undertaken to determine the preliminary pipe sizes required to support the development of the additional lots in the Environa area of the RJP.

The modelling undertaken identified that a second supply main from the Jerrabomberra Parkway, part of Jerrabomberra Reservoir Zone, was required during Stage 2. Pipe sizes will need to be refined and further reticulation mains added as the road and lot layout, and specific industry demands, are confirmed over time.

### Sewer Pump Station

The existing 88 L/s capacity proposed for the new Tralee Sewer Pump Station (SPS) at Ultimate is anticipated to be insufficient by the end of Stage 2 and will require upgrade. It is noted that the draft *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O) also highlighted upgrade requirements for Tralee SPS with an initial augmentation to 140 L/s in 2030 and a further augmentation in 2040 to an ultimate capacity of 240 L/s. An upgrade to ~120 L/s is required for Stage 3 inflows with a further augmentation to ~150 L/s being required to accommodate Ultimate inflows anticipated under Stage 4.

By the end of Stage 2 the proposed 400kL emergency storage volume is less than the nominal 8hr ADWF storage requirements. This would trigger an augmentation of the emergency storage volume to 614kL. Further augmentations to increase the emergency capacity to 966kL and 1,245kL are required for Stages 3 and 4 respectively.

### Trunk Sewer Upgrades

Portions of the existing DN600 trunk main have been identified as being under capacity, leading to overflows along Kendall Avenue. General capacity of the existing DN600 trunk sewer is approximately 330 L/s, which is first exceeded under the Stage 3 wet weather inflows.

### Sewage Treatment Plant

There is an existing project to upgrade the Queanbeyan Sewage Treatment Plant (STP) to a new facility to cater for up to 75,000 Equivalent Persons (EP) and is anticipated to be completed by mid-2024. It is also noted that a Stage 2 upgrade is also planned for the new STP, which would increase capacity to 150,000 EP; however, timing for Stage 2 is yet to be confirmed. The current Stage 1 augmentation for the Queanbeyan STP appears to be sufficient for the anticipated EP's through to Stage 4. Future applications for rezoning or development of land which increase EP's would be subject to additional levying of contributions, as appropriate.

However ongoing monitoring of population forecasts and inflows to the Queanbeyan STP will be required as part of continued review and updating to the sewer servicing strategy to ensure adequate capacity is maintained and possible timing for a Stage 2 upgrade.

### Funding Mechanisms

The South Jerrabomberra Local Infrastructure Contributions Plan 2018 levies development contributions under Section 7.11 of the EP&A Act for local infrastructure associated with previously anticipated development in Poplars, Environa, North and South Tralee, Forest, Morrison and Walsh. The contributions under the South Jerrabomberra Local Infrastructure Contributions Plan 2018 are at the maximum permitted levy, and cover planned infrastructure for the land associated with Stage 1 to 3 of the master plan, based on current zonings.

As the master plan changes land uses and increases the demand for infrastructure in the RJP, any additional infrastructure will need to be funded by levies associated with the release of additional development parcels in Stage 4, or would need to be separately funded.

Given that the growth anticipated by the RJP Master Plan is much greater than that previously contemplated in this contributions plan, it is recommended that an updated development contributions plan be prepared by QPRC to cover the growth anticipated in the area, and the change in land zonings.

Section 64 of the Local Government Act 1993 allows contributions to be levied towards the provision of water, sewerage and stormwater infrastructure, provided a Developer Servicing Plan is in place. A contributions plan can cover both Section 7.11 and Section 64 contributions. When updating the provisions of the South Jerrabomberra Local Infrastructure Contributions Plan 2018 to accommodate the increased demand associated with the new and changed land uses in the RJP, Council should also consider ensuring sufficient levying of Section 64 contributions.

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# 1 Introduction

The objective of the Regional Job Precinct (RJP) program is to provide a more streamlined planning process to drive investment and development in regional NSW. The RJP program focuses specifically on targeted locations that are ready for development and will support thriving industries and job creation. SMEC has been engaged by Department of Regional NSW (DRNSW) to prepare an assessment of infrastructure needs to help attract new business to the South Jerrabomberra region, and support job growth.

This report firstly provides an assessment of existing (baseline) conditions of the electricity and gas, telecommunications, water and waste water supply to the RJP. This report then tests the additional demand that would result from the fully realised Master Plan, and recommends upgrades, augmentations or highlights capacity constraints. This report provides commentary on infrastructure funding mechanisms and next steps in understanding the infrastructure needs. The South Jerrabomberra RJP is accessed via Tompsitt Drive, via a new north-south collector signalised intersection to “Environa Drive” providing access to South Tralee residential area and the future North Tralee Light Industrial area, a future comprehensive high school that offers Science Technology Engineering Mathematics (STEM) subjects and a planned innovation precinct in the Poplars development. Henry Place to the north provides access to commercial land including fast food restaurants, Aldi supermarket, service station and a future planned commercial precinct.

The intent of the South Jerrabomberra RJP is to encourage an agglomeration of knowledge based industries, focused on the proximity to Canberra Airport, access to skilled workforce, proximity to traditional industrial lands in Hume (ACT) and Oakes Estate (NSW) and existing or planned access to the ICON-GNS secure cable, NBN, existing utilities and a newly upgraded collector road. Planning of infrastructure to support the RJP is at varying stages, with the subdivision and first stages of the Poplars precinct already underway, the high school, regional sports precinct and North Tralee industrial area in planning approval stage and approximately 675 dwellings of the permitted 1,500 in South Tralee constructed.

There has been some utility augmentation associated with the delivery of Environa Drive and the first stage of South Tralee, including installation of water and sewer infrastructure, and a commitment to the construction of an electricity substation. The development of the RJP area is already quite advanced in terms of master planning undertaken by key landholders. Master planning and technical investigations have informed the overall vision and development of Poplars (northern section of the site). There is already a significant amount of water and sewer infrastructure in the ground, which provides an opportunity to develop sites in a shorter timeframe than may be expected. However, the existing infrastructure also creates a constraint as it has the potential to limit the prospective businesses due design assumptions and demand volumes already established.

The technical analysis undertaken in this report includes:

- Assessment of existing utilities infrastructure conditions and capacity
- Consideration of current and anticipated future demand from key industries (including staged demand)
- Identify how the Master Plan can support infrastructure provision to the precinct
- Note any land required to be set aside for infrastructure
- Provide commentary on tipping points and staging, to support infrastructure provision and avoid overcapitalisation
- Provide commentary on further recommended studies, staging and funding options.

# 2 Project Background

## 2.1 Project Objectives

The RJP program provides an opportunity to assist regional areas to attract investment through facilitating upfront strategic master planning. There is also an opportunity to streamline statutory planning to further drive agglomeration and reduce investment barriers.

The targeted technical advice SMEC has been engaged to deliver for the South Jerrabomberra RJP focuses on:

- Electricity and gas
- Telecommunications and internet services
- Potable water supply
- Waste water servicing and treatment
- For each of these utility sectors, a desktop review of the existing network has been undertaken. Previously published reports and investigations of nearby or overlapping study areas have been assessed for influence and relevance to the South Jerrabomberra RJP. Early and ongoing consultation with relevant utility authorities has allowed SMEC to appreciate the existing network both spatially but also in the context of current network capacity, planned works (repair, upgrade and capital works) and planned future investment in the wider region.
- It must be noted that any information shown in the plans within this report have been compiled from a multitude of sources. While SMEC has worked hard to ensure accuracy is maintained and the information in this section is a reasonable representation of the ground conditions, more detailed site investigations would be required prior to undertaking design and construction activities. None of these diagrams are to be used to locate services and must be assumed as 'indicative only'.

## 2.2 Report Objectives

The objective of this report is to disseminate a technical assessment of the utilities demand of the South Jerrabomberra RJP into plain English. This report integrates initial findings from the baseline assessments undertaken for the area and assesses the impacts that the Master Plan may have on infrastructure within the RJP. This report specifically:

- Assesses the potential increased demand for power, telecommunications, water and sewage as a result of development within the RJP
- Identifies expansion to utility infrastructure that is needed to support the preferred Master Plan, including the land required for infrastructure
- Provides recommendations for a coordinated, precinct-wide approach to utilities provision
- Provides recommendations for updates to existing infrastructure contribution plans to support the cost-effective, equitable and timely provision of key utilities infrastructure for the RJP
- Recommends Development Control Plan provisions for consideration by Queanbeyan Palerang Regional Council (QPRC).
-

## 2.3 Project Location and Key Features

The South Jerrabomberra Regional Job Precinct (RJP) is located on a 950 ha parcel of land, located adjacent to the ACT. The vision for the South Jerrabomberra RJP is to encourage agglomeration of a knowledge-based industry specialising in Defence, space, cyber-security, information technology and scientific research.

The investigation area (the site) occurs within the Queanbeyan-Palerang Regional Local Government Area (LGA) and provides approximately 97 ha of land that is readily zoned for employment generating uses, and an additional 134 ha for potential future expansion.

The site is predominantly vacant, however is subject to a number of Development Applications (DA's) and master plans for the Poplars Innovation Precinct (three staged, 28 lot subdivision) including a commercial centre north of Tompsitt Drive, business park and a comprehensive high school that offers STEM subjects, with an enrolment capacity of 500 students[1].; the North Tralee light industrial subdivision, regional sports precinct and the unzoned (deferred matter) parcel of land known as Environa. Parts of the site, including much of Environa are within the noise contours of Canberra Airport, which is located to the north-west of the site.

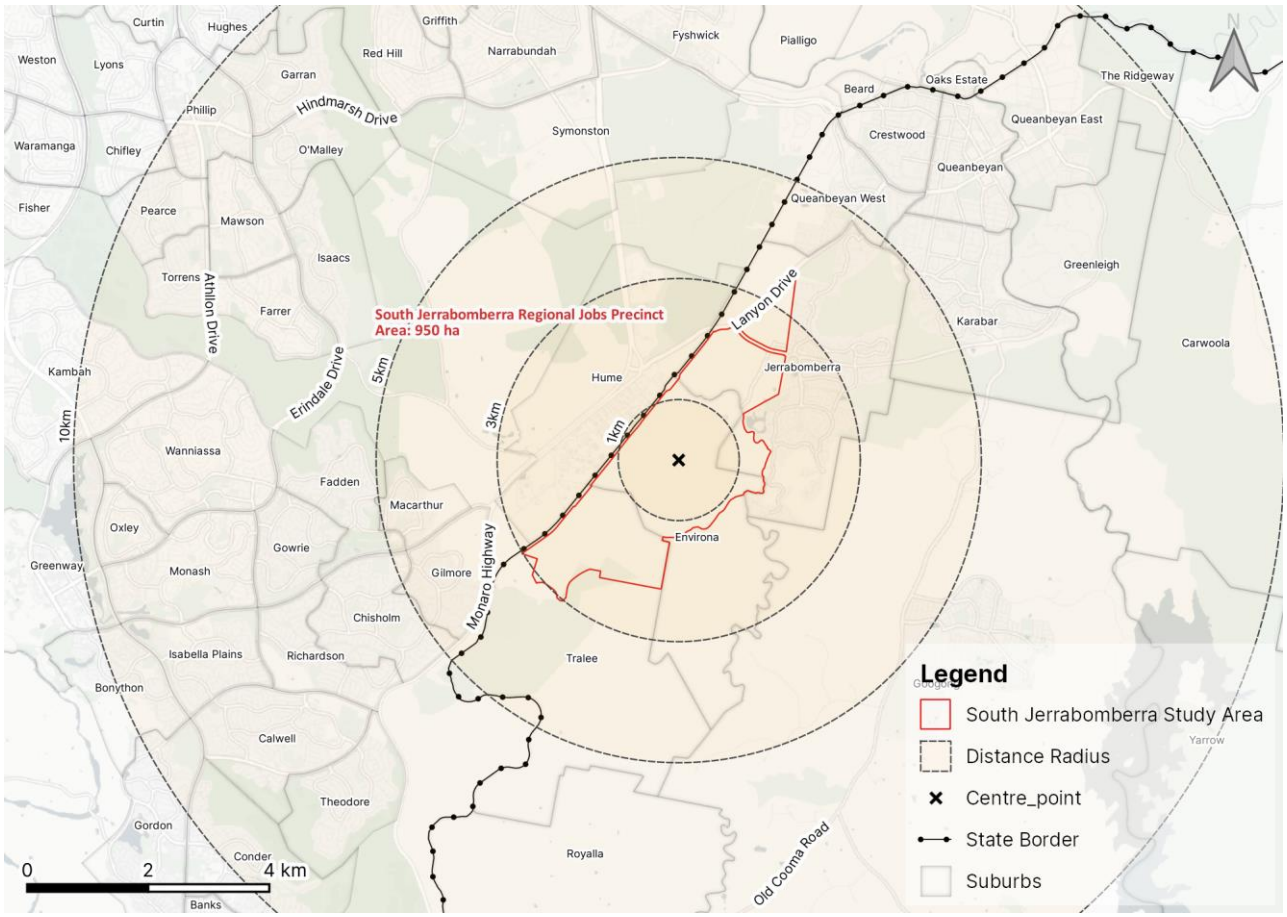


Figure 2-1 | South Jerrabomberra Location Context

Environa Drive, a newly constructed north-south collector road provides access to the Poplars Innovation Precinct, the South Tralee residential development (first stage complete), future town centre and the North Tralee light industrial area. Approximately 100 ha of the site is identified as the 'Poplars Grassland Reserve', a conservation area subject to a Biodiversity Stewardship Agreement, providing protection for Button Wrinklewort which is an endangered flora listed under the both the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *NSW Biodiversity Conservation Act 2016 (NSW)*.

[1] https://www.schoolinfrastructure.nsw.gov.au/projects/n/new-high-school-in-jerrabomberra.html

The South Jerrabomberra RJP expands on the existing Poplars Innovation Precinct to consider options for other landholdings in the area including Environa and South Tralee. These parcels of land have the potential to be better connected, activated and possibly expanded to become an employment generating precinct. Considering topography and ecological constraints will be a key driver in determining appropriate land use for Environa, whilst also ensuring there is sufficient infrastructure to support the desired mixture of future business, innovation and industrial uses.

The South Jerrabomberra RJP can complement existing industrial development within the adjacent suburb of Hume (ACT), where existing industrial land is highly sought after[2]. It is expected that the demand for industrial land will continue to increase as housing development pressures extend to the industrial and bulky goods areas in Fyshwick, ACT.

The proximity of the area to new residential development in South Tralee, established suburbs in Jerrabomberra, the Department of Defence Headquarters Joint Operations Command (HQJOC), Brindabella Business Park, Canberra Airport, other Defence holdings within Canberra and the servicing of the Site by the secure ICON-GNS cable, presents an opportunity to capitalise on the local skilled workforce to support highly skilled employment, research and development.

## 2.4 Key Attributes and Challenges

Figure 2-2 provides a high level analysis of the key attributes and challenges of the South Jerrabomberra RJP, and context of adjoining development.

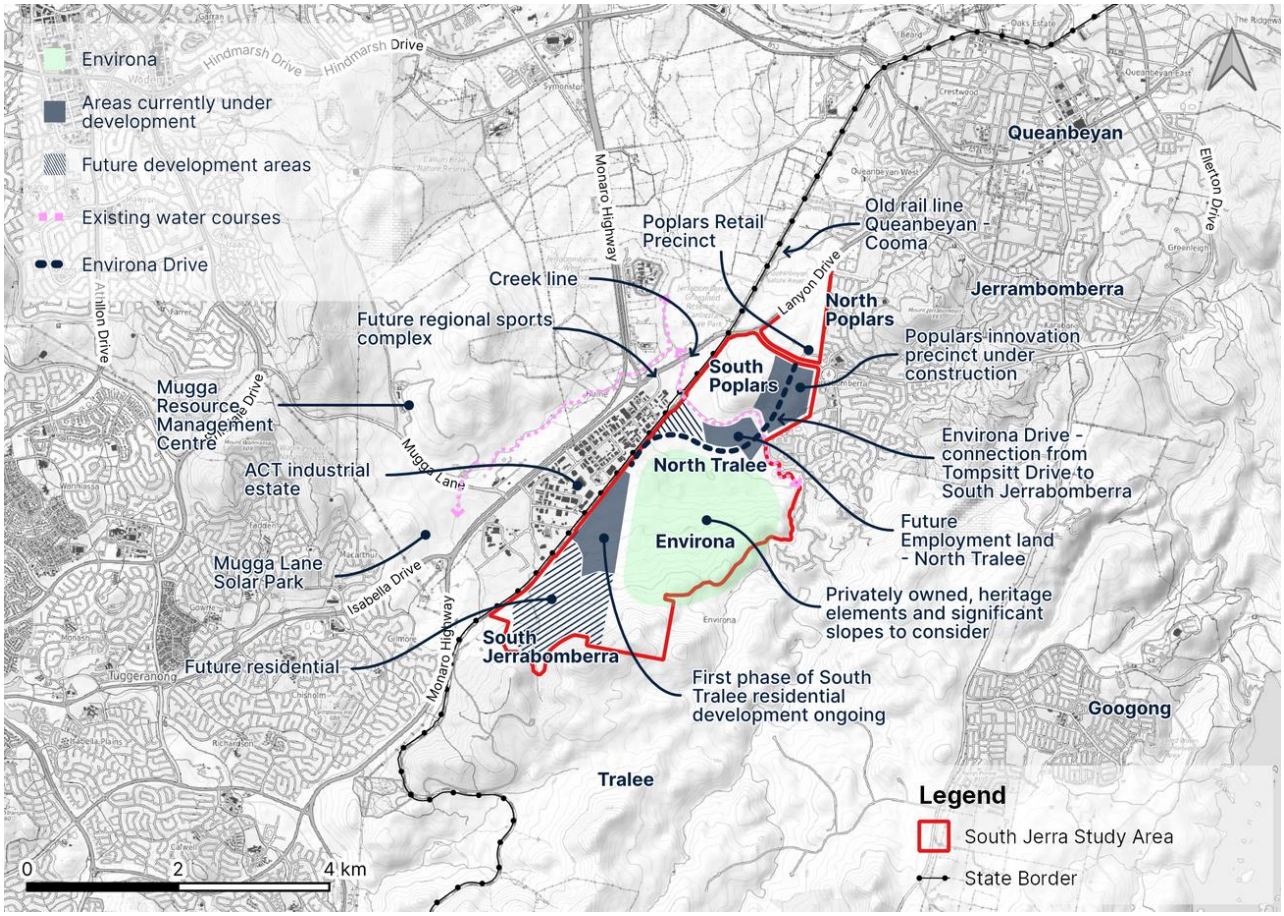


Figure 2-2 | Key Attributes of South Jerrabomberra

[2] https://canberraweekly.com.au/act-regions-industrial-property-sector-sets-record-price/

## 2.5 Future Anticipated Demand

A key intent of the South Jerrabomberra RJP is to bring together existing master planning into a single vision, to create an identity that drives business agglomeration and ultimately investor certainty. It is anticipated that the following industries and uses will be targeted for the South Jerrabomberra RJP:

- Data centre – noting that DCI Data Centres announced plans in August 2022 to open a 20 megawatt centre in the Poplars Innovation Precinct3 with associated electricity infrastructure augmentation currently being negotiated with Essential Energy
- Space, Defence and Technology Sub Precinct which includes the recently announced satellite manufacturing facility4
- High-technology manufacturing and 3D printing
- Department of Defence
- A comprehensive high school with an enrolment capacity of 500 students, offering STEM subjects
- Innovation Hub
- Regional sports precinct comprising four football pitches (synthetic and grass), two hockey pitches, warm up areas, club rooms and amenities, car parking, indoor basketball courts, netball, futsal and aquatic centre5.
- Planned light industrial subdivision development in North Tralee
- Residential development in South Tralee, noting 1,500 dwellings were permitted under the planning proposal which rezoned the area
- Local centre (South Tralee)

## 2.6 Observations

Members of the SMEC team attended the South Jerrabomberra RJP site on 8 December 2021 to undertake a site reconnaissance and familiarisation exercise. This section provides some key observations of the local area:

- Railway easement including missing bridge from Sheppard Street, Hume
- Flight path and ANEF contour over Environa
- Topography of innovation precinct may make large floorplate industrial or high-tech manufacturing uses difficult to accommodate
- Freight connectivity may be difficult given the disused nature of the existing railway line and missing infrastructure
- Low lying area around the Regional Sports Precinct warrants further drainage investigation
- Potential ground water bore application associated with Regional Sports Precinct
- Restricted road connectivity into the ACT

[3] https://www.canberratimes.com.au/story/7845742/hunger-for-cloud-based-storage-drives-construction-of-new-data-hub-in-jerrabomberra/

[4] https://www.australiandefence.com.au/defence/cyber-space/australian-satellite-manufacturing-hub-secures-funding#:~:text=Australia's%20first%20Satellite%20Manufacturing%20Hub,Technology%20Precinct%20in%20Botany%2C%20NSW.

[5] https://www.qprc.nsw.gov.au/Major-Works-Projects/Regional-Sports-Complex

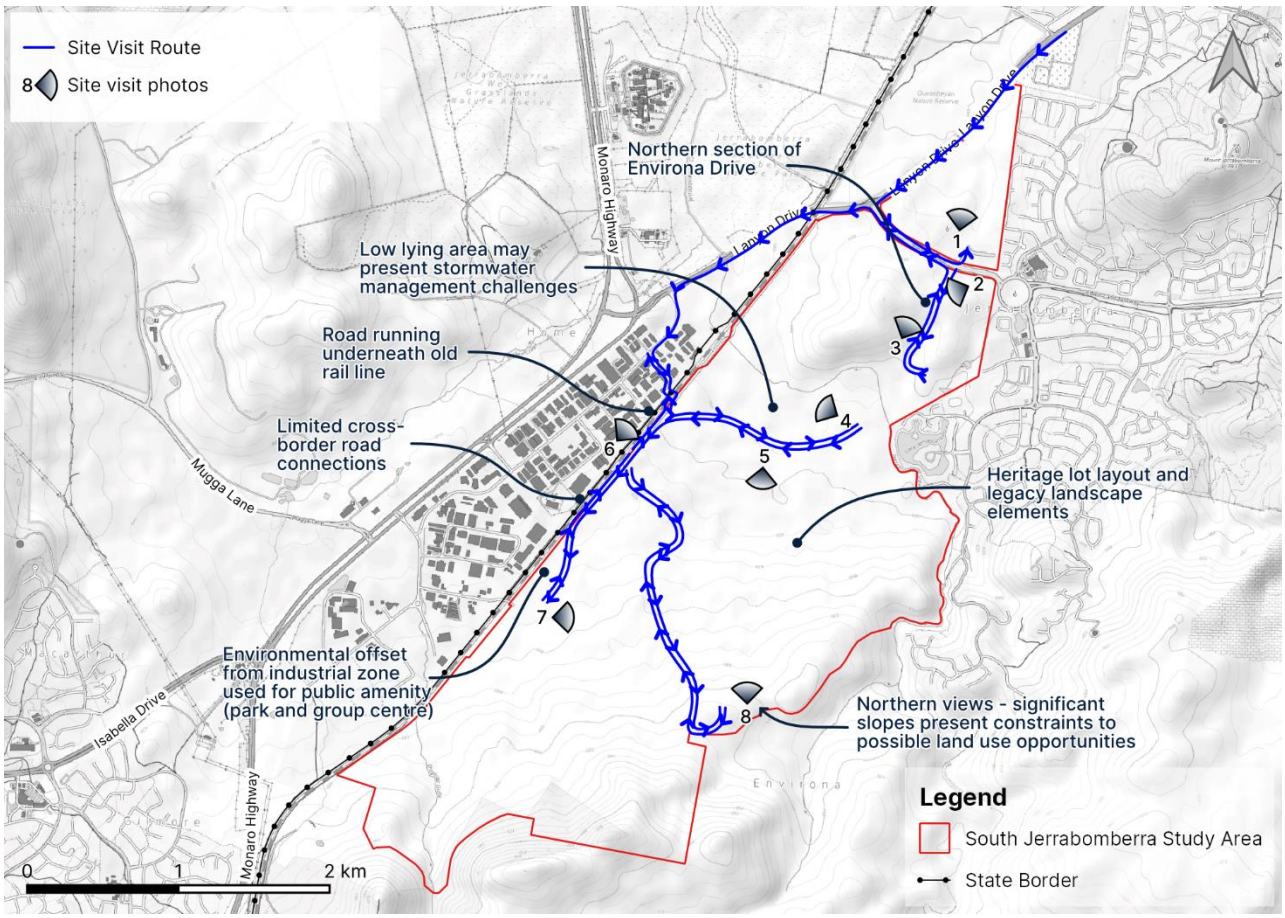


Figure 2-3 | South Jerrabomberra Site Visit

## 2.7 Images

The following images were captured during the site visit of 8 December 2021. The numbers correlate with the views in Figure 2-3.

Figure 2-4 |1- Looking North from North Poplars Retail Precinct

Figure 2-5 | 2 - Looking south along Environa Drive

Figure 2-6 | 3 - Looking north from the site of the Innovation Hub

Figure 2-7 | 4- Looking across North Tralee future development area

Figure 2-8 | 5- Looking south across the privately owned parcels

Figure 2-9 |6-Looking east toward Arnott Street and railway corridor

Figure 2-10 | 7- Looking toward South Tralee residential subdivision

Figure 2-11 | 8 - Elevated View from Environa toward Hume and ACT

# 3 Regional Job Precinct Master Plan

## 3.1 Overview

The South Jerrabomberra RJP Master Plan has been underpinned by the Urban Design work undertaken by Jensen Plus as part of the RJP project. The Master Plan has been developed based on site visits, preliminary technical studies, an options development process and information gathered from stakeholder workshops.

## 3.2 Vision and Principles

The vision of the South Jerrabomberra RJP is to differentiate itself as an innovation precinct, bringing together new employment and industrial lands specialising in advanced manufacturing, space and defence related industries. The Master Plan has been developed based on the following six principles:

1. Innovative tech-jobs precinct
2. Seamless precinct and cross border connectivity
3. High quality urban design and placemaking
4. Leading sustainability outcomes
5. Be a good neighbour
6. Collaborative cluster

## 3.3 Land Uses and Sub-Precincts

The South Jerrabomberra RJP Master Plan integrates previous master planning activities progressed by landowners and considers how to best integrate the following areas into one precinct:

- North Poplars
- South Poplars Innovation Precinct
- Environa
- Regional Sports Precinct
- North Tralee
- South Tralee and Forest Morrison
- Refer to Figure 2-2 for a delineation of each of these areas within the RJP.
- The Master Plan incorporates the following sub-precinct categories:
- Activity Centres Sub Precinct
- Space, Defence and Technology Sub Precinct
- Education Sub Precinct
- Local Business and Industry Sub Precinct
- Residential Sub Precinct
- Rural Landscape Sub Precinct
- The Master Plan prepared by Jensen Plus is shown Figure 3-1.

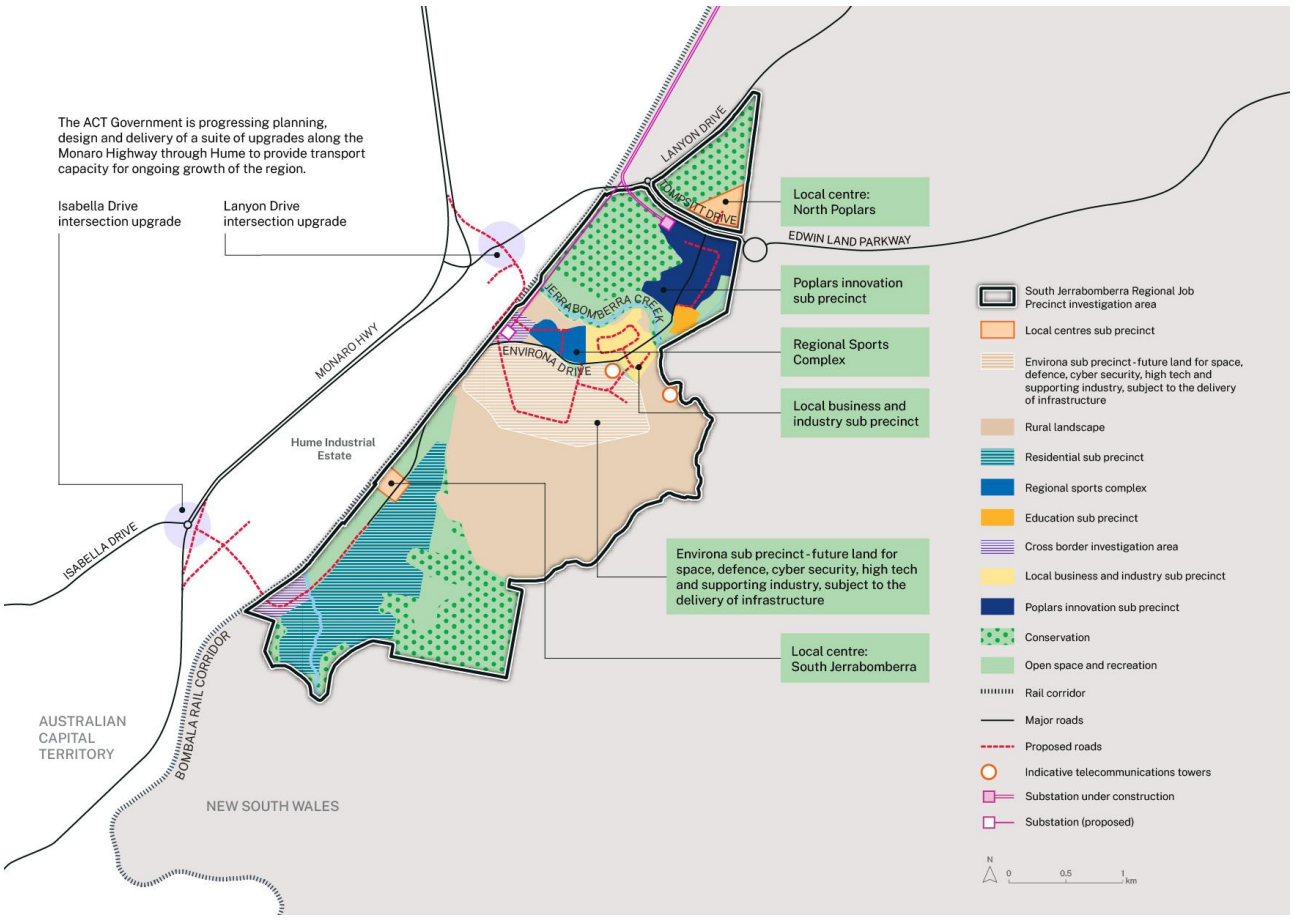


Figure 3-1 South Jerrabomberra RJP Master Plan prepared by Jensen Plus 2022

## 3.4 Staging

Staging is a critical consideration in planning for 'just in time' delivery of infrastructure to support growth. For the purpose of this assessment, the uptake of development opportunities in the South Jerrabomberra RJP is assumed to comprise four stages. Table 3-1 provides the assumed staged increase in gross floor area as a result of uptake of development opportunities in the RJP.

Table 3–1 | Assumed Staging of gross floor area by sub-precinct

| Sub-Precinct | Stage 1 2026 (ha) | Stage 2 2031 (ha) | Stage 3 2041 (ha) | Stage 4 Beyond 2041 (ha) | Total (ha) |
|---|---|---|---|---|---|
| Conservation | 0.66 | 0 | 0 | 0 | 0.66 |
| Education | 5.07 | 0 | 0 | 0 | 5.07 |
| Activity Centres | 3.75 | 20.68 | 24.73 | 13.29 | 62.44 |
| Business + Industry | 17.35 | 10.97 | 9.89 | 35.69 | 73.90 |
| Open Space | 13.16 | 8.6 | 0.92 | 2.45 | 25.13 |
| Residential | 16.08 | 40.88 | 35.59 | 21.15 | 113.70 |
| Rural | 0 | 0.00 | 0.00 | 0.00 | 0 |
| Space, Defence + Technology | 29.41026 | 9.646185 | 0.00 | 0.00 | 39.06 |
| Total | 85.49 | 90.77 | 71.12 | 72.58 | 319.96 |

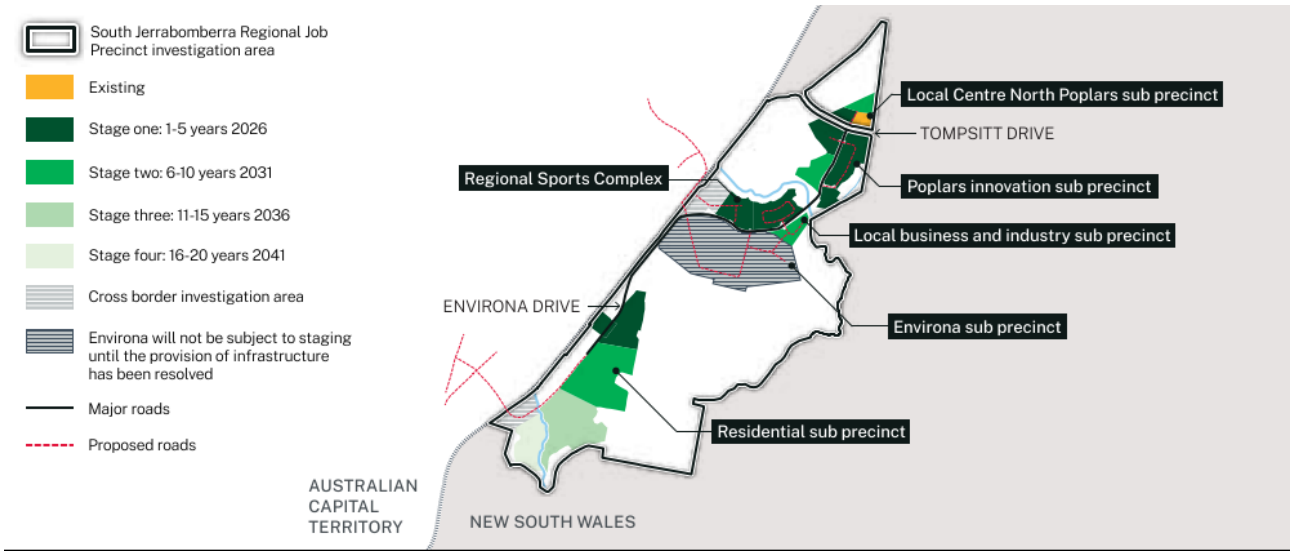


Figure 3-2 | Staging Plan

# 4 Electricity and Gas

## 4.1 Baseline Assessment

Essential Energy is the responsible authority for the provision of electricity supply services in the South Jerrabomberra area. Essential Energy operate and maintain one of Australia's largest electricity networks, providing electricity network services to more than 865,000 homes and businesses across 95 per cent of NSW (Essential Energy, 2021).

Essential Energy has two main substations which supply the South Jerrabomberra area, Oaks Estate Zone Substation and Queanbeyan South Zone Substation. Oaks Estate is a 66/11kV substation, with a firm normal cyclic rating of 33-36MVA (Summer-Winter). It is located on Railway St, Jerrabomberra, within the ACT, directly adjacent to, and fed from, the upstream TransGrid Queanbeyan substation. The Queanbeyan South Zone Substation is a 66/11kV substation with a firm normal cyclic rating of 33-36MVA (Summer-Winter). It is located on Coolabah Crescent, Karabar. The existing combination of residential and industrial developments in the area require a combination of underground and overhead electrical transmission and reticulation. Ultimately, the final interconnectivity of the Zone Substations and upstream Sub-Transmission Substations will need to be confirmed with both TransGrid and Essential Energy.

Figure 4-1 provides the current operational network in relation to the RJP investigation area. It is noted that new infrastructure is currently under construction in the area, however as it is not yet commissioned it is not shown on the available network diagrams. Evo Energy infrastructure present within the ACT is shown within 5km of the South Jerrabomberra RJP.

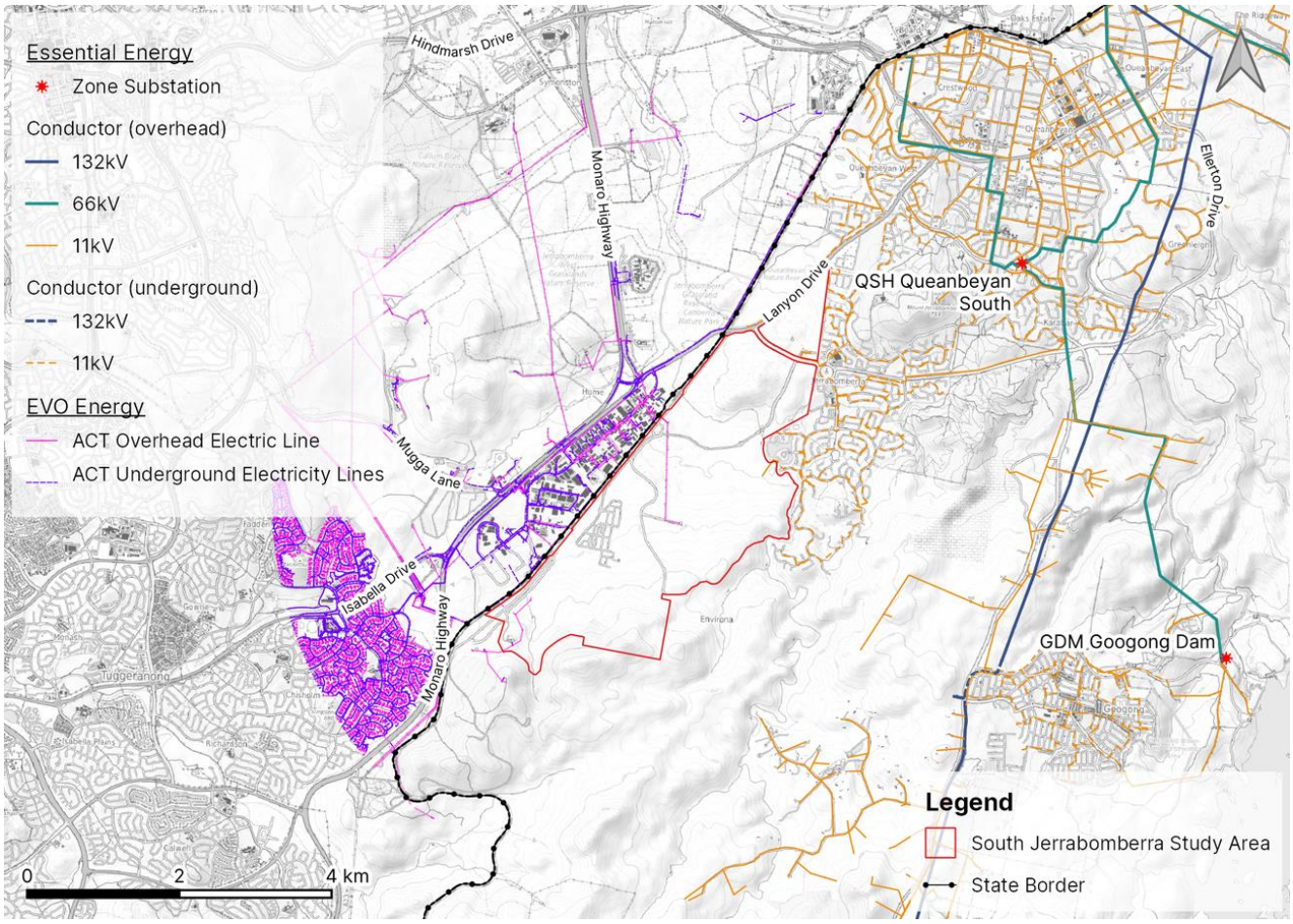


Figure 4-1 | Existing Electricity and Power infrastructure (source: Essential Energy and Evo Energy)

## 4.2 Planned infrastructure works and upgrades

Electrical Utilities are bound by regulation and procedures as set out in the National Electricity Rules (NER) by the Australian Energy Market Commission (AEMC). The rules are specific sets of guidelines which govern the operation of the National Energy Market (NEM). As such, each Electrical Utility has standard procedures for the connections to the electrical network and planning for future upgrades.

Essential Energy has advised that ordinarily the standard procedure for connections is the submission of Preliminary Enquiry on a site-by-site basis. However, for wide scale strategic planning, such as the case of the South Jerrabomberra RJP, Essential Energy encourages government authorities and consultants to work with them to fully comprehend the needs of the project, to allow for an efficient and wholistic approach to the delivery of the Network upgrades.

The Jerrabomberra power network augmentation plans are largely progressed. Current applications with Essential Energy for approximately 90MVA of load are in place to provide for high energy users (including the recently announced Data Centre). Combined with the Poplars Innovation and Retail and Services Precincts, which are in various stages of development, Essential Energy have advised the need for a new Zone Substation within the RJP site.

Essential Energy have advised the new planned substation is to be run off Feeder 975, which runs between TransGrid Sub-Transmission Substation Queanbeyan and Essential Energy Googong Town Substation to the south. The approximate location of the new Zone Substation is proposed to run off the augmented feeder, out to the east. From there, it will track south and west, via an Overhead conductor through the existing Rail Corridor, span alongside Queanbeyan nature reserve then transition to underground south of Tompsitt Drive for ultimate connection to the new Zone Substation in stage 1, indicatively shown in the Poplars Innovation Precinct (Figure 4-2). Utilising existing easements will require further consultation between Essential Energy and QPRC during design and construction to ensure the ongoing protection and operation of the critical infrastructure in the area, including the Jerrabomberra bulk sewer trunk main which runs along the existing rail corridor.

Discussions with Essential Energy have confirmed that a second zone substation will likely be required to support anticipated development in Environa, North Tralee Light Industrial Precinct, the Regional Sports Precinct and South Tralee Residential area. An indicative area of 2 hectare for an outdoor substation, or 1 hectare for an indoor substation, would likely be required and could be placed in proximity to other infrastructure in the western portion of the site.

Constructing a new zone substation presents a ‘business as usual option’ and may be unavoidable in the long-term based on the expected demand from commercial enterprises and industries within the RJP, and residents in South Tralee. There may be opportunity to defer the investment in a new zone substation through the use of micro-grid technologies and community scale batteries. These business as usual and more innovative options are discussed further below.

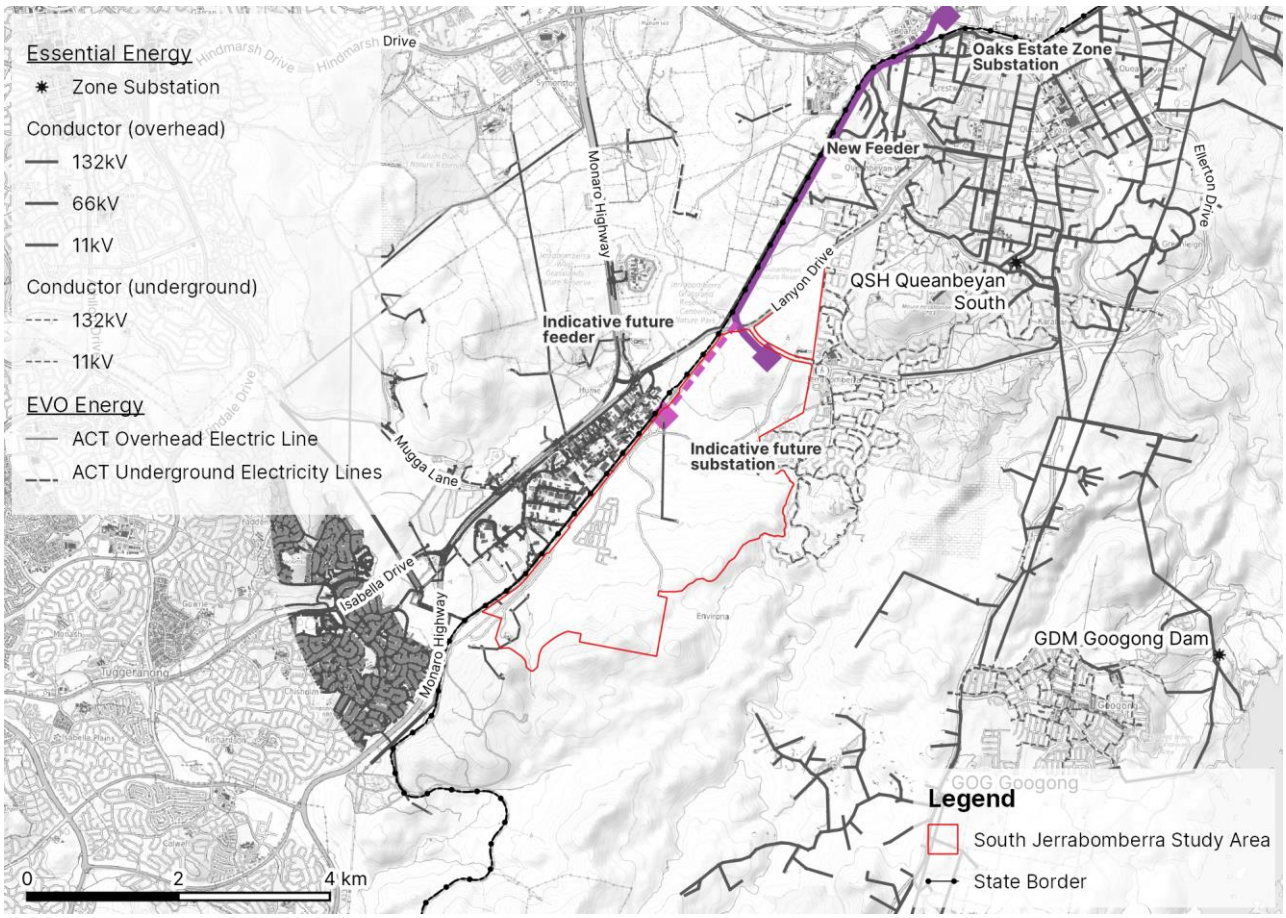


Figure 4-2 | Proposed new feeder line and indicative location of new substation

## 4.3 Gas

It is widely recognised in Australia that gas supply, particularly the establishment of new networks, is on the decline. The Australian Energy Market Operator (AEMO) 2022 Gas Statement of Opportunities[6] forecasts that, based on existing, committed and anticipated future gas supply, including anticipated Liquified Natural Gas (LNG) imports, there will be a decline in gas consumption until 2033. The report also shows the pathway for gas reticulation is uncertain as Australia transitions to a net-zero emissions economy by 2050.

The user profile expected within the South Jerrabomberra RJP is unlikely to require gas connections for industrial heating and manufacturing purposes, particularly noting the high technology, light industrial profiles of expected future tenants. It is assumed that there will be generally less dependency upon the use of gas as the nation continues to push towards net zero carbon emissions, particularly in production and manufacturing.

Newly constructed dwellings in South Tralee would be built to current insulation standards, further reducing reliance on gas for heating and cooking.

[6] Https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2022/2022-gas-statement-of-opportunities.pdf?la=en&hash=7E0084BA4D0BC9C60FA851081F876625

## 4.4 Recommended Upgrades

### 4.4.1 Overview

This section provides a summary of the recommended upgrades to the electricity and gas network to support the South Jerrabomberra RJP Master Plan. This strategy is intended to be aspirational and should be flexible to the changing needs of the RJP as development progresses and land use composition changes.

As the composition of development (industries) and thus demand is somewhat unknown at this stage, a number of assumptions have been made to estimate the likely demand for power. If different types of industries choose to establish in the RJP, the energy demands may be higher or lower than what has been anticipated by our assessment.

Options for the uptake of electrical and gas infrastructure are highly dependent on the utility provider. Energy providers generally require confirmation of customer investment in order to develop and deliver the required energy solutions. Network providers are heavily regulated and need to satisfy their own modelling and forecasting in order to justify investment, with upstream constraint limitations as to how they are able to distribute transmitted energy. Major infrastructure investment, such as a new zone-substation, comes with long legislative lead times and design timeframes. To plan such investment, energy providers need certainty of likely demand from customers.

When developing these recommendations, we have sought to limit overcapitalisation of unnecessary infrastructure prior to the establishment of industries, and build flexibility into the network so that the South Jerrabomberra RJP can be more responsive to the energy needs of future businesses. The infrastructure recommendations in this report are intended to guide QPRC in the preparation of a site specific South Jerrabomberra RJP Development Contributions Plan and it is hoped that the studies undertaken for the RJP can be used to support business cases for funding for future infrastructure upgrades.

### 4.4.2 Assumed Demand

An assumed power demand for the staged delivery of the South Jerrabomberra RJP has been prepared based on the Master Plan prepared by Jensen Plus. Given the flexible nature of the land use designations, a mixture of potential land uses has been adopted to provide a theoretical demand for power. If development was to occur out of sequence, or if specific uses with high energy needs were to relocate to the South Jerrabomberra RJP, additional augmentation to the network may be required. This more detailed assessment would occur on a case-by-case basis, in close consultation with the specific business, Essential Energy and QPRC.

With limited availability of connected load and network data, it is assumed the upstream TransGrid owned Queanbeyan substation has adequate capacity to supply the committed northern Zone substation within the Poplars subdivision of the South Jerrabomberra RJP. The Queanbeyan substation is a 132kV to 66kV substation with two 120MVA Transformers on site.

- Specific needs of the potential future use could increase demand for power beyond the assumptions used in this modelling. Our assessment assumes a theoretical demand at fully utilised of 155MVA, based on a mixture of initial high energy uses, high-technology manufacturing, offices and general industries. It is strongly suggested to stage development in a way to allow for future additions to the network as required load materialises.
- Thus, the approach has been to distribute energy demand and equivalent estimated land area pro-rata with the staging of development to inform a plan for electrical infrastructure. Our assessment assumes 38.5MVA would be required for the first stage of development when early movers are establishing in the Poplars Innovation Precinct. An additional 28MVA would be required to support development in the medium term and an additional 58.5MVA for long term.

The sub-precinct categories and estimated demands are categorised and tabulated below:

- Activity Centres Sub Precinct – comprising local activity centres including retail, business, community and recreation uses.
- Space, Defence and Technology Sub Precinct
- Education Sub Precinct
- Local Business and Industry Sub Precinct
- Residential Sub Precinct
- Rural Landscape Sub Precinct

Table 4–1 | Assumed power demand (MVA) based on the Jensen Plus Master Plan

| Sub Precinct | Stage 1 | Stage 2 | Stage 3 and 4 | Total |
|---|---|---|---|---|
| **Activity Centres** | 2 | 10.5 | 20 | 13 |
| **Space, Defence and Technology** | 22 | 7.5 | 0 | 12 |
| **Education** | 2.5 | 0 | 0 | 2 |
| **Local Business and Industry** | 10 | 6 | 23 | 106 |
| **Residential** | 2 | 4 | 15.5 | 2 |
| **MVA (staged)** | 38.5MVA | 28MVA | 58.5MVA | **155MVA** |
| **Total GFA (ha)** | 85.49 | 90.77 | 143.7 | **319.96ha** |

## 4.5 Staging Recommendations

### 4.5.1 Stage 1

The short-term option is a readily adoptable strategy with the construction of a new Essential Energy owned substation to service anticipated demand in the RJP. This will be adopted through a proportionately customer funded substation, to support the short term expected demand of 38.5MVA of the Master Plan and the large energy needs of early movers. We understand planning is already being undertaken to deliver this substation which would be located within the Poplars Innovation Precinct.

### 4.5.2 Stage 2

The medium term option presents a network development where energy demand is managed through a new substation and may be augmented by rooftop solar panels, which could be encouraged through rebate schemes with supplementary private battery storage. This would provide the South Jerrabomberra RJP with a degree of self-sufficiency, supported by the establishment of the new substation. With small scale renewable generation and battery technology expected to become more economical for both the residential and industrial customers in the medium term, this staged approach would encourage more adaptable energy consumption and generation reducing demand placed upon the network.

Whilst still reliant on a zone substation, this integrated network would have significantly less demand, placing less stress on the grid. This presents a potential to offset applications for additional load demand, which would require notably less investment into the electrical network infrastructure. As shown in Figure 4-4, additional network capacity could be supported by a grid battery or Battery Energy Storage System (BESS). The typical parts of a utility scale BESS are depicted in Figure 4-4, with nominal electrical parameters outlined. As discussed with Essential Energy through the course of this project, a BESS could be used as a staging mechanism to negate the 28MVA demand requirement of major capital and plant involved in a second Zone Substation. A BESS must be suitably located to minimise impact on adjoining land uses or environmental risk. This would be subject to a further feasibility study; however, it is likely a BESS could be located on the site of a potential future substation in North Tralee with feeder supply extended south through the existing rail corridor.

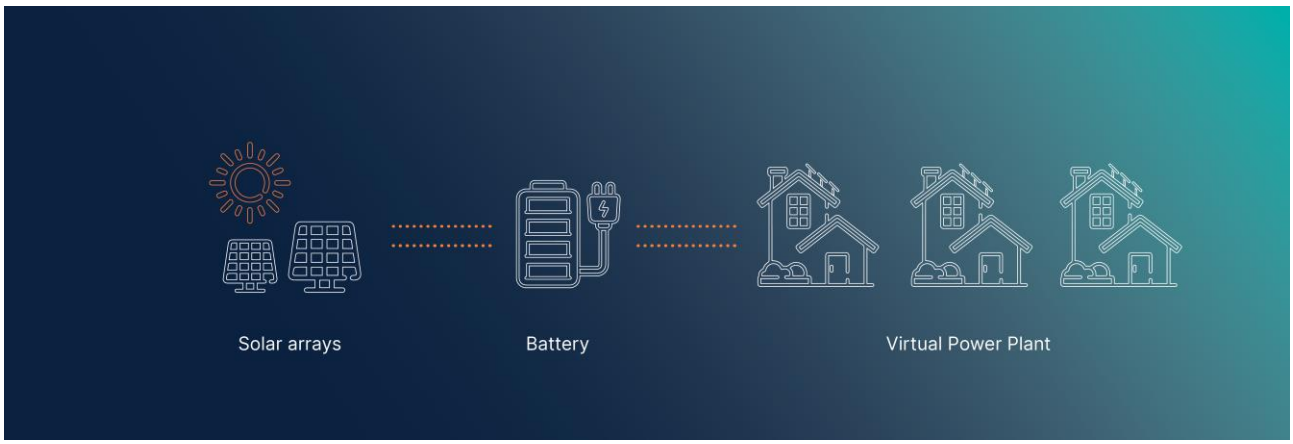


Figure 4-3 | Integrated network example

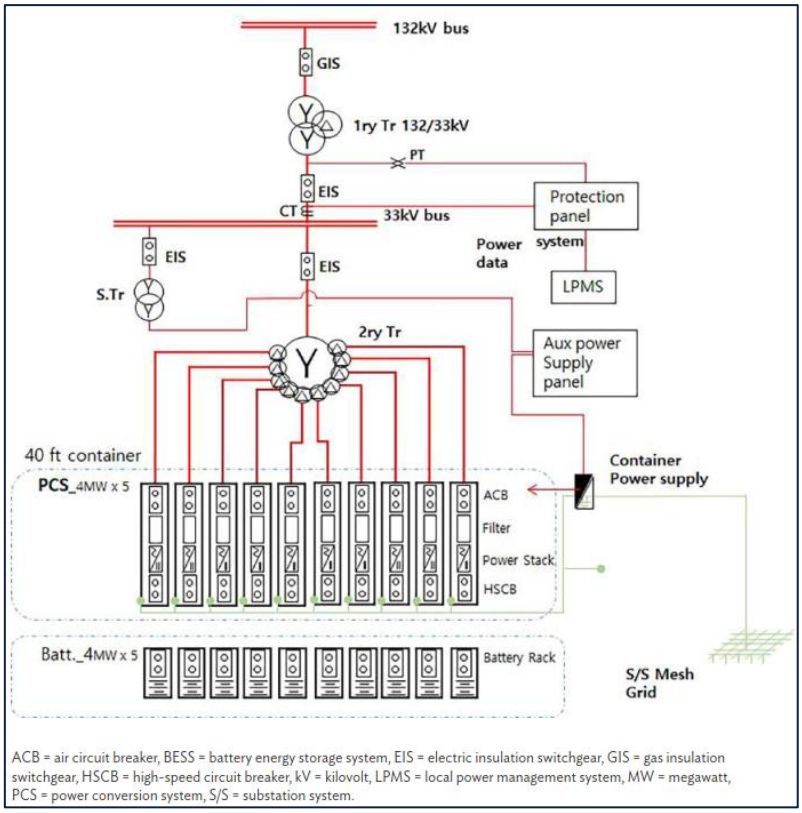


Figure 4-4 | Components of a Utility Scale BESS (Source: Handbook on Battery Energy Storage Systems, 2018)

### 4.5.3 Stage 3 and 4

Based on the assumed demand provided in Section 4.4.2, the short term would require at least 38.5MVA, medium term would require 28MVA and Stage 3 would require 58.5MVA. If a second substation were to be the selected solution, noting the electrical requirements of early development and large energy users are satisfied, it is suggested that in the long term the provision of a second substation with 2 x approximately 40 MVA Transformers would deliver the base power needs for the RJP and provide opportunities to accommodate a range of industries, without the timeline of further utility development, design and construction.

However, to support network reliability and network security may require Essential Energy to have the ability to provide greater power under certain conditions. The Firm Rating of a substation under N-1 conditions needs to allow for excess load, to avoid network failure and thermal regulatory standards.

The firm rating is specified for all network assets covering each type of element in the network. The firm rating is an operating rating assigned to a network element based on the network asset configuration and the load type.

The firm ratings of the assets are adjustable and set at specific levels to ensure the required supply security and network performance is achieved.

It is understood that under N-1 conditions, the forecast demand is not to exceed the thermal capacity for more than 1 per cent of the time. Considering this, direct discussion with Essential Energy is required to interpret the required contribution towards electrical augmentation.

It is advised that the following matters be considered in the development of the South Jerrabomberra RJP:

- Ensure adequately sized sites are reserved for the construction of new zone substations to service demands in the short to medium term with sufficient access to existing upstream power supply
- Develop the area to enable efficient power delivery via distribution feeders and electrical network infrastructure
- Look to uprate any feeders for development in load concentrated areas, ideally delaying large expenditure on a new substation or further substation augmentation as long as possible
- Look to encourage rooftop solar generation and battery storage to reduce load applications and electrical demand, delaying the need for a new substation as long as possible

### 4.5.4 Other Innovative Options

The RJP could accommodate a fully integrated network with a microgrid or virtual power plant, which is self-reliant with reduced operating costs for businesses. Whilst this option presents similar significant initial infrastructure investment, it may also offer investment attraction opportunities for the RJP.

Microgrids present an option for communities and precincts to become self-sufficient in their own power network and usage requirements. Detailed network analysis and a rigorously designed grid is required for this solution, including further construction and methods of electrical delivery back into the network.

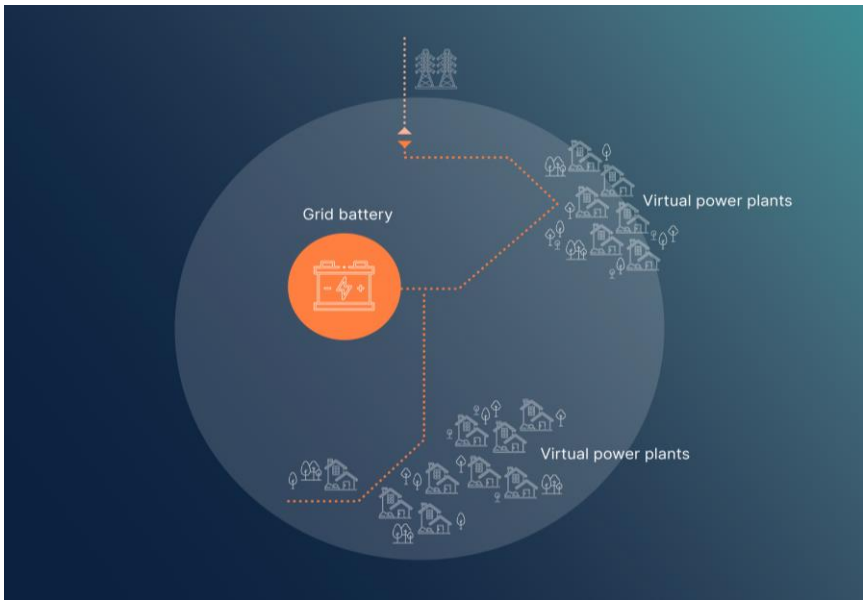


Figure 4-5 | Example of a microgrid of multiple virtual power plants and a grid BESS

The commitment to the Regional Sports Precinct presents a unique opportunity to form a symbiosis with heat creating uses, such as high energy users. This concept is known as a ‘district cooling loop’, and has been successfully implemented in Barangaroo South, with other international examples throughout Europe and Singapore.

There is an opportunity in the South Jerrabomberra RJP to use heat generated from possible cooling functions of industry in the area to warm the water for the swimming pool within the Regional Sports Precinct. This sustainable function provides an optimised solution where excess heat output from the data centre can be beneficially reused by the sports complex, reducing the overall demand for power across the precinct and linking uses in a carbon

positive way. This process may similarly be applied to other uses that may require consistent heating inputs. There are notable constraints in delivering this type of technology with limited underground space for the associated infrastructure, however it is worth considering innovative opportunities to coordinate the energy needs of adjoining uses as the precinct develops in the future.

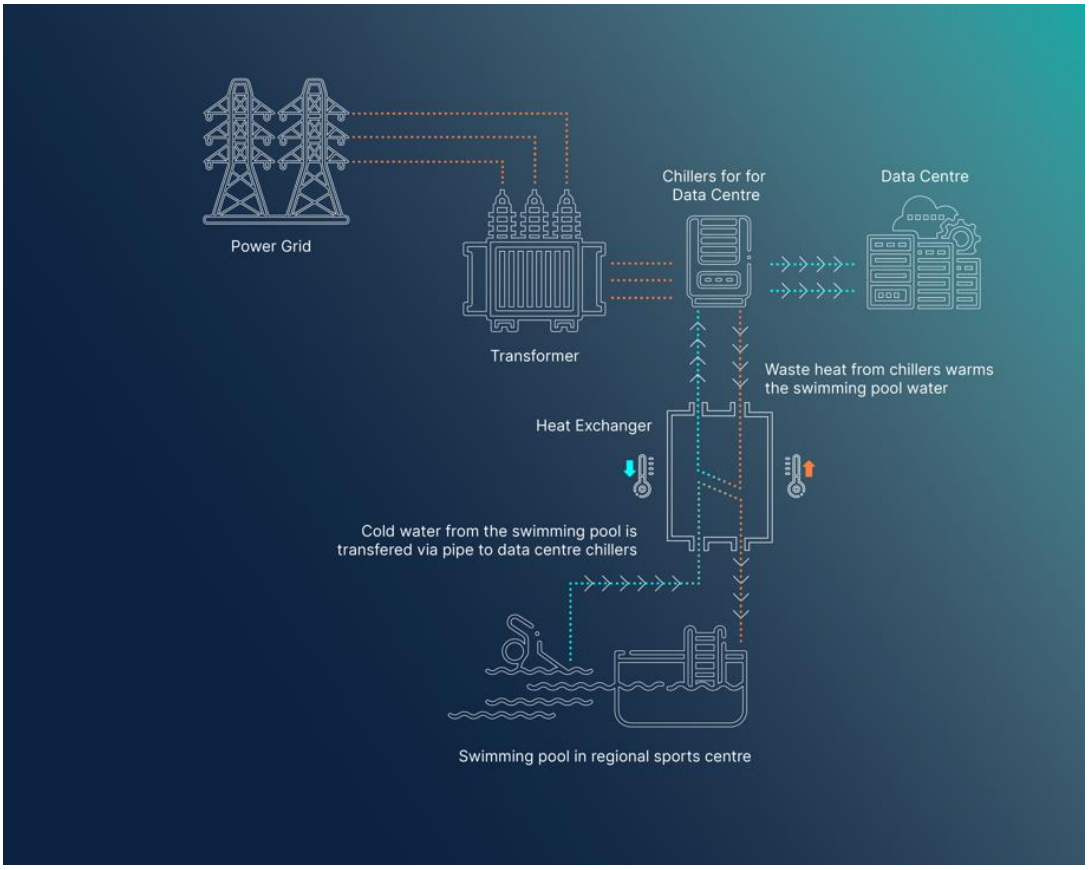


Figure 4-6 | Concept for district cooling loop to heat swimming pool

## 4.6 Suggested Funding Mechanisms

It is recommended that Council's Section 7.11 Development Contributions Plan be updated to share a portion of the cost associated with improved power supply to the RJP. Under the Essential Energy Connection Policy – Connection Charges 2018, the type of connection required to support the growth of the RJP is likely to be a "negotiated connection offer". The apportionment of this contribution between Council (on behalf of future occupants) and Essential Energy would need to be assessed and negotiated and would be within the scope of a feasibility study for the network Master Plan. In considering the apportionment of the cost of delivering the new electricity infrastructure, Essential Energy takes into account a number of matters including:

- The number of new customers that can be reasonably expected
- The number of existing properties / connections that would benefit from the upgrade
- The current zoning of the area, development applications and planning proposals
- Historic patterns of use in similar areas
- Options for common funding of works (sharing the cost between customers)

By embedding cost recovery for the electricity infrastructure within a Section 7.11 Development Contributions Plan, the Council will be able to be reimbursed for the upfront contribution made to Essential Energy to fund the new zone substation. Whilst Essential Energy do have a cost share refund scheme, this is restricted to a seven year period only and comes with a number of qualifications. Given the anticipated staging and uptake of development beyond 2036, a Section 7.11 Development Contributions Plan would provide a longer period of time over which Council can levy contributions and would provide more surety in recovering funds.

Further information regarding the recommended upgrades, timing and funding mechanisms is provided in Section 8.

# 5 Telecommunications and internet services

The vision of planning the South Jerrabomberra RJP as a hub of Information and Communications Technology (ICT) entails world class telecommunications and Internet infrastructure. Attracting industries such as defence, space, cyber-security, information technology and scientific research requires very reliable, resilient and secure networks with very high speed and big capacity. To leverage opportunities associated with the Poplars Innovation Precinct, the South Jerrabomberra RJP should be planned to attract ICT professional services businesses. Therefore, the South Jerrabomberra RJP should enable integration between work from home, office and everywhere. The complete ecosystem should be based on innovation and smart solutions.

## 5.1 Baseline Assessment

The National Broadband Network (NBN) currently provides a mix of Fixed line network, Fibre-to-the-node (FTTN) and Fibre-to-the-premises (FTTP) to the existing developed areas surrounding the study area. Currently, only satellite coverage is provided to the majority of the study area. The proximity to currently installed infrastructure will make the RJP viable for increase fixed line coverage to within the study area as investment in the region is established. This coverage is shown in Figure 5-1.

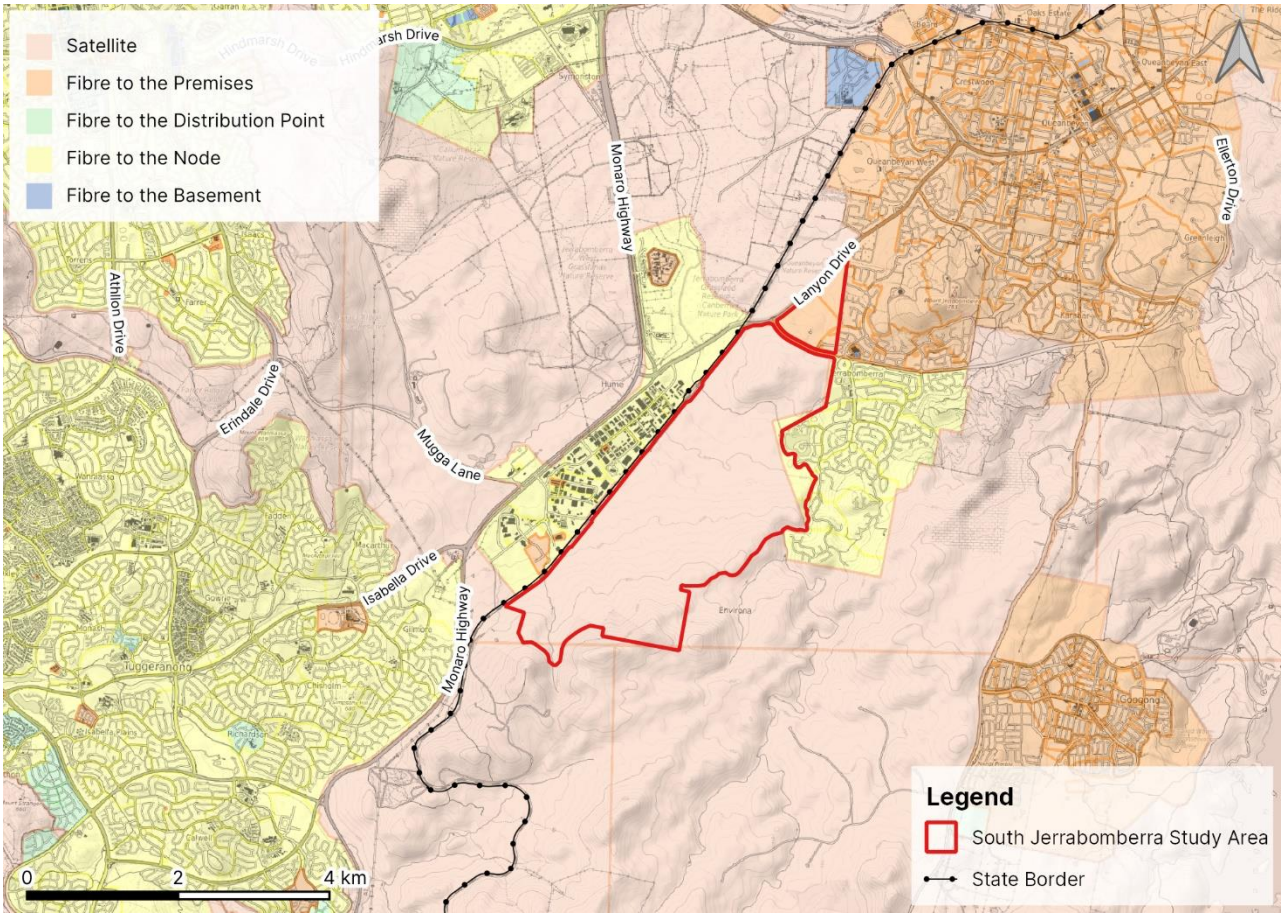


Figure 5-1 | NBN Rollout – Current & Future Coverage

NBN are currently expanding their network within the RJP. Investigations are ongoing into the opportunities and constraints that this will present to the project. Further development of the NBN FTTN network will allow industry to take advantage. High bandwidth and low latency telecommunications are integral for the development of enterprise within the area.

Within the RJP region there is conduit laid for the Intra-Government Communications Network (ICON-GNS), however it is understood that this connection is not yet live. Agencies are required to supply their own equipment

to 'light' the fibre and therefore the fibre-optic cable does not provide commercial connectivity. The existence of the cable, believed to be the only location outside the ACT, removes a significant barrier to entry for Commonwealth Agencies that may be wishing to locate to the South Jerrabomberra RJP.

## 5.2 A Smart Precinct

The South Jerrabomberra RJP should consider being a Digital/Smart Precinct that applies integrated digital technology, data and innovative practices to improve liveability, sustainability, collaboration and economic opportunities. Successful digital precincts do not just focus on digital technology integration, but also develop the systems, processes and programs that support collaboration and innovation both within councils and throughout the community.. Smart technology and digital innovation in the Precinct will be attractive for the community and businesses and encourage economic diversity and liveability.

When functioning as an open network that is attractive across multiple industry sectors, technology networks can play an important role in economic development and business attraction. Inviting technology vendors, start-ups and research institutes to work with a range of end-users to co-create solutions within a specific test-bedding environment can effectively enhance investment and talent attraction.

The following strategies are suggested to help Council promote the South Jerrabomberra RJP as a smart sustainable precinct:

- Smart Precinct Strategy
- Technology Framework
- Innovation Strategy

## 5.3 Progressive Governance

The South Jerrabomberra RJP may leverage the opportunities created in the concept of "Industry 4.0" which seeks to connect people virtually through the Internet of Things (IoT), and automation and cyber-physical production systems, which enhance production through communication and co-ordination of machines, products and networks with minimal human intervention. This same concept can apply to government, encouraging local and state government to innovate and find digital solutions to social, economic, political and other pressures. This push is changing both inward and outward-facing governance dialogue and processes which is being used to facilitate the establishment of a digital democracy between government and the community.

These measures can encourage businesses to invest in the South Jerrabomberra RJP, and would show commitment to the concept of the innovation precinct. Figure 5-2 illustrates the main differences between 'business as usual' and Government 4.0.

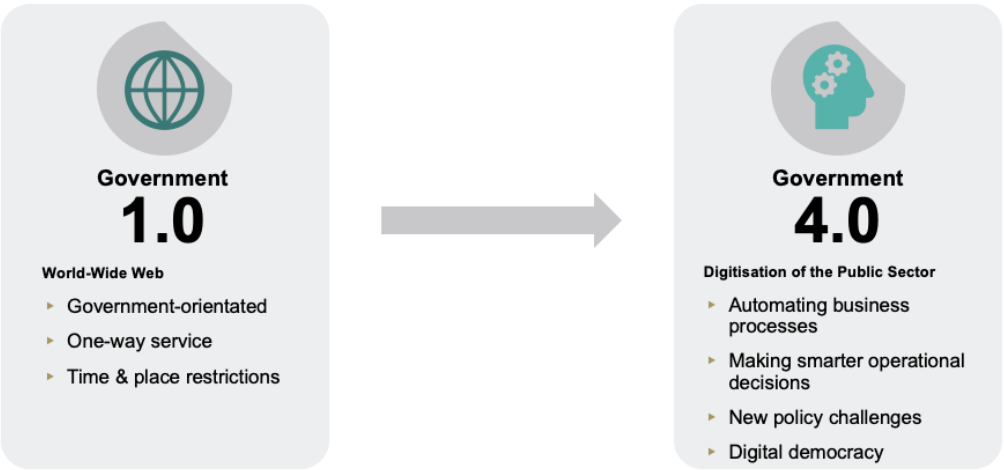


Figure 5-2 | The South Jerrabomberra RJP provides the opportunity to digitise business and local government

## 5.4 Supporting Infrastructure

Telecommunications and Internet infrastructure is a key enabler for intelligent traffic management, responsive grids, smart lighting, and intelligent irrigation systems to allow the transfer of information that makes services 'smart'. This infrastructure allows efficiencies and benefits to be shared across a range of stakeholders and supports integration in ways that are yet to be imagined. By making telecommunications and internet essential "infrastructure of infrastructures" available, stakeholders can proceed straight to implementing systems that add value.

Upgrades to the existing network that support the above suggestions are outlined further below.

## 5.5 Recommended Upgrades

Telecommunications and Internet infrastructure considerations are essential to meet stakeholder expectations of modern industrial and business precincts. Intelligent traffic management, responsive grids, smart lighting, and intelligent irrigation systems all require a common communications platform to allow the transfer of information that make services 'smart'. This infrastructure allows efficiencies and benefits to be shared across a range of stakeholders and will support integration between businesses and the environment in ways that are yet to be imagined. By making telecommunications and internet essential "infrastructure of infrastructures" available, stakeholders can proceed straight to implementing systems that add value.

This base connectivity is a key enabler for *NSW Smart Places Strategy*. All new smart infrastructure should comply with the NSW Smart Infrastructure Policy[7] which sets the minimum requirements for smart technology to be embedded in all new and upgraded infrastructure.

The presence of base connectivity will provide a driver for businesses to choose to locate within the South Jerrabomberra RJP. Internet systems can allow local talent to be exported from the region without the employees physically leaving, expanding the opportunities and potential market share of future industries. Opportunities include growing high-value jobs in the local economy and showing young people that they do not need to migrate elsewhere to find opportunities.

Carriers in Australia are under constant pressure to improve productivity and streamline their process. Understanding planning requirements, having a dedicated Council contact for carriers seeking to roll out infrastructure, and ensuring timely approvals are key to attracting carriers to a new area.

Council can take an active role in encouraging expansion of telecommunications infrastructure into the South Jerrabomberra RJP by streamlining approvals and processes for the deployment of additional networks. The following actions are suggested to help Council attract new carriers to the South Jerrabomberra RJP:

- Document and automate procedures for required installation permits of new telecommunications networks (such as Development Applications and Works Applications) and make sure they are easily discovered on Council's website via an internet search
- Provide a single point of contact at Council for telecommunication carriers to seek information on the RJP and equip them with the authority and knowledge to resolve queries and requests efficiently
- Avoid levying multiple costs beyond an initial charge, to clarify the total project cost upfront
- Broker and facilitate communications between stakeholders and utilities – this might be as simple as the Council concierge summarising Dial Before You Dig (DBYD) requests in the project area and collating via a GIS portal
- Identify and remove any obstacle to carriers implementing 5G and Fibre capacity in the precinct
- Install a public Wi-Fi network to support today's high-tech infrastructure

[7] https://www.digital.nsw.gov.au/sites/default/files/Smart%20Infrastructure%20Policy.pdf

- Build “Internet of Things” (IoT) capability to support sensor networks and encourage experimentation
- Work with carriers or infrastructure providers to improve 5G capacity to the precinct
- Choose technology that allows all data collection and decision-making functions to be performed remotely via an Internet Protocol (IP) network

Upgrades to the existing network that support the above suggestions are outlined further below.

**Mobile Network**

The intended population profile of South Jerrabomberra RJP entails very high quality of mobile services and ubiquitous coverage outdoor and indoor. 5G is the most recent commercially available mobile technology, yet the precinct should be after new mobile generations when technically and commercially viable. The vision of new mobile generations implies more cyber physical integration, higher speeds and more reliable mobile networks.

5G capacity will be necessary for innovation to thrive in the precinct. The present network coverage in the South Jerrabomberra RJP will support mobile phones as expected, but is unlikely to be suitable for applications such as:

- Fixed Broadband
- Video applications
- Portable broadband devices
- Temporary or staging office connectivity

To ensure future provision is appropriate, the Master Plan should allocate land for lease to the three major mobile operators or a shared tower operator. Ideally this land will be:

- Near existing fibre and power assets
- Centrally located to maximise 5G capacity
- Set back from areas intended to have aesthetic appeal
- Away from childcare centres and schools to avoid conflict
- Have suitable access and operating areas for heavy vehicles including multiple cranes

All mobile phone base stations must stay within the safe limits of electromagnetic energy (EME) set by the Australian Radiation Protection and Nuclear Safety Agency’s (ARPANSA) Radiation Protection Standard for Limiting Exposure to Radiofrequency Fields – 100 kHz to 300 GHz. Construction of new mobile phone towers must follow Industry code C564: 2020 mobile phone base station deployment, and relevant state/territory planning laws. A limited range of facilities may also be subject to Commonwealth approval processes under the *Environment Protection and Biodiversity Conservation Act 1999*. Code C564: 2020 mobile phone base station deployment requires Carriers to:

- Notify Councils and the local community about proposals for installation of all mobile phone base stations prior to construction
- Have regard to community sensitive sites
- Design and operate mobile phone base stations to minimise electromagnetic energy (EME) exposure
- Develop a consultation plan for the deployment of infrastructure that is not subject to Development Approval/ Approval in accordance with state or local planning laws
- Turn off out-of-service transmitters
- Test their decisions about the deployment of infrastructure against a range of important factors
- Document their decision-making processes about the deployment of infrastructure

An area suitable for supporting a tower and ground leases for the three major mobile operators and their setup cranes would be around 400 square meters. Current practice is to continue to use cranes for maintenance of tower equipment, as shown in Figure 5-3, rather than maintain and certify a ladder safety system.

For efficiency, we would recommend co-locating telecommunications infrastructure with other infrastructure recommended to support the RJP. A more detailed feasibility study would be required in order to consider suitable sites for both a reservoir to service future stages of South Tralee and the recommended telecommunications tower. A future feasibility study should consider benefits of co-location of infrastructure (such as telecommunications), which could help to partially fund the acquisition of land and site establishment such as vehicular access and power. A feasibility study should also consider land use safety considerations, such as distance to schools and childcare centres.

Figure 5-3 | A crane and an EWP assembling a mobile tower

### Independent Network Testing

5G operators have no way of knowing if their network builds are successful unless they perform testing. If the results of such testing are not favourable, they are unlikely to be published.

To support the region, Council can take a lead role in testing the coverage and capacity claims of 5G operators. A neutral third-party testing company can be engaged to produce a report on coverage and capacity. When published, such a report will provide business with the information that they need to reliably choose a mobile carrier, without having to resort to dated anecdotes or unreliable sales information. It will also provide important and verified data to confirm the telecommunications capacity of the RJP.

### Public Wi-Fi

A public Wi-Fi network will provide the precinct with connectivity independent of carrier contracts with individuals. Regardless of how much this network is used, the presence of a public Wi-Fi network signals to visitors and residents that the precinct is innovative and focused on technology. It can also be used to measure movement and growth in the precinct, which can aid in decision making or provide valuable feedback on which policies are effective.

Installing a public Wi-Fi system would bring the following benefits to the South Jerrabomberra RJP:

- Connectivity to people reluctant to use a mobile service, such as tourists or foreign business guests
- Inclusive access to people visiting the precinct who do not have access to a mobile service
- Extra bandwidth for those who have accessibility requirements that cannot be satisfied by normal voice services
- A backup network that can be used as a contingency by business
- A start-up network that will allow business to start operating on day zero before services are connected
- Employee Access to social information that might be blocked by corporate policy on business networks
- Realtime analytics about movement in the precinct, by observation of mobile devices
- Long term data on growth in the precinct
- The Wi-Fi network offloads some high-capacity usage from local mobile networks, allowing them to appear faster
- A public Wi-Fi network can also be shared with CCTV to access federal funding for community safety (discussed further below).

### Long Range IoT network

One of most consistent features of smart city plans is the presence of an Internet of Things (IoT) network. This allows stakeholders to have wireless connectivity to devices without the cost of a wired network or the commitment of a mobile plan.

While Wi-Fi has excellent characteristics for such a function, its range is usually limited to line of sight, and its power requirements are unsuitable for regular operation from batteries. Long range, or Narrowband IoT, allow for long range and low power connectivity for applications that do not require significant capacity.

In 2022, the pressures of 5G capital cost have seen mobile network operators focus on fixed broadband rather than the small revenue offered by IoT, limiting their offerings.

Long Range Wide Area Network (LoRaWAN) infrastructure is a 900Mhz IoT protocol that offered a lot of promise, but its community-oriented principles have made it difficult to commercialise. By using a low bandwidth 900Mhz spectrum from an unlicenced scientific band it can reach into buildings where outdoor Wi-Fi cannot penetrate or cover long distances on long-life battery power making it suitable for agriculture applications.

More recently a new network offering called Helium has built on the LoRaWAN protocol by offering a reward mechanism for network operators. This network has proved to be an order of magnitude more popular than its predecessor, with more than 2000 base stations now deployed across Australia.

It is recommended that the precinct offer an accessible location, Internet connection and power source for a Helium node. This network can be introduced into the region to provide a self-sustaining IoT network that can be used by both industry and governments.

Care should be taken to select products and services that are compatible with the AU915 band plan. The US915 band plan has a benefit of scale and can operate in Australia, but this is achieved by sacrificing compatibility and performance.

It is tempting to consider light poles or the substation site and electrical transmission towers as a site to mount an IoT radio, but these structures might have safety and access requirements that will make the project difficult to maintain.

Instead, it is recommended to work with an existing site such as the new recycling centre, to mount an antenna on the rooftop or fix a 4m mast to the side of an existing building. If a site is chosen with a view of the Hume Highway, the radio will provide valuable coverage for vehicle tracking systems that operate without a traditional mobile network.

The NSW Internet of Things (IoT) Policy applies to all NSW Government agencies including relevant Smart Places programs and initiatives. The policy includes important principles including interoperability, cyber security, competitive and flexible procurement, and data-driven decision making.

### Smart Street Poles

Smart poles should be included in all new developments to provide space for smart city devices. While regular poles provide lighting function only, smart street poles act as a host of multiple smart services. As depicted in Figure 5-4 , smart street poles hold smart street lighting energy-saving LED that can adjust level of lighting based on time of day and level of density. In addition, smart poles can host CCTV smart cameras, IoT sensors, public Wi-Fi, charging stations, etc.

The location of smart poles must not impact convenient pedestrian and vehicular connections and accessibility. Smart poles should be integrated with smart lighting columns and CCTV to ensure visual amenity is maintained with no extra clutter. Poles should be able to hold up to 60kg of additional equipment and include a round profile so that a traditional band can still be used if necessary. The inside diameter for the base section of each pole should be at least 150mm to fit smart city equipment and be accessible through a lockable panel for maintenance. Smart Street Poles location should include a 20mm conduit and more than one fibre optic connection to the smart city network.

Smart street lighting should be deployed in activity centres and existing townships, and in community land use areas such as sports reserves, and business areas. Performance and brightness levels for street lights should be in line with AS/NZS 1158.3.1:2020. Street lights should be fitted with programmable systems to ensure lights automatically turn on/off at appropriate times and maintain required brightness levels when cars or pedestrians are present.

It is recognised that Smart Poles have not been included along Environa Drive or as requirement for initial subdivisions in the area. However, there is still an opportunity to require future subdivisions make provision for Smart Poles through inclusion of a control in a site specific DCP for the precinct.

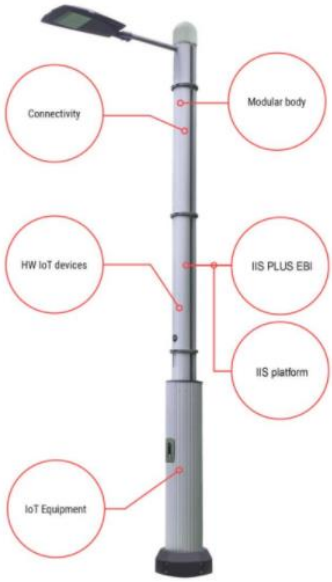


Figure 5-4 | Smart Street Pole

### EV Charging

EV charging stations in private developments must be at a rate of 20% of parking spaces and EV-ready infrastructure for an additional 10% of spaces must be available. EV charging stations should be serviced by “Level

2” charger of 15A or 7kw of charging capacity. The EV charger location should include a 20mm conduit and fibre optic connection to the smart city network.

EV charger visual displays should have appropriate cybersecurity controls to prevent malicious content from being shown to the public.

### Fibre Networks

It is recommended that new street conduits in developments should be constructed to the Communications Alliance specification G645:2017.

This will allow NBN Co or another fibre operator to easily deploy fibre in the neighbourhood. This conduit design will still be suitable for copper deployment if NBN decides to proceed with its Fibre to the Node (FTTN) plan.

As shown in Figure 5-5, two runs of P100 conduit should be installed along main routes. One conduit can be delegated to a primary fibre provider such as NBN. The second conduit will be used to support smart city or CCTV activities, such as fibre connections to hubs and light poles. By using a P100 diameter, maintenance and changes to the cabling infrastructure will be simpler and reduce operational risk. The pipe network will be able to support additional services such as carrier enterprise fibre without coming into conflict with the primary fibre provider.

Figure 5-5| "9 Pit" with multiple P100 conduits being installed

Underground networks will require a “backbone” of sorts to aggregate connections back to a principal node. The route taken by this backbone should be chosen in such a way that it will not conflict with other services or be vulnerable to natural disasters.

Future carriers may wish to use horizontal directional drilling to create their own new conduit. This might happen due to a future subdivision, or where carrier policy discourages shared ducts. Typically, horizontal bores will require at least 1m of separation from other utilities including other Telco conduits. If verge areas are narrow or have large trees, it may be difficult to retrofit additional conduits by horizontal drilling.

A dense fibre network will usually require large P6 or P9 pits with a joint. Such joints are configured and maintained by splicing vans, which will require a suitable driving space to setup and safely access the joint without having to seek access, see Figure 5-6.

When developing a Development Control Plan for the precinct, it is recommended Council consider requesting larger width verges to provide sufficient area for the installation of telecommunications infrastructure to support the intended nature of the innovation precinct.

Figure 5-6 | Splicing Van Accessing a roadside pit

### Copper Networks

If a copper FTTN network is deployed to match existing NBN infrastructure, splicing pits may not be as critical, but there will still be a need for the network to aggregate to low impact cabinet infrastructure up to 2 square meters. Such locations will also need to be safely accessible and have access to power. Cabinets will support 48, 192 or 384 premises using Digital Subscriber Line Access Multiplexer (DSLAM) technology, and are usually placed adjacent to pillars for copper distribution. The cabinets can be placed on the verge. Designers can influence the locations of such cabinets by providing open, flat areas adjacent to power and conduits.

Cabinets should not be deployed in locations that are subject to flooding or may have access restricted during a natural disaster.

### Datacentre

Datacentres attract significant investment and support an ecosystem of service providers that maintain their cooling systems, electrical systems, security systems and the IT infrastructure within.

The most effective way of monetising a fibre optic network in Australia is to have it connect to a datacentre, as it ensures that multiple customers will purchase services on the same route. Carriers will then connect to datacentres to ensure that their fibre coverage is competitive, even if they have few customers in the location.

Singapore demonstrated that it could attract a number of datacentres to a new precinct in a hot climate by establishing a "District Cooling Loop". This is where chilled water is reticulated around a precinct, so that datacentres and other large users of air conditioning can access cooling capacity without the capital and maintenance costs of large-scale cooling infrastructure. It allows such users to share a common cooling plant that is operated by the precinct. In some cases, other industries are able to take advantage of the waste heat rejected in the cooling loop, such as through heating a community swimming pool or an industrial process or linen service that uses steam.

## 5.6 Recommendations

It is noted that the role of the RJP project is to facilitate precinct-scale strategic master planning and streamlined approvals, which will ultimately drive investment and job creation. A key aspect of this is providing investor certainty, by ensuring appropriate infrastructure is provided in a timely manner to support business investment.

Whilst the RJP project does not directly fund the infrastructure recommendations in the Master Plan, it can make recommendations regarding the collection of infrastructure contributions, access to other funding mechanisms (such as grants) and can form the basis for future business case work to seek grant/other funding for required infrastructure upgrades.

**Option 1 – Level Playing Field**

- Allow NBN to take the lead on fixed telecommunications and expand their existing FTTN network in the precinct
- Allocate land for at least one mobile tower
- Meet with tower operators to seek their proposals for shared tower or infrastructure deployment
- Install IoT sensors where a definitive business case can be made (i.e., smart metering, lighting)
- Review Council standards and process to make sure it is clear to carriers what is required to build infrastructure in the area (e.g. works permit process, reinstatement requirements).

**Option 2 – Capable Innovation**

- Construct conduit along major routes
- Influence NBN to install fibre infrastructure
- Install public Wi-Fi capability at high traffic locations, such as a park or library
- Install Long Range IoT capability
- Perform 5G network testing
- Install Smart Lighting

**Option 3 – Innovation Leadership**

- Construct a dual conduit network to all areas of the precinct
- Install and maintain a wholesale fibre optic network for use by retail service providers
- Provide ubiquitous public Wi-Fi, and use location analytics reporting to identify actionable data
- Deploy an IoT sensor network and publish non-identifying data
- Perform regular 5G and Wi-Fi testing
- Mark footpaths, signs and roads with patterns that assist autonomous vehicles, such as recommended by Austroads[8]
- Partner with a smart pole provider to provide small cell 5G capability

## 5.7 Suggested Funding Mechanisms

**5G Mobile Services Funding**

Telcos will fund their own 5G networks to improve coverage and maintain a competitive advantage. Investment in new or upgraded networks is prioritised where there is demand for services. Demand is monitored through the presence of customers with 5G compatible devices present on the network.

With a new regional development, the business case for network investment by telecommunications companies is speculative. Often investment is prioritised in metropolitan locations, where there is a higher density of customers. This may create delays in the timing and availability of upgrades.

8 Benefits and costs of investing in physical infrastructure to support automated driving | Austroads

Shared infrastructure providers have access to infrastructure funds to identify long-term opportunities such as the RJP. These providers are often excluded from metropolitan locations by the community objection to building additional towers where infrastructure is well established.

They will fund infrastructure themselves and then provide an attractive business case to mobile operators to have them establish high-capacity services sooner rather than later. These infrastructure operators may also build or attract fibre assets to support their cause. Such operators in Australia include Axicom, ENE-HUB and Stilmark Group.

Fibre networks will typically require an anchor customer to cause them to establish assets. Major carriers will often subsidize network build if they are able to offset the cost against winning business in other parts of Australia. This is usually achieved by attracting national businesses that have a large number of branches with a high-quality connectivity requirement. Examples of such tenants include:

- Banks
- Australia Post
- Radiology Services
- Call Centres
- Datacentres
- Large Retail shops
- Supermarkets
- Professional Services Firms
- University Campus'

**Local Fibre Network Funding**

Local governments can access the "Safer Communities Fund" to build CCTV services. This fund has most recently been administered by the Federal Department of Home Affairs. By establishing a CCTV network with this fund, and carefully ensuring compatibility, a fibre optic network can be built that can later be extended to smart city services.

**Public Private Partnership**

Some public smart services can be monetized by applying innovative solutions and smart applications. In such cases, private sector can be interested in injecting some investment to modernize service provisioning while in return diversifying revenue streams to ensure project profitability. One example of diversifying revenue streams is smart street lighting where poles are equipped with sensors to monitor air pollution, temperature and parking spaces. In addition to energy efficiency, this system also generates rich data that can be monetized.

## 5.8 Cyber Security

The South Jerrabomberra RJP is envisioned as a hub of defence, space, cyber-security, information technology and scientific research sectors. Information and Communications Technology (ICT) entails world class telecommunications and Internet infrastructure. Previous experience proves that all ICT hubs are natural targets for cyber-attacks. Hence, the South Jerrabomberra RJP should be leading by example by adopting and complying with the Australian Cyber Security Centre (ACSC) Critical Infrastructure guidelines. It is worth mentioning that the ACSC provides timely, tailored advice to Critical Infrastructure partners, aids asset owners in identifying and evaluating security vulnerabilities, and provides assistance to asset operators in implementing sound mitigation and risk reduction strategies.

Smart City projects often fall outside of the scope of traditional IT operations, and an emphasis is placed on capital expenditure rather than maintenance. New technology moves at such a rapid pace that leading edge devices are likely to become obsolete and unsupported within their expected life. Components of disparate technological innovations may interact in unexpected ways that might create new opportunities for attackers to exploit.

It will be difficult for the media and the public to focus on the successes of such a project if its reputation has been damaged by a cyber security incident.

While a full cybersecurity analysis is outside of the scope of this engagement, the following guidelines will assist the stakeholders in avoiding reputational damage and limiting the effects of incidents:

- Ensure that the public is only able to interact with devices in ways that are explicitly defined
- Partition management interfaces onto their own network where possible, and ensure that this network is only reachable by encrypted and authenticated access
- Configure devices to log events and errors to an external server on a different network
- Where possible, require each administrative user to have their own unique login and password, rather than sharing a common login, and annually review access for each user
- Prefer vendors that have a stated long term support policy
- Where devices use open-source software libraries, they should require documentation of the exact versions in use and regularly compare them to publicly disclosed Cyber Security Vulnerabilities, such as those published by the Countering Violent Extremism (CVE) program
- Where a display interface is used to display custom information, ensure that the council has the necessary controls to shut down the display or curate its content
- Have independent routines to notify administrators if content or configuration is changed
- Hire an independent penetration tester to evaluate the completed project and advise on potential vulnerabilities
- Prefer modular systems that provide transparent interfaces for troubleshooting over all-in-one systems that are more opaque
- Regularly backup configurations.

# 6 Potable Water Supply

## 6.1 Baseline Assessment

The water supply for Queanbeyan, including the South Jerrabomberra RJP, is from the Googong Dam. QPRC has a supply agreement with Icon Water to provide bulk potable water to Queanbeyan through two offtakes. QPRC manages distribution within the Queanbeyan network. The two designated offtakes for this supply are at 99 Edwin Land Parkway and in Karabar, which are shown in Figure 6-2.

A schematic of the water supply trunk pipe network is provided in Council's Development Servicing Plan for Water Supply and shapefiles of the network have been provided by QPRC. The water supply network, including the Googong to ACT water main, is shown in Figure 6-2 .

Some water supply infrastructure for the South Jerrabomberra area has already been designed and installed as part of earlier and current developments. This is discussed further in the following sections.

Figure 6-1 | Googong Dam Spillway (source: Icon Water 2022)

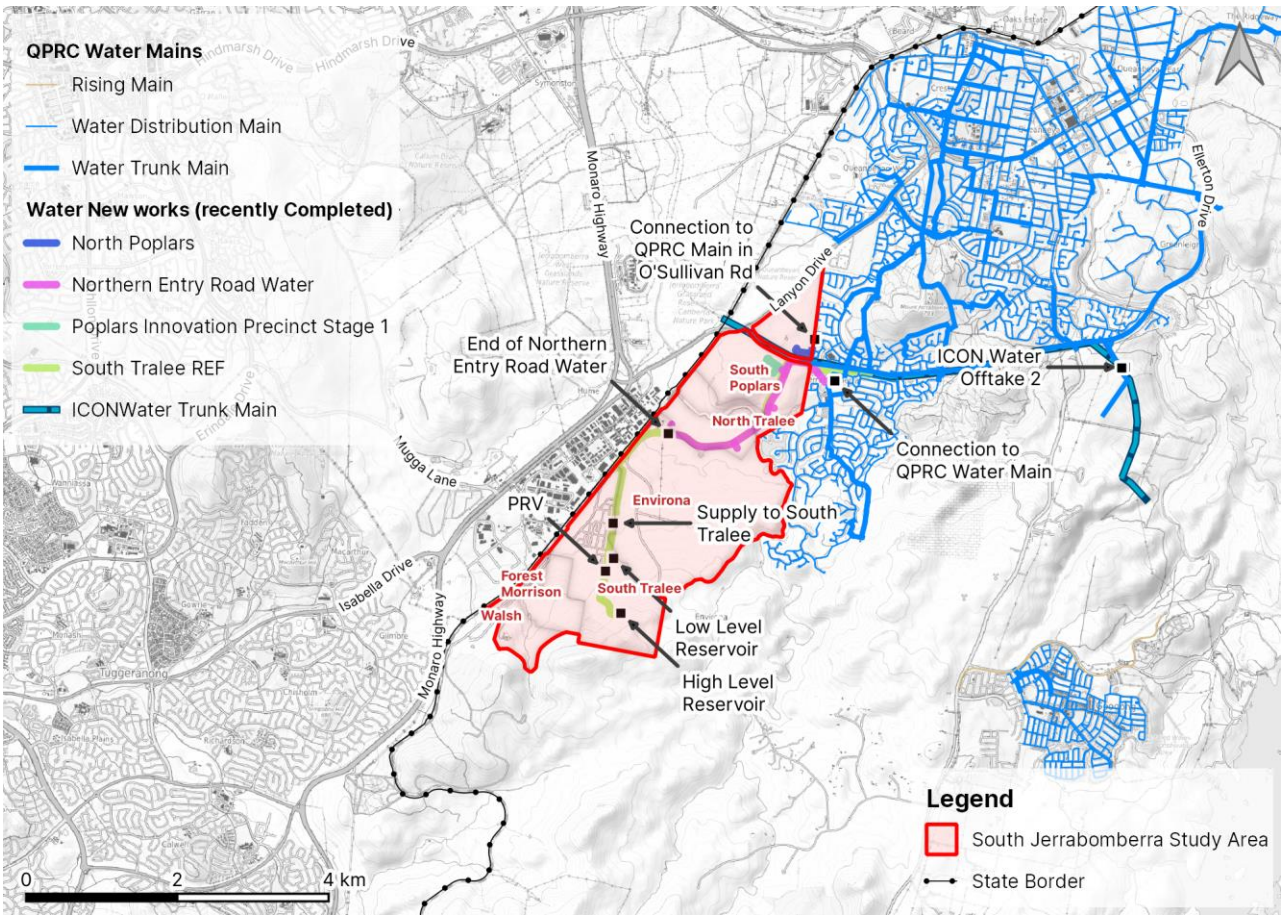


Figure 6-2 | Existing Water Supply Network, (Sources: QPRC Shapefiles 2022, Queanbeyan Water Supply Agreement 2008)

The South Jerrabomberra RJP is broken into a number of areas as shown in Figure 6-2 these are:

- North Poplars
- South Poplars & North Tralee
- Environa
- South Tralee
    - The assessment of the water supply for each of these areas is summarised below.

### North Poplars

North Poplars consists of Poplars Grassland Reserve to the west and Poplars Retail Services Precinct, known as Marketplace at Botanical, to the east. As constructed drawings from 2019 show, this retail precinct connects to an existing main in O'Sullivan Road and is serviced by a 150 mm water main.

### South Poplars and North Tralee

The areas of South Poplars and North Tralee are covered by the Northern Entry Road (NER) Water and Sewer Infrastructure Master Plan (Calibre for Poplars Developments Pty Ltd, 2019). This Master Plan was reviewed by Urban Water Solutions (UWS) in 2020.

The South Poplars area includes 22 commercial lots, as part of the Poplars Technology Park (also called Poplars Innovation Precinct), and a new high school to the east of the area, with the balance of the area to the west marked for Poplars Grassland Reserve. North Tralee consists of the Regional Sports Precinct, a light industrial area (North Tralee Industrial Park) and a commercial area (Future Business Park).

During the UWS review, it was advised that the Sports Complex did not require an allowance for irrigation water supply 'on the basis that any irrigation would be from on-site storage tanks and that any potable water top up would be from off peak flow'. However, a further sensitivity analysis was also undertaken by UWS and determined the peak hour supply to the Sports Complex could be increased to 30 L/s (if required) while still meeting service standards in the area.

The NER Master Plan determined the connection point to the existing network for this area to be to a 450 mm main in Rosewood Glen with a supply grade of 680 m AHD. Figure 6-3 below shows the connection point and water mains proposed by this Master Plan. The majority of these mains have since been installed.

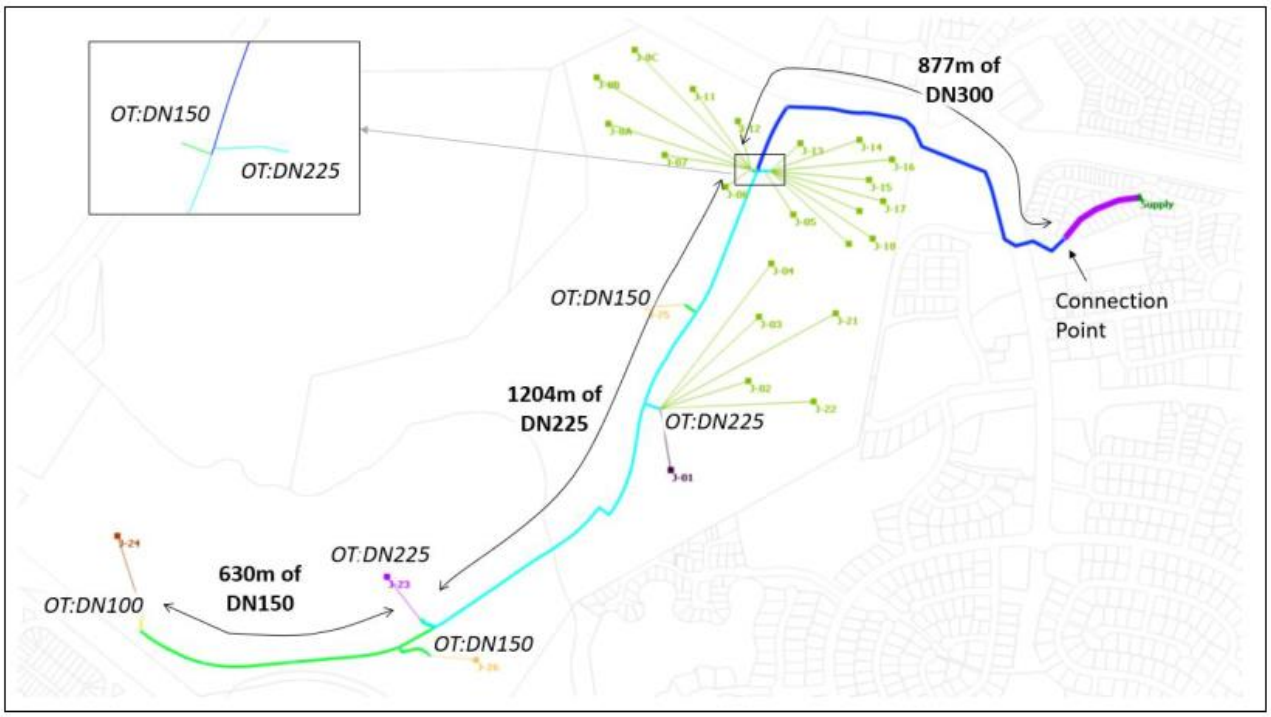


Figure 6-3 | Water Network for NER (source: AWS, 2020)

### Environa

Water supply to Environa has not been accommodated for in the infrastructure planning for the area. Environa lands are currently used for rural purposes, however the RJP Master Plan contemplates 'local business and industry' and 'space, defence and technology' sub precincts. The anticipated water supply requirements for this area are discussed in Section 6.2.2 as part of the assessment of the infrastructure required to support the Master Plan.

### South Tralee

The water supply for South Tralee is covered by the 'South Jerrabomberra Water and Sewer Servicing Strategy' (Calibre for Village Building Company, 2016). This strategy covers the South Tralee, Forest Morrison and Walsh lands and demonstrates the required ultimate water and sewer infrastructure to service development in this catchment. The catchment was planned to consist of a mix of single lot, large lot, multi-unit and apartment residential areas, a commercial precinct, and a school. Based on the strategy, it connects to the Queanbeyan network at the ICON Water supply point, '1st Queanbeyan Offtake', on Edwin Land Parkway. From this point, the new main transfers water to a Low Level Reservoir before boosting to the High Level Reservoir, with a second High Level Reservoir planned for the future.

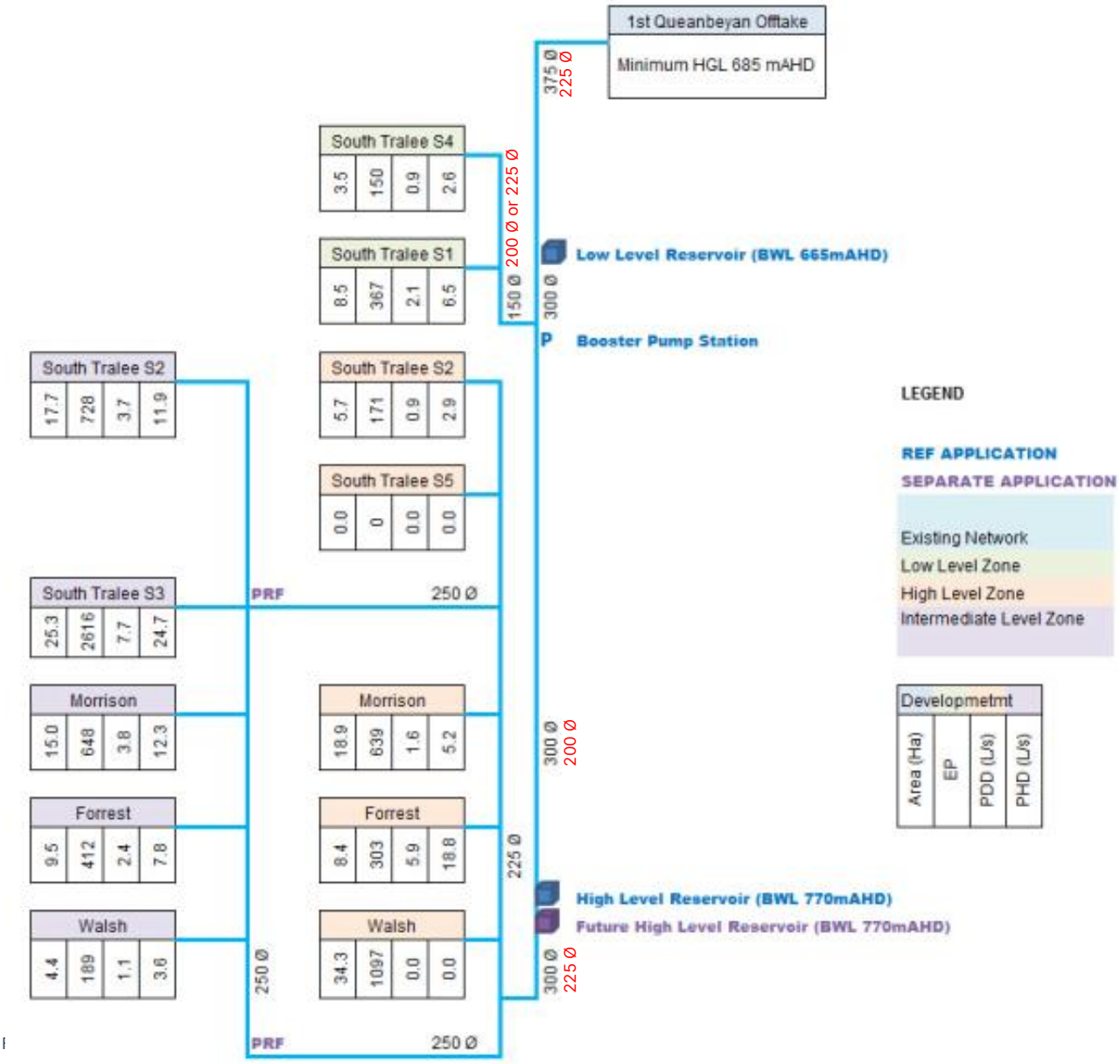


Figure 6-5 | South Jerrabomberra Water Supply Catchment Development Schematic (sourc: Calibre, 2016), with updates in red (works as executed)

Due to varying topography in the area, the strategy identified three servicing zones for the South Jerrabomberra catchment:

- Low Level Zone: 640 – 610 mAHD, to be serviced from the Low Level Reservoir
- High Level Zone: 740 – 690 mAHD, to be serviced from the High Level Reservoir
- Intermediate Level Zone: 690 – 640 mAHD, to be serviced via a pressure reducing valve (PRV) from the High Level Reservoir

The schematic of this catchment from the offtake is shown in Figure 6-5, however it is understood that some design parameters and pipe sizes were changed between approval and construction. Based on 'work as executed' drawings from 2021, the constructed pipe sizes are shown in red text on Figure 6-5. The sizing of infrastructure is understood to be sufficient to service existing residential and supporting developments within the investigation area. From discussions with QPRC, it has been confirmed that expansion of developable areas beyond existing approvals would require additional infrastructure which has not been space-proofed within the Environa Drive road reserve.

### 6.1.1 Recently installed water infrastructure

Based on information received from QPRC (Infrastructure *Works as Executed*), Figure 6-6 represents SMEC's current understanding of installed water infrastructure interacting with the RJP.

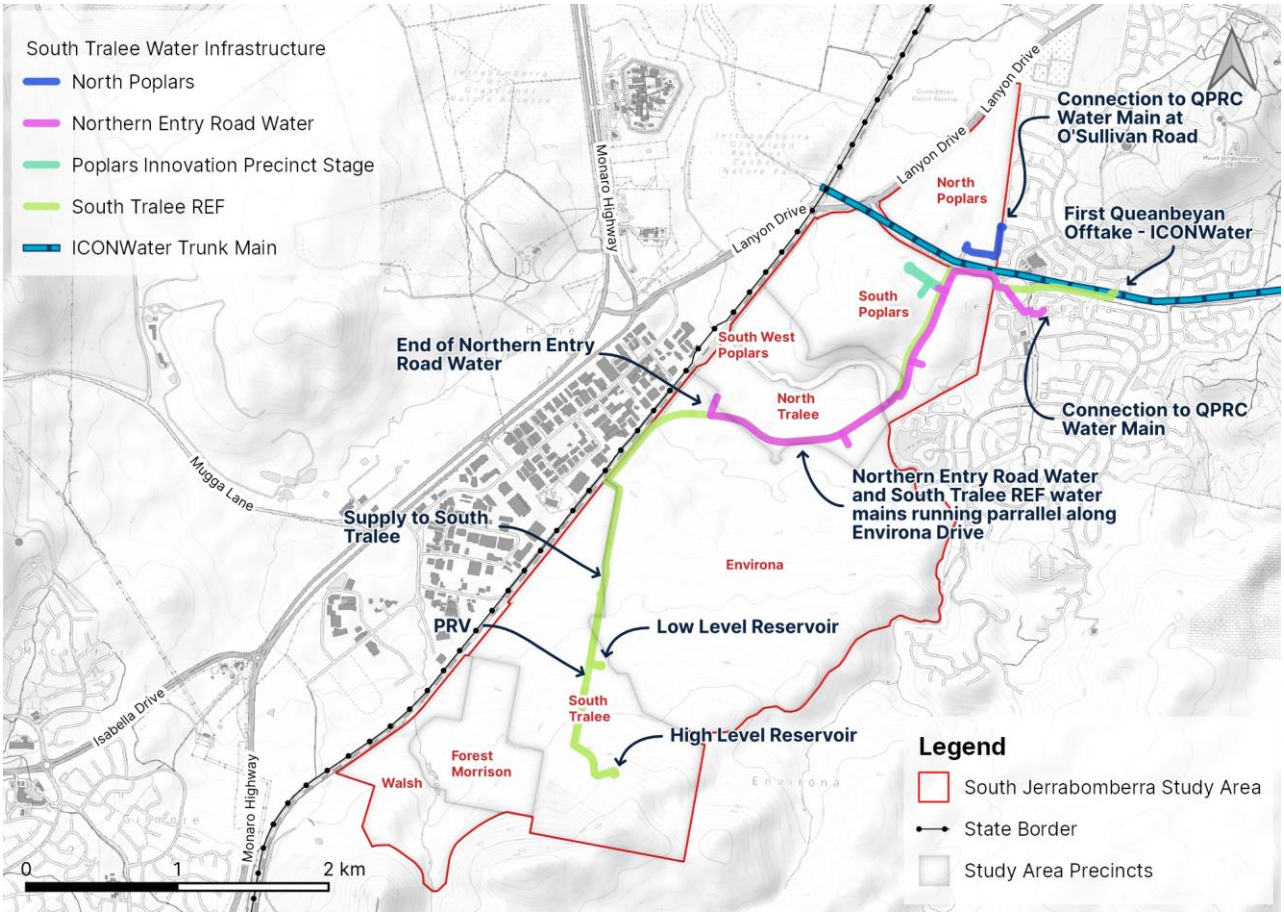


Figure 6-6 | Current Water Network for region (Note: Location information derived from multiple sources. Accuracy and notes to be confirmed)

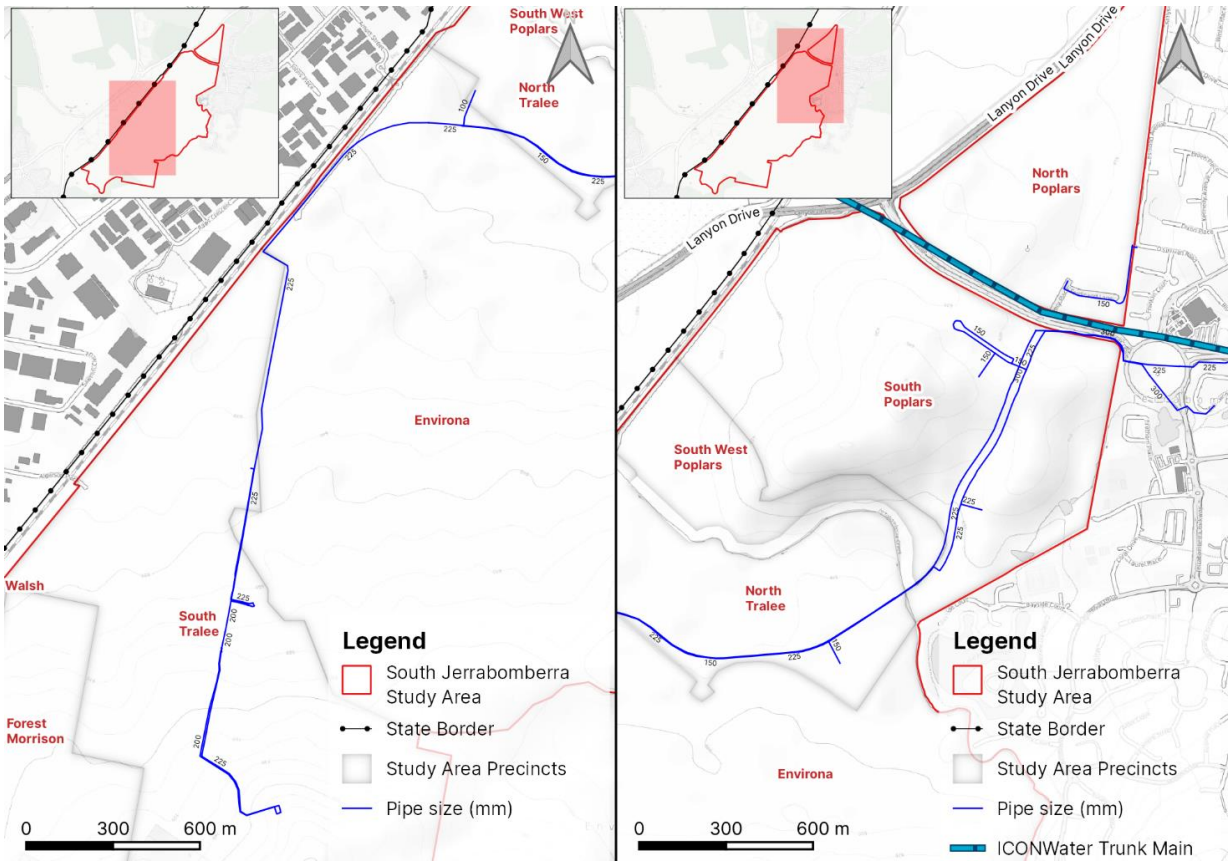


Figure 6-7 | Current Water Network zoomed scale (Note: Location information derived from multiple sources. Accuracy and notes to be confirmed)

## 6.2 Recommended Upgrades to Support the Master Plan

### 6.2.1 Overview

This section provides a summary of the recommended upgrades to the water network to support the South Jerrabomberra RJP Master Plan. Options for augmentation to the existing potable water supply network will be driven by demand from industries, the speed of uptake of development opportunities and the capacity of council to fund new infrastructure through development contributions planning.

This strategy is intended to be flexible to the changing needs of the RJP as development progresses and land use composition changes. We have adopted the four staged approach from the RJP Master Plan, which will allow Council to monitor the uptake of development in the RJP and residential growth in South Tralee to ensure infrastructure is planned in a logical and timely manner.

### 6.2.2 Basis of Assessment

The basis of assessment of the water supply for the Master Plan consists of:

- Determination of demands
- Modelling of network
- Consideration of upgrades
    - Assessment of the North Poplars commercial area has been excluded as it is assumed that the water supply has already been secured based on the current status of development approvals.
    - Assessment of the South Tralee residential area, including South Tralee, Forest Morrison and Walsh lands, has been based on a potential additional 500 dwellings and 3.94 ha of Local Business and Industry, beyond the existing capacity of the as-built network. It is assumed the supply for the existing planned

residential area and 5.3 ha of Activity Centre has already been secured based on the current status of development approvals, and only assessment of additional loads in this area is required.

- Alternative water sources are considered for the development to reduce potable water consumption through the IWCM as discussed in the 'Hydrogeology, Water Quality and Water Demand Technical Report', however this will not affect the peak hour demand and has therefore not been considered as part of this assessment.

#### 6.2.2.1 Demands

Various sources have been referenced to estimate water demand for the development including:

- QPRC, Development Design Specification (D11) Water Reticulation, V1, 2019
- UWS, Technical Memo: Sth Jerrabomberra – Northern Entry Road Water Infrastructure Review, 8 May 2020
- Water Directorate (NSW), Section 64 Determinations of Equivalent Tenements Guidelines, 2017
- Water Services Association of Australia (WSAA), Water Supply Code of Australia WSA 03 – 2002 (previous version) and WSA 03-2011 (current version)
- Calibre, South Jerrabomberra Water and Sewer Servicing Strategy – Technical Report, May 2016

Demand rates determined in the UWS technical memo have been used to estimate the non-residential water demand for the development and are outlined in Table 6–1. This memo was provided by Council and is assumed to have met Council's requirements, it is also the basis of design for the existing South Poplars and North Tralee water main that is part of the RJP area.

Table 6–1 | Non-Residential Water Demand Assumptions (UWS,2020)

| Classification | Peak Hour Demand Rate |
|---|---|
| Schools | 1.1 L/s/ha |
| Commercial | 1.1 L/s/ha |
| Light Industrial | 2.25 L/s/ha |

Initial investigations indicated that data centres in the area could have a very high water demand due to the use of water for cooling towers, however recent discussions with the committed data centre have confirmed that they do not plan on using cooling towers and cooling will be undertaken with electricity. This has been discussed in detail in analysis of electricity demand (Section 3).

It has been assumed that no water supply is required for the conservation areas, and that the regional sports precinct and other open space areas, will use alternative water sources for irrigation as per the UWS Technical Memo: 'Sth Jerrabomberra – Northern Entry Road Water Infrastructure Review'. The UWS Technical Memo: 'Sth Jerrabomberra – Northern Entry Road Water Infrastructure Review – Addendum' modelled a supply of up to 30 L/s for the Sports Centre as a sensitivity test, however it is not clear if the sports centre requires this flow and it has not been included in this assessment.

The peak hour demand assessment for each RJP zone, based on anticipated development, is summarised in Table 6–2 and Table 6–3 below. Further information on the 'RJP Zoning Classification' can be found in Section 7.3.1.2.

In addition to peak hour demands, fire flow was also considered with an allowance of 30 L/s for commercial/industrial and 10 L/s for residential.

Alternative water sources could be considered for the development to reduce potable water consumption, however this will not affect the peak hour demand and has therefore not been considered as part of this assessment.

Table 6–2| Water Demand Assumptions for South Poplars, North Tralee & Environa

| Area | RJP Zoning Classification | Demand Classification | Peak Hour Demand Rate | Peak Hour Demand | Source |
|---|---|---|---|---|---|
| **Northern Entry Road Area (Existing Plan)** | | | | | |
| South Poplars – Stage 1 | Space, Defence & Technology | Commercial | 1.1 L/s/ha | 29.95 L/s | UWS Memo |
| South Poplars - High School | Education | School | 2.25 L/s/ha | 3.30 L/s | UWS Memo |
| South Poplars – Stage 2 | Space, Defence & Technology | Commercial | 1.1 L/s/ha | 10.24 L/s | UWS Memo |
| North Tralee Estate | Local Business & Industry | IND2 & B7 | 2.03 L/s/ha & 1.1 L/s/ha | 34.22 L/s | Spiire Drawings[9] |
| Regional Sports Precinct | Open Space | Various | 3.7 L/s for Sports Centre for drinking water as per UWS memo, assuming no potable water for irrigation | 3.7 L/s | UWS Memo |
| **SUB TOTAL – Existing Planned Area** | | | | **81.4 L/s** | |
| Environa – B&I | Local Business & Industry | 20% Commercial, 80% Light Industrial | 1.84 L/s/ha | 94.06 L/s | N/A – new area |
| Environa View | Space, Defence & Technology | 20% Commercial, 80% Light Industrial | 1.84 L/s/ha | 76.76 L/s | N/A – new area |
| Environa – Activity Centre | Local Business & Industry | Commercial | 1.1 L/s/ha | 2.09 L/s | N/A – new area |
| **SUB TOTAL – Environa** | | | | **172.9 L/s** | |
| **TOTAL** | | | | **254.3 L/s** | |

[9] Spiire, 'North Tralee Estate Development Application – Water Concept Master Plan', 25/03/2021

Table 6–3| Water Demand Assumptions for South Tralee Residential Development

| Area | Number of Lots | AD | PDF | PHF | PH | Sources |
|---|---|---|---|---|---|---|
| **Existing Planned Development (assumed)** | | | | | | |
| Residential Lots | 1,500 | 230 kL/ET/yr | 2.36<br>(~ 4,300 EP) | 4.15<br>(~ 4,300 EP) | 107 L/s | WSA, QPRC |
| Activity Centre | 5.3 ha | - | - | 1.1 L/s/ha | 5.8 L/s | - |
| **SUB TOTAL – Existing Planned Area** | | | | | **113 L/s** | |
| Additional Residential Lots | 500 | 230 kL/ET/yr | 2.27<br>(~ 5,700 EP) | 3.63<br>(~5,700 EP) | 13.1 L/s<br>(including peaking adjustment to existing planned lots) | WSA, QPRC |
| Local Business & Industry | 3.94 ha | | | 1.84 L/s/ha | 7.2 L/s | |
| **SUB TOTAL – RJP Proposed** | | | | | **20.4 L/s** | |
| **TOTAL** | | | | | **133.2 L.s** | |

The existing planned demand for South Tralee is not known and has been assumed. These flows are to be used for comparison for infrastructure sizes only, as discussed further in Section 6.2.3.5.

#### 6.2.2.2 Design Parameters

The following design parameters in Table 6–4 were used as part of the assessment.

Table 6–4 | Water Design Parameters

| Parameter | Value | Source |
|---|---|---|
| **Supply Pressures** | | |
| Minimum Service Pressure | 20 m Residential<br>25 m Commercial / Industrial | WSA 03-2011 |
| Maximum Desirable Service Pressure | 50 m | |
| Maximum Allowable Service Pressure | 80 m | QPRC D11 |
| Minimum Fire Flow Pressure | 15 m | AS 2419.1-2005 |
| **Pipeline Design** | | |
| Flow Equation | Colebrook White | Assumed |
| Friction Factor | 0.30 mm | Conservative assumption |
| Headloss Gradient (preferred) | < 3 m/km for DN > 200 mm<br>< 5 m/km for DN ≤ 200 mm | WSA 03-2011 |
| **Reservoir Design** | | |
| Reservoir Volume | 24 hr of PD | Assumed (WSA 03-2011) Agreed with QPRC during meeting 16/9/22 |
| Inlet Main Pressure Capacity | PD over 18 hrs | QPRC D11 |

#### 6.2.2.3 Network Model

**South Poplars, North Tralee and Environa**

As a calibrated water model of the existing network was not available, SMEC developed a network model for the South Poplars, North Tralee and Environa areas in WaterGEMS based on the information provided in the following documents:

- Master Plan prepared by Jensen Plus
- QPRC Shapefiles
- UWS, Technical Memo: Sth Jerrabomberra – Northern Entry Road Water Infrastructure Review, 8 May 2020
- Calibre, Northern Entry Road (NER) Water and Sewer Infrastructure Master Plan, 2019
- Design drawings and 2021 Works As Executed (WAE) drawings for the Northern Entry Road project
- Spiire, North Tralee Estate Development Application – Water Concept Master Plan, March 2021
- QPRC engineering officers recommended that modelling the network south of Edwin Land Parkway would be sufficient to assess the network capacity. The following parameters for this are:
- Supply pressure at Edwin Land Parkway: 680 mAHD
- Flow Rate at Homestead Pump Station: 150 L/s
- Peak Instantaneous Demand for residential lots: 0.15 L/s/ET
- Demand for non-residential lots: as per RJP assessment

The model layout is shown in Figure 6-8 below. Proposed new mains shown in this figure are detailed further in Section 6.2.4.2. It is highly recommended that QPRC develop a calibrated water network model of the full catchment to confirm proposed infrastructure sizing and enable monitoring of the precinct and the Jerrabomberra reservoir zone as the area develops.

The model layout includes a new DN450 supply main from the DN450 trunk main in Jerrabomberra Parkway. This main connects to the same Jerrabomberra Reservoir zone as the Northern Entry Road supply and was Council's preferred second supply option. This main is required during Stage 2 as discussed in Section 6.2.3.2. Other options considered include:

- New supply point and supply main from the 1St Queanbeyan offtake on Edwin Land Parkway, following the South Tralee main along Environa Drive. This option is not preferred by Council as it requires negotiations with Icon Water, a new reservoir in Environa and would have a high capital cost due to the length of new main required. As there are already two water mains within the Environa Drive road reserve, concern has also been raised that there is insufficient space for additional infrastructure along the road.
- A new reservoir in Environa to supply the area that is filled by the Jerrabomberra Reservoir zone. The existing DN225 from the Northern Entry Road works has insufficient capacity to provide the required peak day flow so a new main from the east would be required. Connection to the DN375 main prior to the pump station adjacent to Forest Drive was considered, however this option was not preferred by Council. This option would require further approvals and a suitable location for a new reservoir would need to be acquired.

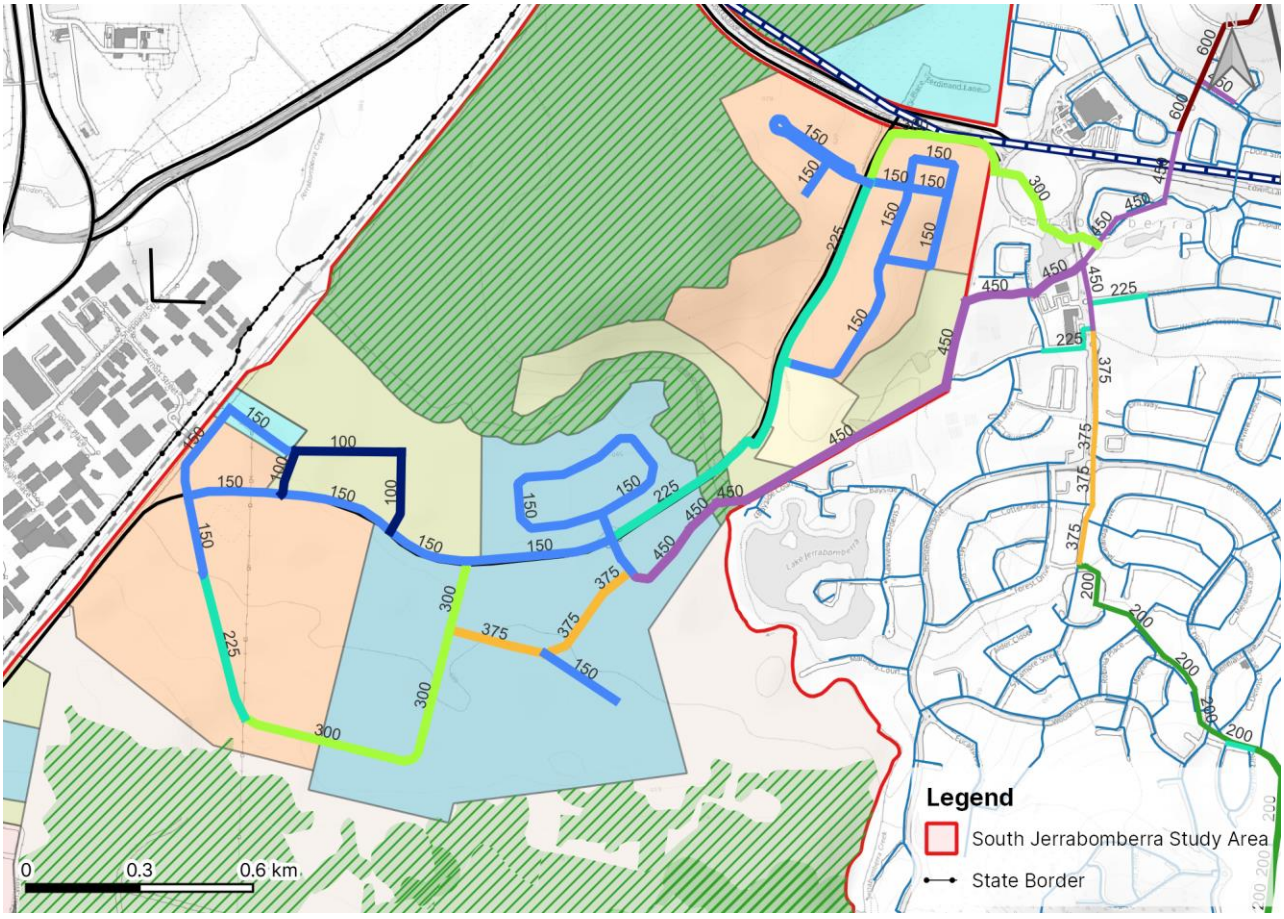


Figure 6-8 | Network Model Pipe Sizes, including QPRC trunk main sizes (as shown numerically in mm on plan)

- 

### South Tralee Development

A simple comparison of flows to check for supply capacity was done as discussed in Section 6.2.3.5.

## 6.2.3 Network Assessment

### 6.2.3.1 Stage 1

Stage 1 of the RJP consists of the majority of the existing planned area in South Poplars, North Tralee and the Regional Sports Precinct. Supply for Stage 1 is via the existing Northern Entry Road DN300/DN225 pipeline from the Rosewood Glen connection.

Peak hour modelling was undertaken, with the flow demands shown in Table 6–5 and the results shown in Figure 6-9.

Table 6–5 | Stage 1 Demands

| Area | PH Demand |
|---|---|
| Jerrabomberra Reservoir Zone incl Homestead Pump Station | 348 L/s |
| South Poplars (part of) | 30.0 L/s |
| High School | 3.30 L/s |
| North Tralee | 34.2 L/s |
| Regional Sports Precinct (part of) | 2.21 L/s |
| **TOTAL** | **418 L/s** |
| Flow through Main 1 | 360 L/s |
| Flow through Main 2 | 57.6 L/s |
| Velocity for Total Flow in 600 mm main | 1.48 m/s |

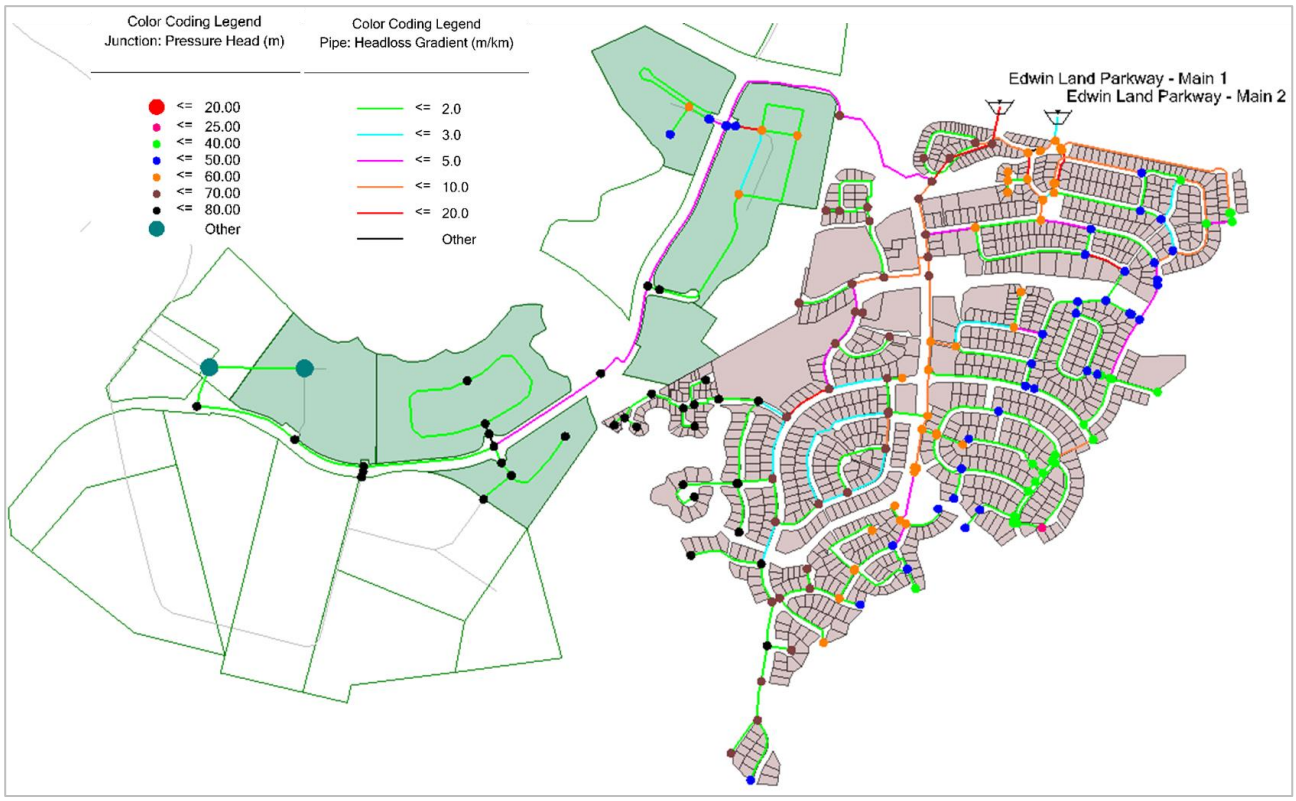


Figure 6-9 | Peak Hour Modelling of Stage 1

The results show, that during Stage 1, the supply pressure for the RJP sites meets the 25 m requirement at the main, confirming the existing mains are sufficient. It is noted that high pressures, in excess of 80 m, are shown in the Regional Sports Precinct. These high pressures will need to be considered further and approved by Council.

A fire flow test was also undertaken for the nodes within the RJP. As shown in Figure 6-10, there is sufficient fire flow available on Environa Drive. However, the nodes within the sports centre, on the 100 mm main, do not receive the required 30 L/s for fire. It is expected that this would be addressed in the detailed design of the network through a looped connection back to Environa Drive and/or through the fire engineering for the Regional Sports Precinct, with pressure increased through boosters as required.

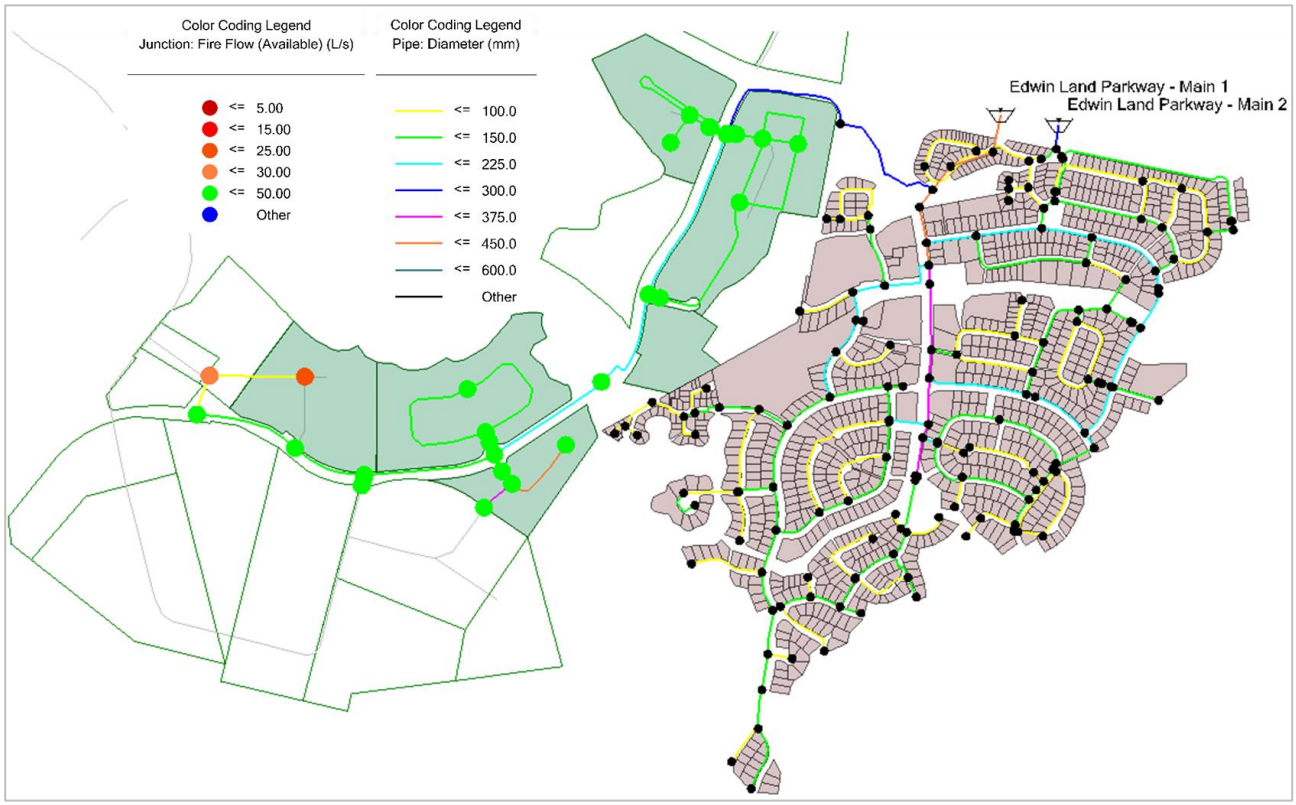


Figure 6-10 | Stage 1 Fire Flow Assessment

### 6.2.3.2 Stage 2

Stage 2 of the RJP consists of the full development of existing planned area in South Poplars, North Tralee and the Regional Sports Precinct and the addition of two areas in the Environa lands. Peak hour modelling was undertaken, with the flow demands shown in Table 6–6.

Table 6–6 | Stage 2 Demands

| Area | PH Demand |
|---|---|
| Jerrabomberra Reservoir Zone incl Homestead Pump Station | 348 L/s |
| Stage 1 | 69.7 L/s |
| South Poplars (part of) | 10.2 L/s |
| Regional Sports Precinct (part of) | 1.49 L/s |
| Environa B&I (part of) | 29.5 L/s |
| Environa View (part of) | 16.4 L/s |

| Area | PH Demand |
|---|---|
| **TOTAL** | **475 L/s** |
| Flow through Main 1 | 414 L/s |
| Flow through Main 2 | 61.4 L/s |
| Velocity for Total Flow in 600 mm main | 1.68 m/s |

The initial runs considered using the existing Northern Entry Road DN300/DN225 pipeline with supply from the Rosewood Glen connection. The peak hour results are shown in Figure 6-11 and the fire flow assessment in Figure 6-12. The results show that during Stage 2, the supply pressure for the RJP sites meets the 25 m requirement at the main. However, when a fire flow test was undertaken the requirements could not be met in the North Tralee and Environa areas. To provide fire flow to support the development of Stage 2, additional supply would be required. The options for an additional supply are discussed in Section 6.2.2.3.

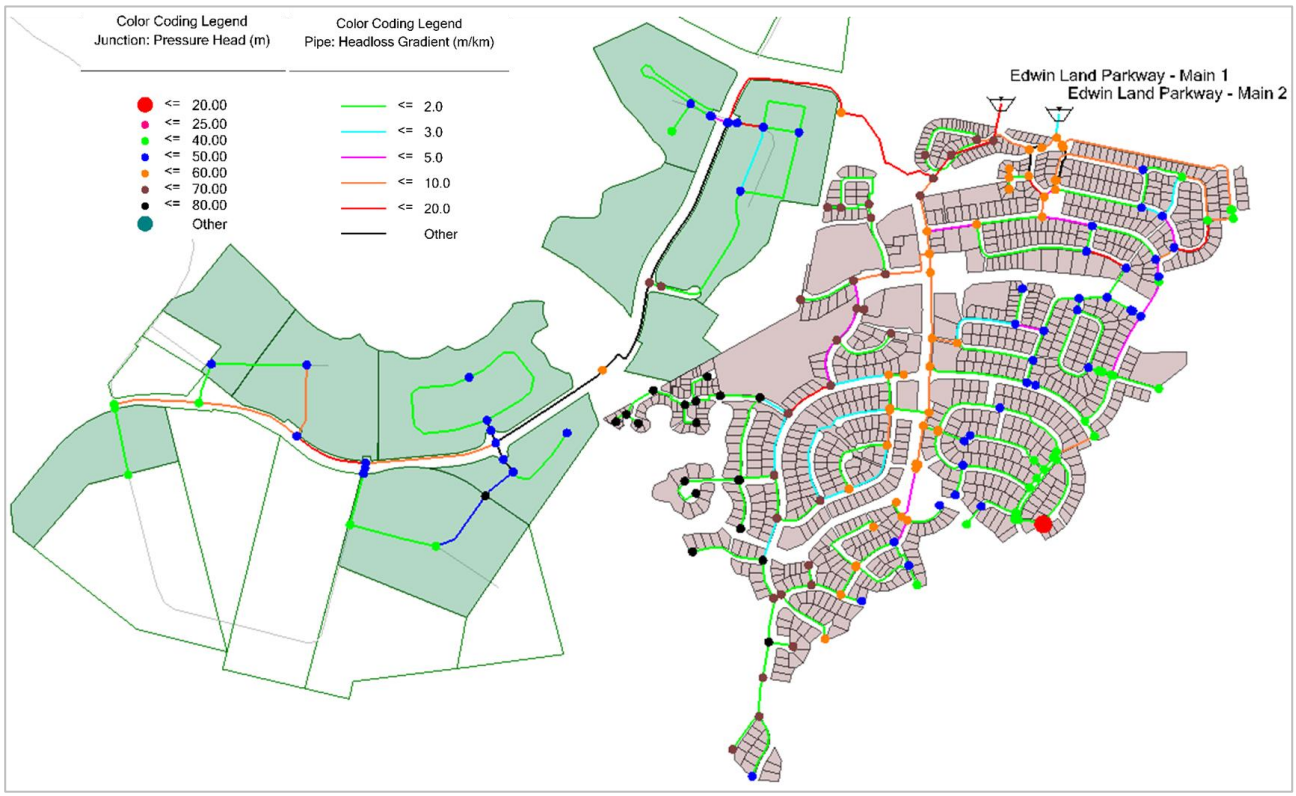


Figure 6-11 | Peak Hour Modelling of Stage 2, prior to second main

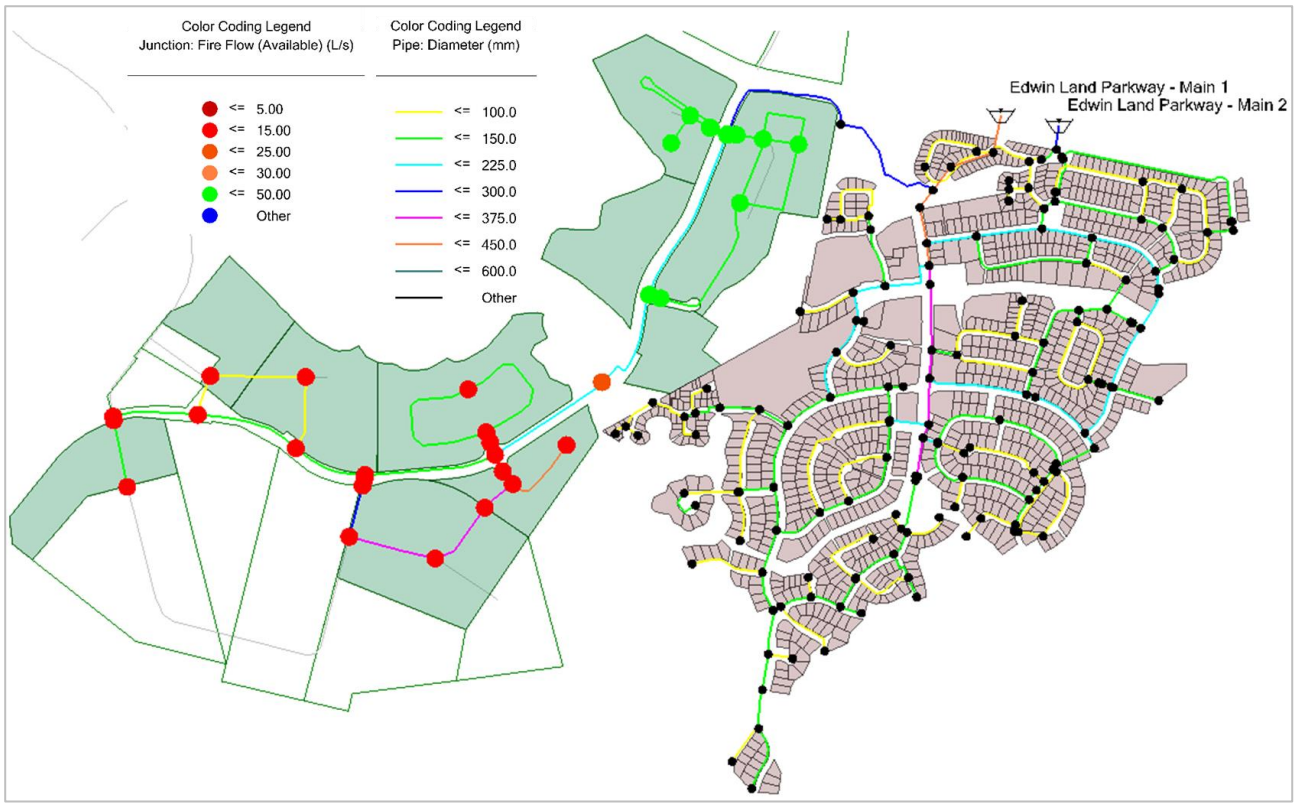


Figure 6-12 | Stage 2 Fire Flow Assessment, prior to second main

The peak hour and fire flow results, with the second main from Jerrabomberra Parkway installed, are shown in Figure 6-13 and Figure 6-14, with sufficient fire flow available at all nodes in the RJP. The flows through the mains crossing Edwin Land Parkway were similar to the flows prior to the second main supplying the RJP.

Based on these results it is recommended that the second main is installed during the development of Stage 2.

It is noted that as part of this scenario, a node in the existing area has dropped below the required 20 m pressure for residential. It is recommended Council monitor pressures in this location as development continues via pressure loggers and, if required, investigate opportunities to improve pressure in the area, such as augmentation of pipes or transfer of properties to the higher Homestead Reservoir Zone. It is also recommended Council develop a calibrated water network model for the catchment to accurately represent and monitor pressures across network as development continues.

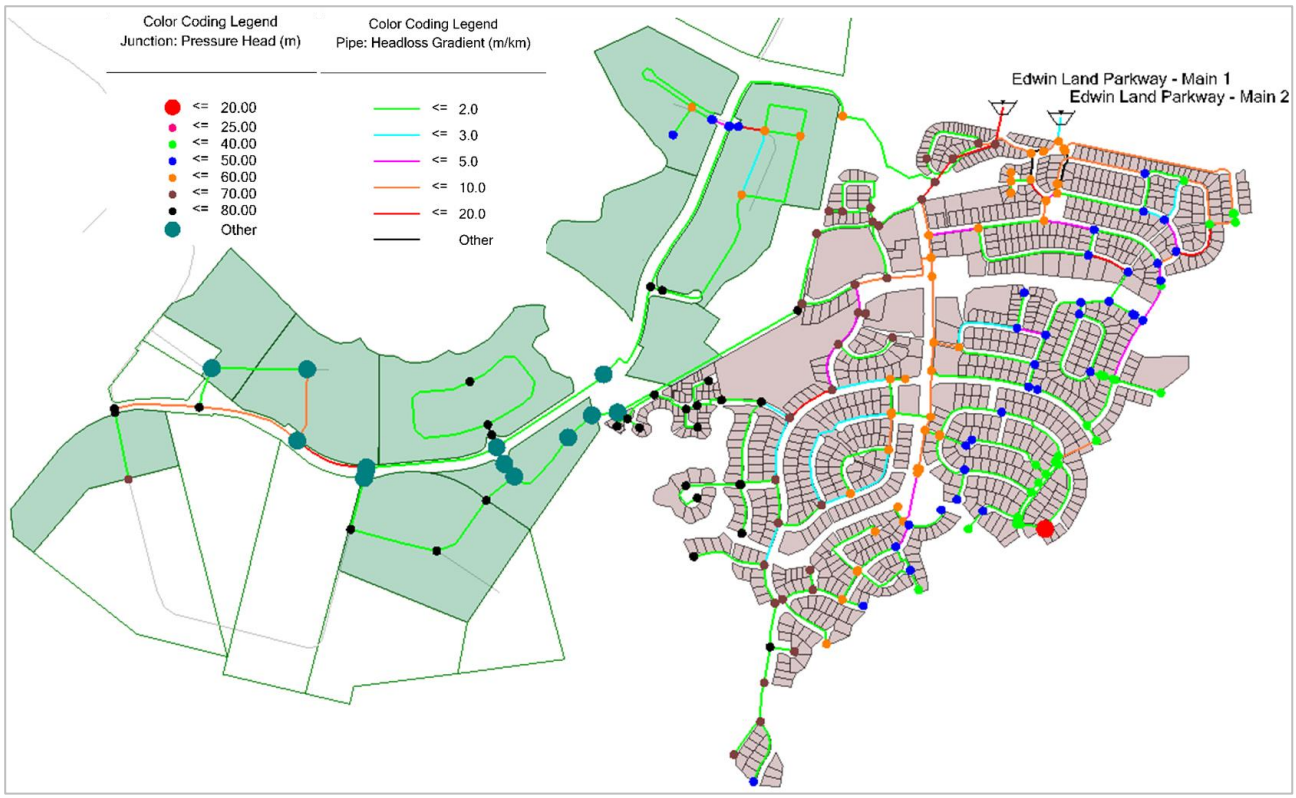


Figure 6-13 | Peak Hour Modelling of Stage 2, with second main from Jerrabomberra Parkway

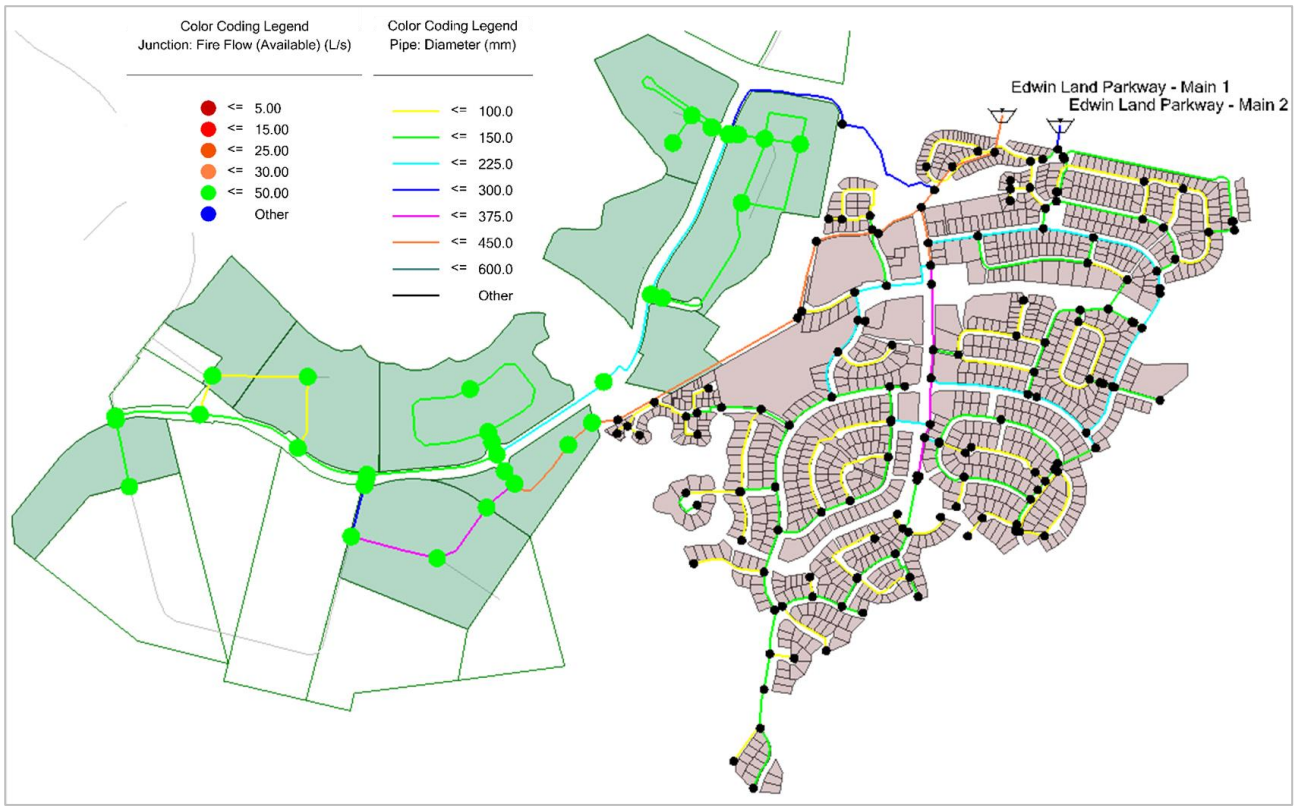


Figure 6-14 | Fire Flow Assessment of Stage 2, with second main from Jerrabomberra Parkway

### 6.2.3.3 Stage 3

Stage 3 of the RJP consists of the further development of the Environa land, both north and south of Environa Drive, and includes the activity centre adjacent the Regional Sports Precinct. Following on from Stage 2, the modelling of this stage includes the second DN450 supply main from Jerrabomberra Parkway. Peak hour modelling was undertaken, with the flow demands shown in Table 6–7 and the results shown in Figure 6-15.

Table 6–7 | Stage 3 Demands

| Area | PH Demand |
|---|---|
| Jerrabomberra Reservoir Zone incl Homestead Pump Station | 348 L/s |
| Stage 1 & 2 | 127.3 L/s |
| Environa B&I (part of) | 20.5 L/s |
| Environa View (part of) | 38.3 L/s |
| Environa Activity Centre | 2.09 L/s |
| **TOTAL** | **536 L/s** |
| Flow through Main 1 | 469 L/s |
| Flow through Main 2 | 66.9 L/s |
| Velocity for Total Flow in 600 mm main | 1.90 m/s |

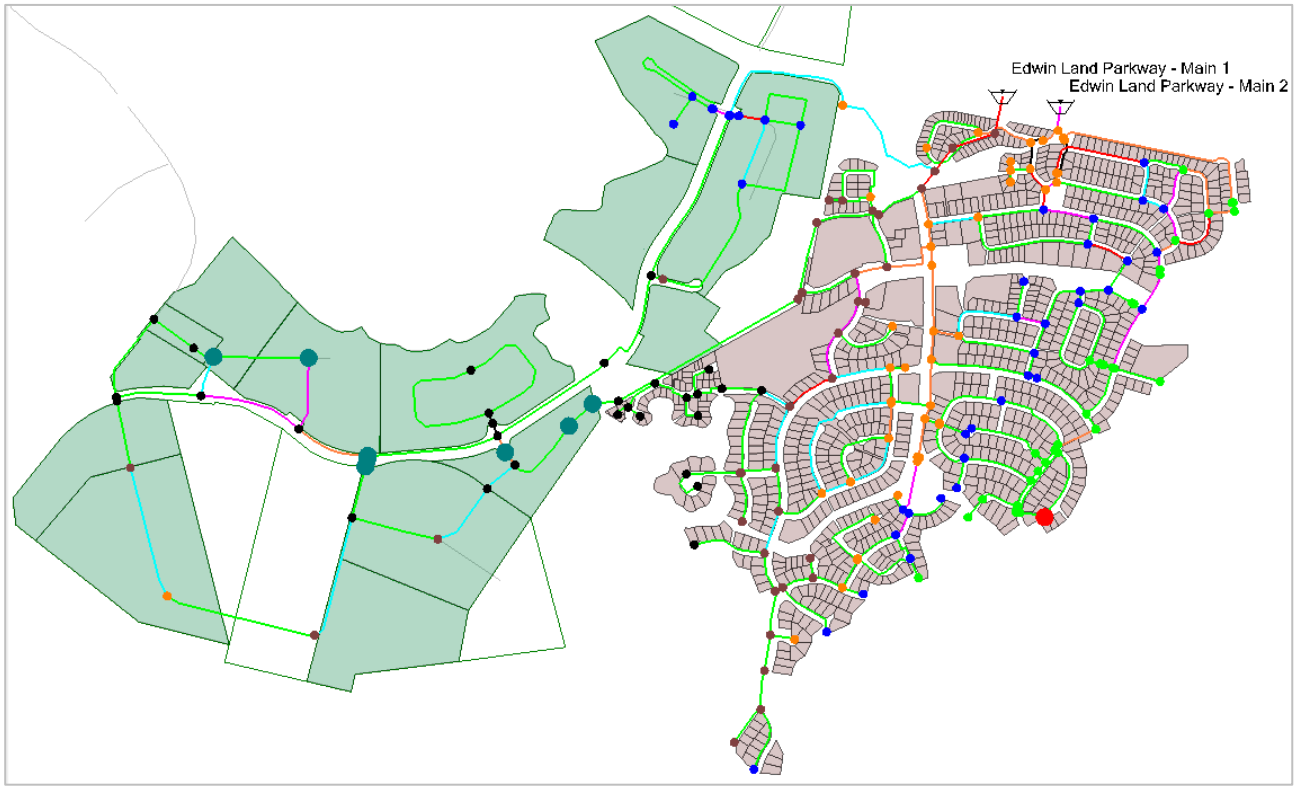


Figure 6-15 | Peak Hour Modelling of Stage 3

The results show, that during Stage 3, the supply pressure for the RJP sites meets the 25 m requirement at the main, based on the assumption that a second supply point is included in the development as recommended in Stage 2. It is noted that high pressures, in excess of 80 m, are shown in the Regional Sports Precinct and part of

North Tralee. These high pressures will need to be considered further and may require pressure reducing valves or similar at the connection point.

A fire flow test was also undertaken, Figure 6-16, which shows that all nodes in the RJP meet the fire flow requirements.

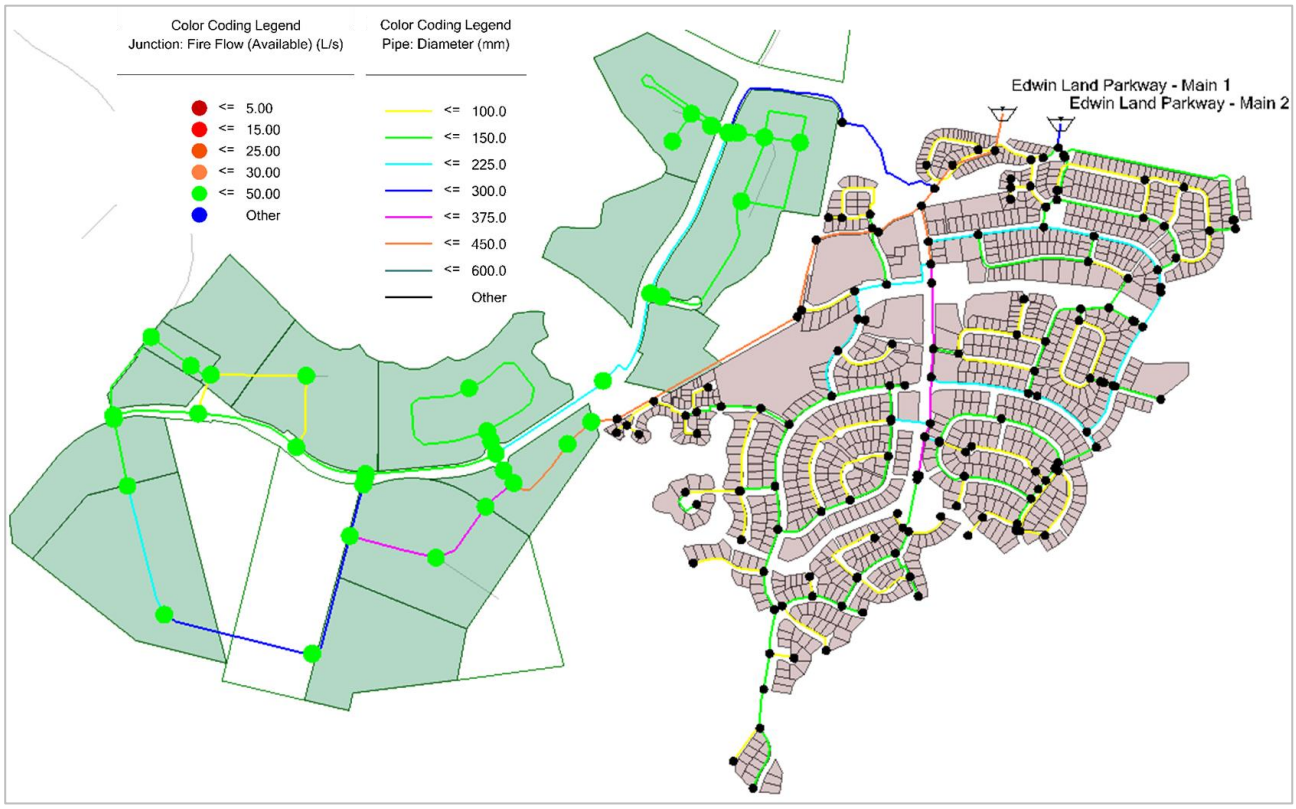


Figure 6-16 | Fire Flow Assessment of Stage 3

### 6.2.3.4 Stage 4 – Full Development

Stage 4 of the RJP consists of the full development of the Environa land. As per Stage 3, the modelling of this stage includes the second DN450 supply main from Jerrabomberra Parkway. Peak hour modelling was undertaken, with the flow demands shown in Table 6–8 and the results shown in Figure 6-17.

Table 6–8 | Stage 4 Demands

| Area | PH Demand |
|---|---|
| Jerrabomberra Reservoir Zone incl Homestead Pump Station | 348 L/s |
| Stage 1 – 3 | 188.2 L/s |
| Environa B&I (part of) | 44.0 L/s |
| Environa View (part of) | 38.3 L/s |
| **TOTAL** | **602 L/s** |
| Flow through Main 1 | 530 L/s |
| Flow through Main 2 | 72.4 L/s |
| Velocity for Total Flow in 600 mm main | 2.13 m/s |

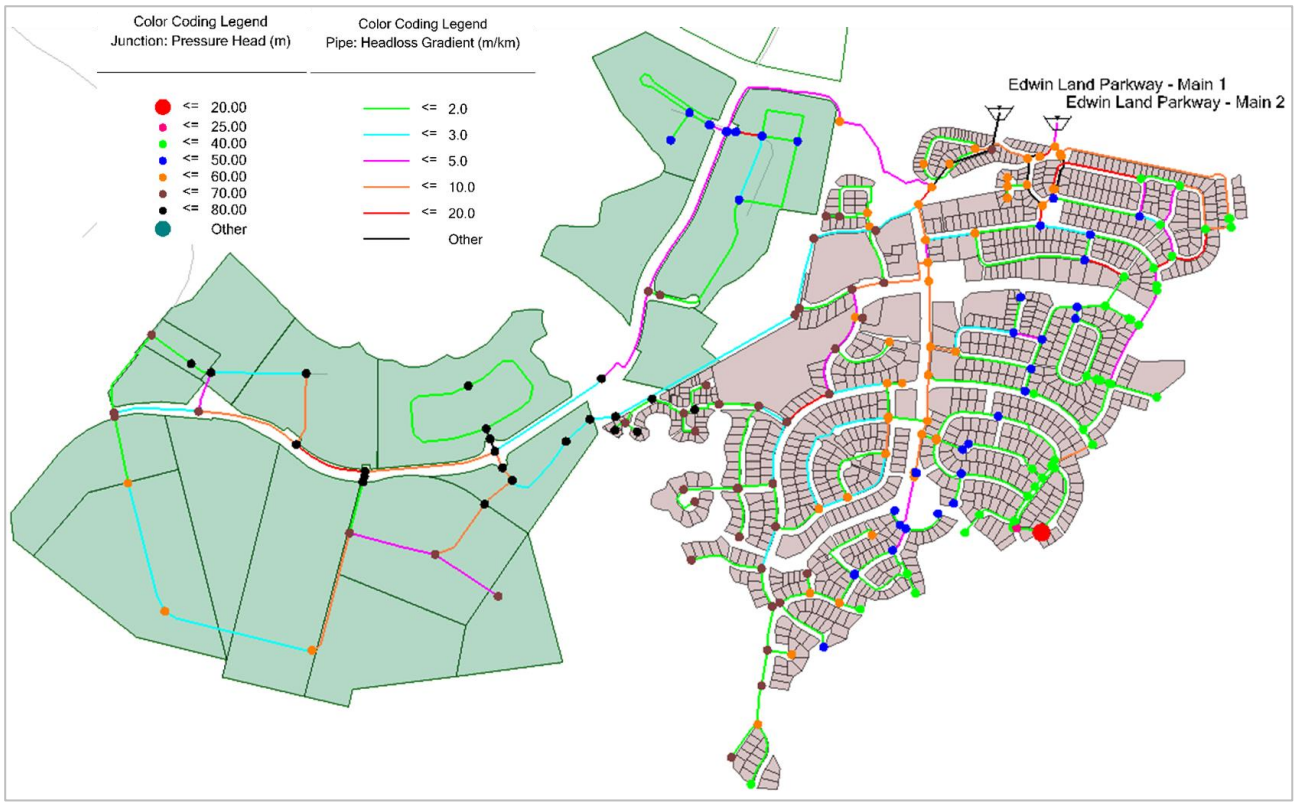


Figure 6-17 | Peak Hour Modelling of Stage 4

The results show that at full development, the supply pressure for the RJP sites meets the 25 m requirement at the main. It also shows that the high pressures shown in earlier stages have now reduced below 80 m at peak hour. These pressures are still expected to exceed 80 m during lower demand times. These high pressures will need to be considered further and discussed with Council.

A fire flow test was also undertaken, Figure 6-18, which shows that all nodes in the RJP meet the fire flow requirements.

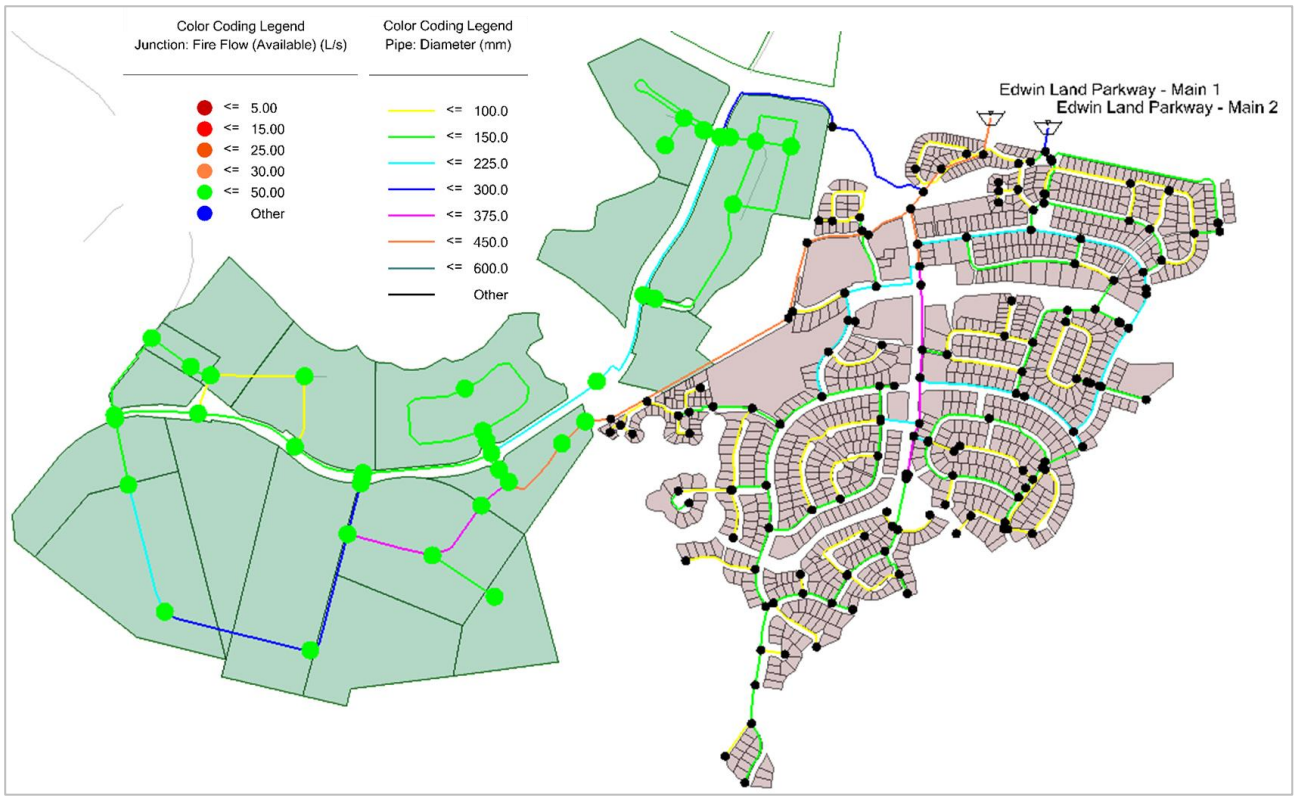


Figure 6-18 | Fire Flow Assessment of Stage 4

### 6.2.3.5 South Tralee Development

As part of the RJP development, it is proposed to increase the number of dwellings in the South Tralee development area by 500 lots and add a Local Business and Industry sub precinct to the area. This results in an increase in peak hour demand of 20.4 L/s, as per Table 6–3.

Limited information has been provided on the basis of design for the existing supply system, which determined the infrastructure sizing. As such, SMEC's assessment has been contained to review of the trunk main that supplies the low level reservoir from the 1st Queanbeyan Offtake and the additional storage required in the Low Level and High Level Reservoirs.

The estimated flows through the supply trunk main and required reservoir volumes are summarised in Table 6–9. This shows the velocity in this main would be within the acceptable range.

Table 6–9 | South Tralee Supply Main

| Item | Existing Proposed Development | RJP Proposed Development |
|---|---|---|
| Development Inclusions<br>*(assumed)* | 1,500 residential lots<br>Activity Centre (5.3 ha) | 2,000 residential lots<br>Activity Centre (5.3 ha)<br>Local Business & Industry (3.94 ha) |
| Peak Day Demand | 2.35 ML/day | 3.00 ML/day |
| Peak Day Flow<br>*- over 18 hours* | 36.3 L/s | 46.3 L/s |
| Peak Day Velocity<br>*- in 225 mm pipe* | 0.91 m/s | 1.16 m/s |
| Reservoir Storage (TOTAL)<br>- 24 hrs storage | 2.35 ML | 3.00 ML |

Further consideration of the hydraulics of this main will need to be undertaken to confirm the capacity of the pipeline. If there is insufficient capacity in the main as a gravity supply, a booster pump station could be installed to increase the flow rate into the low level reservoir.

Based on works as executed drawings there is currently an estimated 2.75 ML of total storage installed for this area, however it is not clear if any of this is unusable or emergency storage. The split of the proposed development between low, intermediate and high level is also not know at this time.

It is recommended that further assessment of this area be undertaken by the developer of South Tralee to confirm that there is sufficient capacity in the existing infrastructure or identify any augmentations that may be required to accommodate the additional 500 dwellings and a Local Business and Industry sub precinct.

## 6.2.4 Identified Upgrades

### 6.2.4.1 Jerrabomberra Reservoir

Modelling for the South Poplars, North Tralee and Environa lands was undertaken at peak hour and did not consider an extended period simulation where reservoir levels were monitored. However, based on the increase in demand in the RJP, an upgrade to the reservoir is likely. The required storage for the additional (unplanned) areas in the RJP, i.e., Environa, at the completion of each stage are summarised in Table 6–10.

Table 6–10 | Jerrabomberra Reservoir – RJP Storage for Additional Areas

| | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Peak Hour | - | 45.9 L/s | 117 L/s | 173 L/s |
| Peak Day | - | 1,631 kL/day | 4,167 kL/day | 6,151 kL/day |
| Reservoir Storage: 24 hrs storage | - | 1.6 ML | 4.2 ML | 6.2 ML |

Council is planning an upgrade to the Jerrabomberra Reservoir to support wider growth in Queanbeyan, and have advised that it is likely to be a duplication of the existing 22.5 ML. When this duplication is triggered is dependent of both the development in the RJP and other areas in Queanbeyan and will therefore be determined by Council at a later date.

### 6.2.4.2 Trunk Main and Reticulation Network

The modelling has been undertaken to determine the preliminary pipe sizes required to support the development of the additional lots in the Environa area of the RJP. It identified a second supply main from the Jerrabomberra Parkway, part of Jerrabomberra Reservoir Zone, was required during Stage 2 to support the development. This second supply is discussed in Section 6.2.2.3 and Section 6.2.3.2.

The main loop pipelines, including the second supply main, are summarised in Table 6–11 and shown in Figure 6-19. These pipe sizes will need to be refined and further reticulation mains added as the road and lot layout, and specific industry demands are confirmed.

Table 6–11 | Additional pipe lengths required to support RJP

| Pipe Size | Stage 1 | Stage 2 | Stage 3 | Stage 4 | TOTAL |
|---|---|---|---|---|---|
| DN100 | 280 m | 216 m [1] | | | **496 m** |
| DN150 | | 683 m | 482 m | 222 m | **1,165 m** |
| DN225 | | 461 m | 393 m | | **363 m** |
| DN300 | | 187 m | 822 m | | **1,009 m** |

| Pipe Size | Stage 1 | Stage 2 | Stage 3 | Stage 4 | TOTAL |
|---|---|---|---|---|---|
| DN375 | 108 m [2] | 475 m | | | **583 m** |
| DN450 | 327 m [2] | 1,250 m | | | **1,577 m** |
| **TOTAL** | | | | | **5,223 m** |

[1] Creates loop through Regional Sports Precinct to support further development of the RJP

[2] Replaces installation of planned DN150 pipe in North Tralee

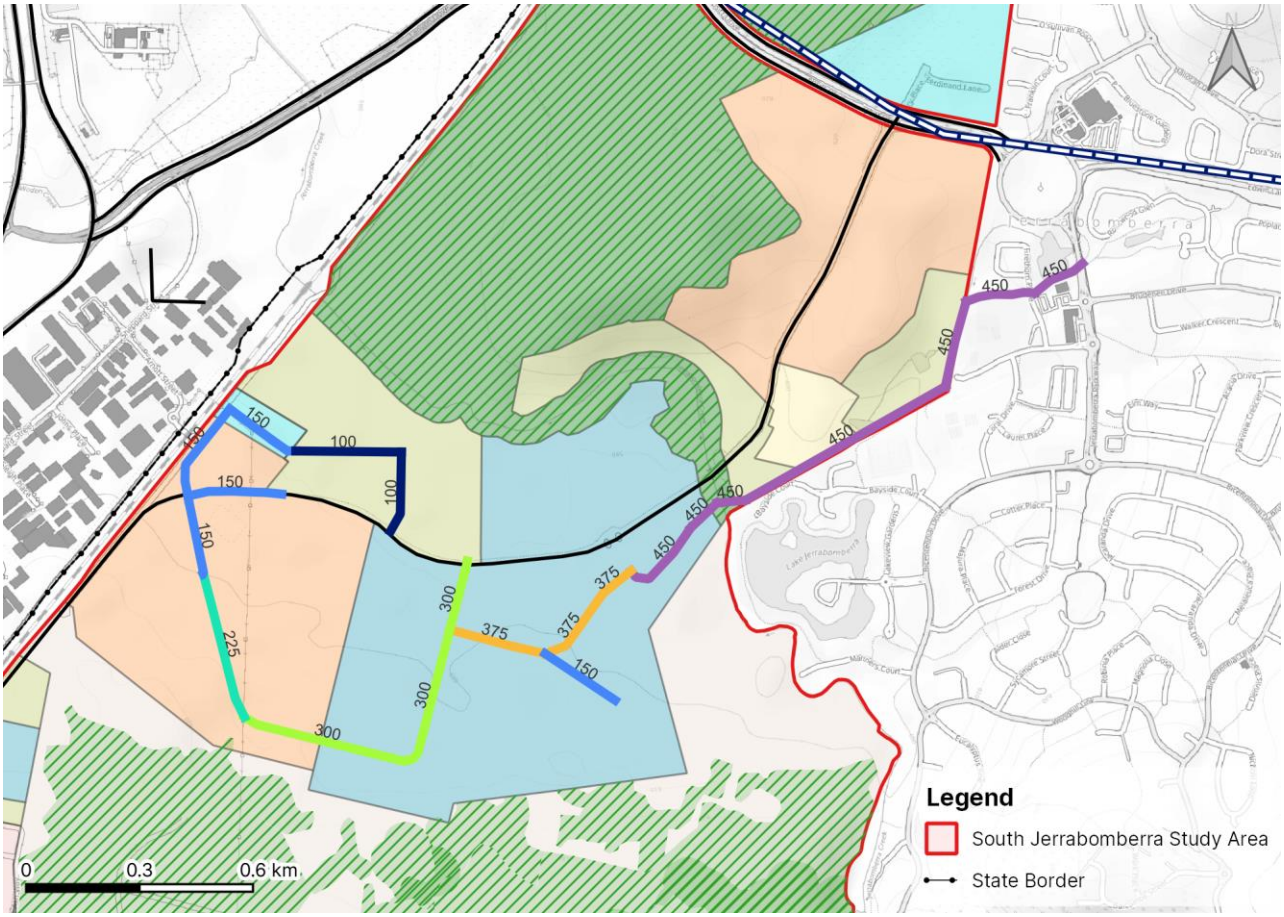


Figure 6-19 | Proposed Trunk Water Reticulation (trunk diameters shown numerically in mm on plan)

### 6.2.4.3 Pressure Reducing Valve

Elevations in the RJP range from 584 mAHD to 630 mAHD. Lower elevations may be subjected to excessive pressures at low flows. This could be addressed through installation of higher-pressure mains or, if required, PRVs. This is highlighted in the modelling in Sections 6.2.3.1 to 6.2.3.4. The location of any required network upgrades or PRVs will be determined as the internal network is designed.

### 6.2.4.4 South Tralee Upgrades

It is recommended that further assessment be undertaken to confirm the capacity of existing infrastructure to accommodate the potable water demand associated with the additional 500 dwellings and Local Business and Industry sub precinct, which are contemplated by the Master Plan. This assessment should include the basis of design which was used to size the existing network, and would ideally be incorporated within a QPRC calibrated water network model.

# 7 Sewage

## 7.1 Existing network

The existing sewer network for the Queanbeyan Sewage Treatment Plant (STP) is shown in Figure 7-1 below. The Queanbeyan STP receives inflows from both the Jerrabomberra and Morisset catchments, which are defined in the figure as orange and blue respectively.

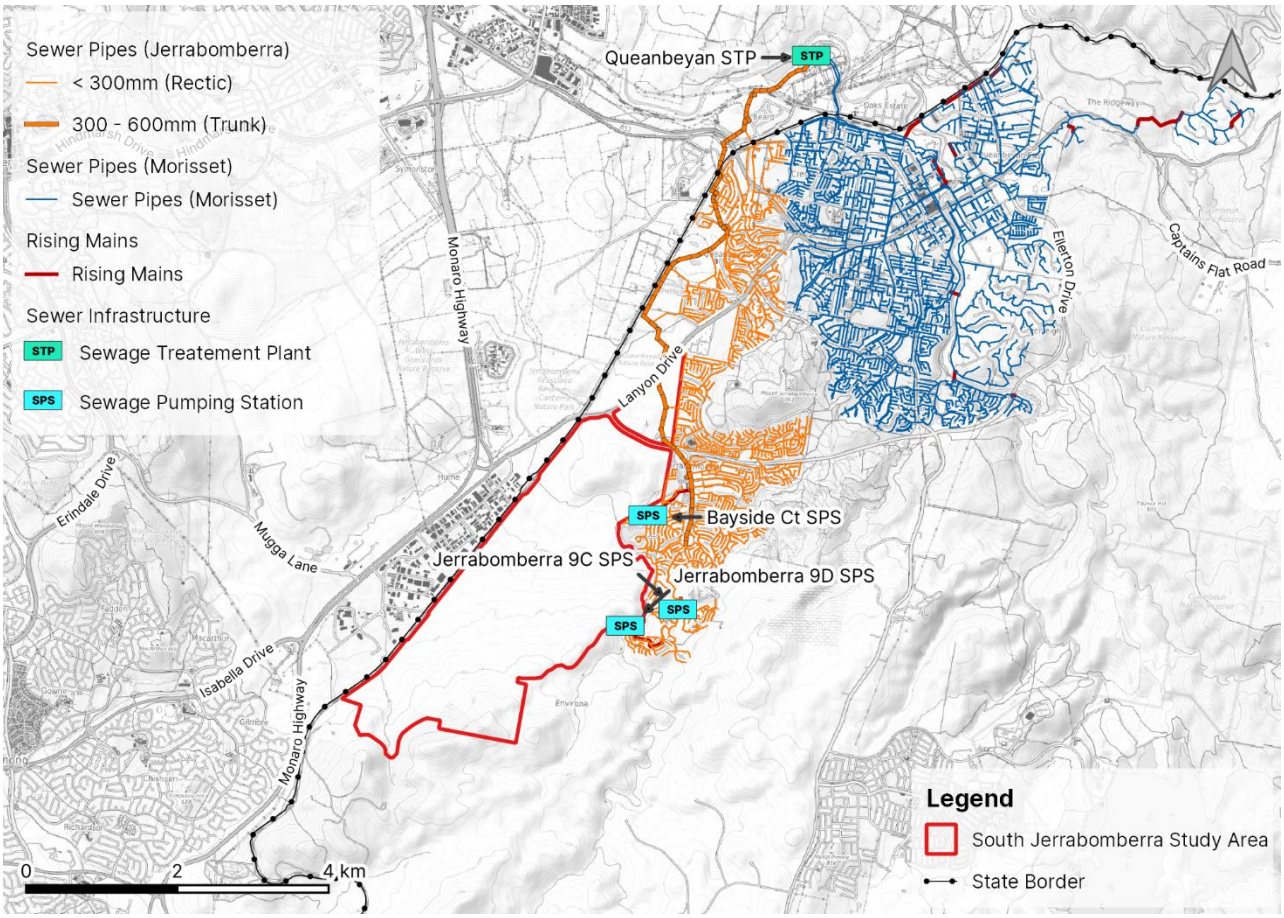


Figure 7-1 | Existing Sewer Network, including Jerrabomberra catchment (orange) and Morisset catchment (blue)

The South Jerrabomberra RJP Study Area is located immediately adjacent to the southern portion of the Jerrabomberra catchment and within proximity of a DN600 trunk sewer, which is the main trunk sewer for the catchment. Works have been completed for a new reticulation sewer network within the South Poplars development area, which ties into the DN600 trunk sewer near Lot 32 DP811146 on Tompsitt Drive.

The South Poplars sewer network has been designed to transfer the majority of flows from the study area to the DN600 main sewer. Flows from Environa and Tralee will be received via a new Tralee Sewage Pumping Station (SPS), which has been constructed near Lot 4 DP1271857. An overview of the South Poplars sewer network and existing lot plan is provided in Figure 7-2 below.

All existing sewage pump stations within the Jerrabomberra catchment are located upstream of the South Poplars tie-in point, therefore flows within the main trunk sewer will be transferred under gravity to the Queanbeyan STP for treatment and discharge. It is noted a portion of the South Poplars lot plan will be diverted to the existing Bayside Ct SPS due to a ridge line within the development that prevents gravity flows towards the DN600 sewer.

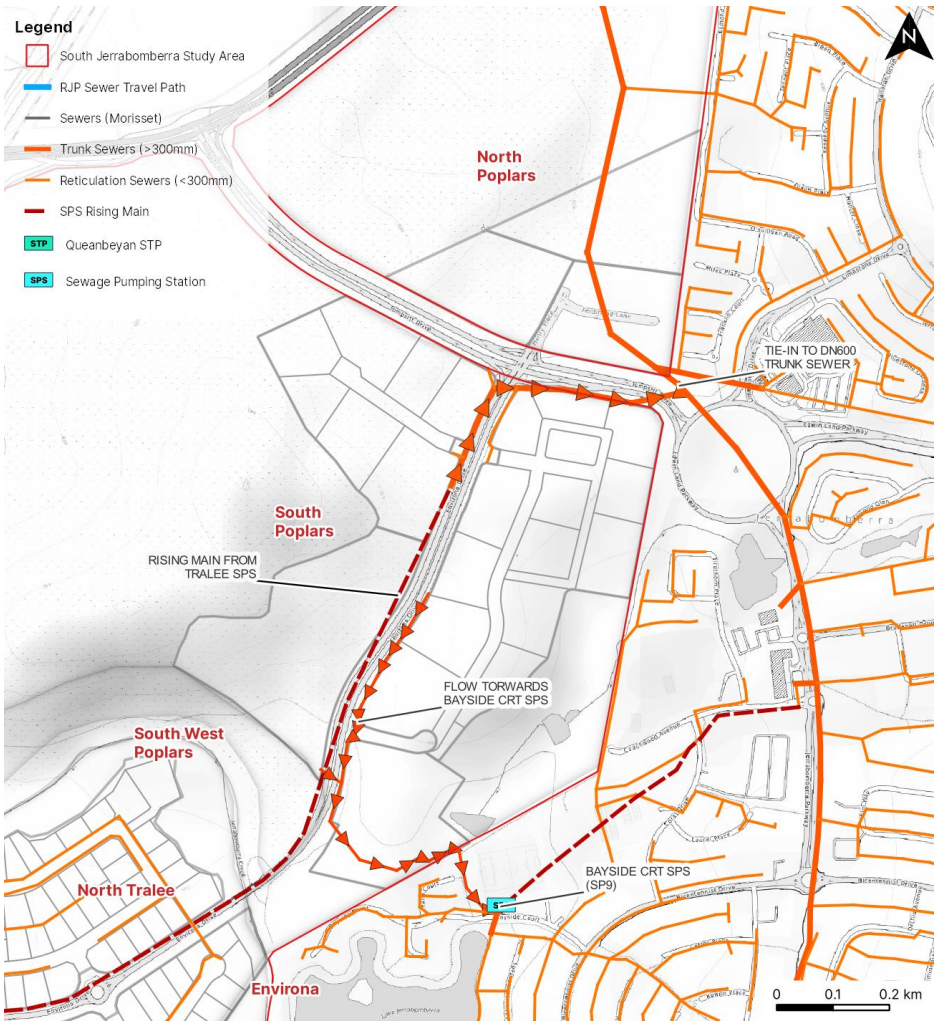


Figure 7-2 | Recently constructed sewer network in South Poplars development area

As noted above, flows from Environa and North and South Tralee will be discharged to the new South Poplars reticulation sewer via a new Tralee SPS. The new Tralee SPS receives flows from the study area via a new DN300 gravity trunk sewer constructed to service initial stages of the South Tralee residential development.

As confirmed by WAE drawings, the current capacity of the Tralee SPS is 17-53.5 L/s. The Tralee SPS will require an upgrade at an approximate EP of 3400 to an ultimate capacity of 88 L/s. The new SPS currently utilises a temporary DN180 PE rising main, which is scheduled to be upgraded to a DN250 DICL rising main as part of ultimate staging with the DN180 rising main to be decommissioned. Both rising mains are intended to discharge to the same manhole within the South Poplars reticulation network.

An overview of the sewer network for Environa and Tralee is provided in Figure 7-3 below. Please note the sewer layout for North Tralee has been incorporated based on the provided concept design for the development area. It is expected a reticulation network to service Environa will be developed based on a future subdivision layout, with connection to either the DN300 Tralee Trunk Sewer or a future North Tralee Sewer Network. Delivery of the Environa reticulation infrastructure is to be funded by the developer as part of a future DA and hasn't been included in the infrastructure upgrades considered by this assessment.

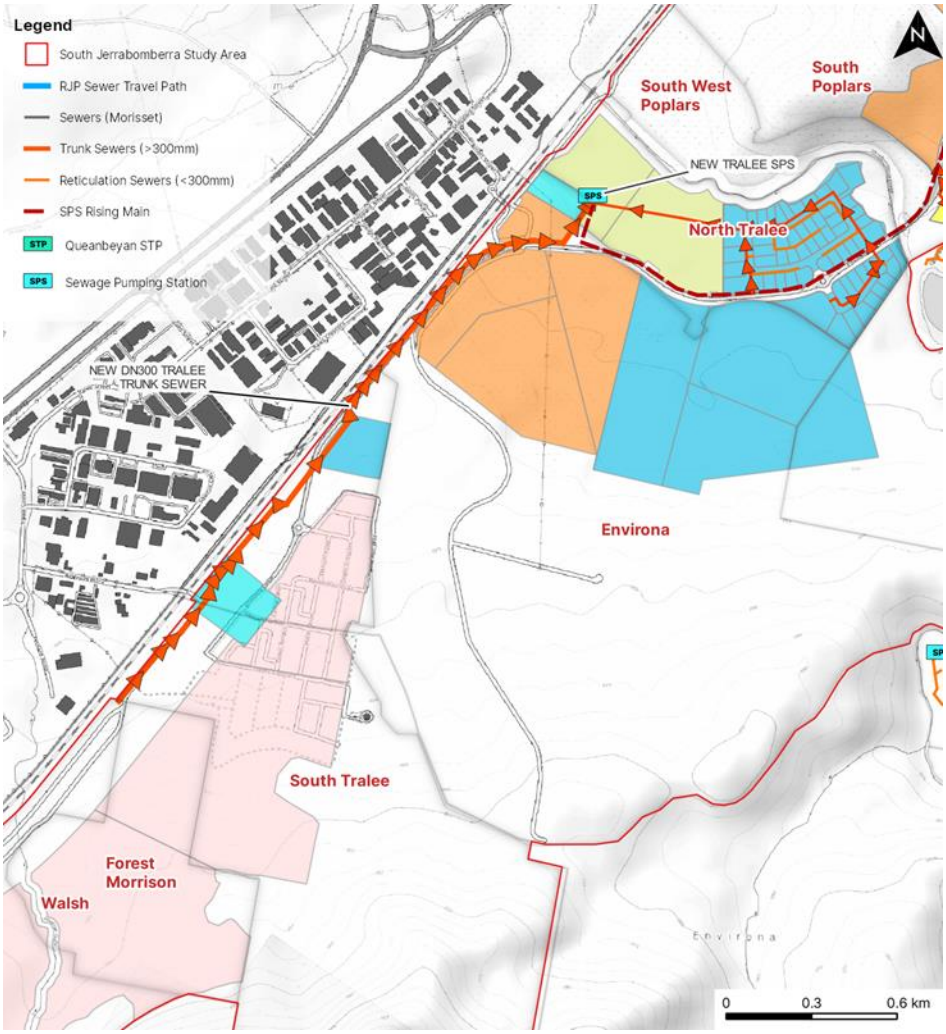


Figure 7-3 | Recently constructed sewer trunk main and Tralee SPS to service Tralee and Environa development areas

The existing Queanbeyan STP was built in 1937 and has been estimated to have a nominal treatment capacity of approximately 34,500 EP. Treated effluent from the plant is currently discharged to the Molonglo River and it is noted the Queanbeyan STP is currently meeting its effluent license conditions. Sludge from the activated sludge process is stored and stabilised prior to drying on the site's sludge drying beds.

It has been noted in the *Queanbeyan Sewage Treatment Plant Upgrade Environmental Impact Statement* (October 2020) that the plant is under-capacity for future population growth and no longer fit-for-purpose, with an upgrade project currently underway. Stage 1 of the Queanbeyan STP Upgrade will provide treatment capacity for an equivalent population of 75,000 EP with Stage 2 allowing for expansion to an ultimate plant capacity of 150,000 EP. Stage 1 is expected to be completed in mid-2024 and includes design and construction of a new STP facility on the existing site to the south east of the existing treatment process. The proposed works for Stage 1 includes the following:

- Construction of a new treatment plant complete with screening and grit removal, a continuous oxidation ditch activated sludge process with gravity clarifiers, tertiary filtration and ultraviolet (UV) disinfection
- Waste sludge produced would be stabilised in an aerobic digester and dewatered, producing a biosolids product that is suitable for reuse.
- Treated effluent would be discharged via an on-bank discharge structure adjacent to the Molonglo River.
- Recycled water produced by the treatment plant would be reused via onsite reticulation for onsite treatment processes (e.g., screen washing) and site hose reels used for washdown.
- A standpipe would also be provided for filling tankers with recycled water for offsite uses managed by QPRC such as dust suppression.

## 7.2 Planned infrastructure works and upgrades

An initial water and sewer servicing strategy for the Poplars development was prepared by Calibre Consulting on behalf of the Village Building Company in 2017, to identify the water supply and sewer infrastructure required to service the proposed study area.

In 2021, QPRC engaged Hunter H2O to develop a Revised Augmentation Strategy for the Queanbeyan Sewer Model. Draft findings and recommendations are outlined in the *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O). The findings relevant to the current servicing strategy for the Jerrabomberra Catchment include:

- Capacity constraints are experienced in DN600 gravity mains from MH5729 to MH9253 due to insufficient capacity during peak flows
- Existing 88 L/s capacity of the new Tralee SPS exceeded between 2030 – 2040 and requiring upgrade or replacement

Recommendations of the Draft Revised Augmentation Strategy are as follows:

- Construction of a new 55 L/s wet weather pump station in 2040 near 67 Kendall Avenue, including new DN200 rising main discharging to the existing Queanbeyan STP (approximately 2,750 m), to address under-capacity issues of the DN600. It is noted that a parallel DN600 gravity trunk sewer was also assessed, but considered less preferred
- Proposed staged upgrade of the new Tralee SPS as follows:
  - 2030: Upgrade Tralee SPS – 140 L/s capacity
  - 2040: Upgrade Tralee SPS – 240 L/s capacity and upgrade rising main

## 7.3 Network Model of Master Plan

This section provides a summary of network modelling undertaken as part of investigating the proposed Master Plan for the South Jerrabomberra RJP and the recommended upgrades to the sewer network. Options for augmentation of the existing wastewater network will be driven by demand from industries, the speed of uptake of development opportunities and the capacity of QPRC to raise funding for new infrastructure.

### 7.3.1 Basis of Assessment

The capacity of identified upgrades to manage new sewage loads from the RJP has considered the following elements:

- Determine estimated wastewater loads based on proposed land use outlined in the draft Master Plan layout
- Determine new infrastructure for sewering of the RJP with consideration of the following:
  - Utilisation of existing sewer assets
  - Topography of the RJP and downstream constraints of existing sewer infrastructure
  - Appropriate staging of infrastructure in line with proposed staging of the Master Plan
  - Appropriate alignment for new network infrastructure to align with proposed Master Plan layout
  - Consideration of pump station requirements
- Assess capacity of existing sewer network to receive new wastewater demands from the RJP, including:
  - New or upgraded infrastructure within the existing sewer network
  - Staging or trigger points associated with possible upgrades or new infrastructure

- Consideration of demands (current and future) within the receiving sewer network.

For the purposes of this assessment, QPRC have provided an existing calibrated InfoWorks ICM Model of the sewer network for the existing Jerrabomberra Catchment. This model has been adopted as the basis for the assessment with modifications included to represent loading from the study area.

As noted in Section 7.2, a revised augmentation strategy of the Queanbeyan Sewer Model is currently in development by Hunter H2O. Draft findings and recommendations outlined in the *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O) have been incorporated into the calibrated InfoWorks ICM Model, specifically population forecasts and proposed wet weather storm event inflows.

#### 7.3.1.1 Extent of study

For the purposes of this study, network modelling has been limited to the Jerrabomberra sub-catchment and assessment will be undertaken on infrastructure directly impacted by flows from the RJP, including the following:

- DN600 Trunk Main from MH6349 (new tie-in at Tompsitt Drive) to Queanbeyan STP
- Bayside Ct Sewage Pump Station (SPS 9):
  - Receiving network downstream of Bayside Ct SPS has not been included in this assessment
- Infrastructure associated with recently approved DA's within the RJP, including:
  - New Tralee sewage pump station
  - New sewer network within South Poplars
  - New DN300 trunk sewer network servicing Environa and Tralee
- Future reticulated sewer networks to service new lots in South Tralee and Environa, would be dependent on the subdivision lot layout and are expected to be designed as part of the future DAs. Consideration of the reticulation network associated with these developments has been excluded from this study, as it is expected that these works would be developer funded.

A visual representation of the sub-catchment is provided in Figure 7-4, including the travel path for wastewater from the RJP to the Queanbeyan STP. The existing sewer along the travel path is DN600 and approximately 6.78km in length.

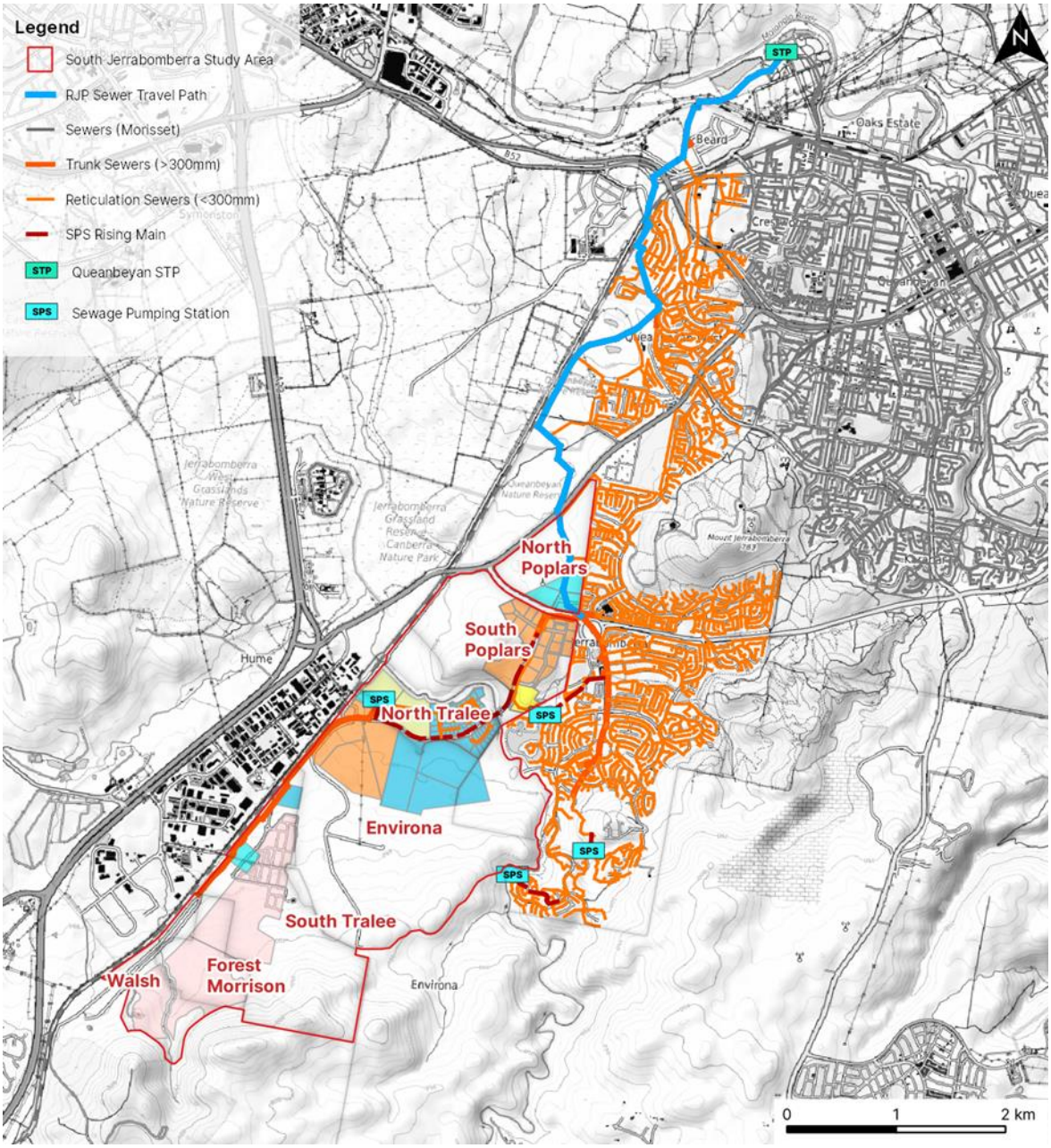


Figure 7-4 | Overview of adopted sub-catchment for South Jerrabomberra

### 7.3.1.2 Demand Assessment

#### Existing Demands

Existing residential and non-residential demands for the Jerrabomberra Catchment are included in the provided calibrated sewer network model and have been retained for this assessment. The calibrated sewer network model also adopts an average day loading of 230 L/EP/day and includes nominal diurnal patterns for residential, commercial and industrial land use types.

Population growth within the existing Jerrabomberra Catchment is outlined in the draft *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O), which has been summarised in Table 7–1 below and has been adopted for this assessment. Associated timing of population forecasts have been adjusted to align with proposed staging of the RJP.

Table 7–1 | Summary of forecasted populations for existing Jerrabomberra Catchment (*Draft Queanbeyan Sewer Model Revised Augmentation Strategy- Table 2-1* (March 2022, Hunter H2O))

| Development Area | 2020-25 (Stage 1) | 2025-30 (Stage 2) | 2030-40 (Stage 3) | 2040-50 (Stage 4) | Total |
|---|---|---|---|---|---|
| Infill - Jerrabomberra | 13 | 27 | 27 | 0 | 67 |
| Infill - Crestwood | 24 | 49 | 49 | 0 | 122 |
| Infill - Queanbeyan West | 22 | 44 | 44 | 0 | 110 |
| Non-Residential development (Jerrabomberra) | 360 | 360 | 721 | 721 | 2,162 |
| **TOTAL** | **419** | **480** | **841** | **721** | **2,461** |

- 

Wet weather flows are documented in the Hunter H2O Draft Revised Augmentation Strategy, based on Council's advice and adopts a 2-year Average Recurrence Interval (ARI) or 0.5 Exceedances per Year (EY). The peak wet weather inflow to Queanbeyan STP from the Jerrabomberra Catchment under the adopted wet weather event is approximately 330 L/s (excluding overflows). However, it is noted applying an equivalent hyetograph to the current RJP Master Plan results in a reduced peak wet weather inflow of 285 L/s to Queanbeyan STP with no overflows occurring. This reduction is considered to be primarily associated with a reduction in the RJP development area from 711 Ha for the Hunter H2O model to 315 Ha under the draft RJP Master Plan. This equates to an approximate reduction of 102 L/s at the new Tralee SPS.

Based on this, it is proposed to also adopt a 10-year Average Recurrence Interval (ARI) or 0.1 Exceedances per Year (EY) in accordance with the QPRC Development Design Specification - D12 Sewerage System for new infrastructure sizing. The InfoWorks ICM ARR Rainfall Generator was utilised to complete a sensitivity analysis 10-year ARI storm durations of 2, 6, 12 and 24 hours. The 6-hour duration storm was identified to represent the critical event and adopted for the analysis.

The total rainfall during the containment event was 56.4 mm and the adopted rainfall hyetograph of the containment event is provided in Figure 7-5.

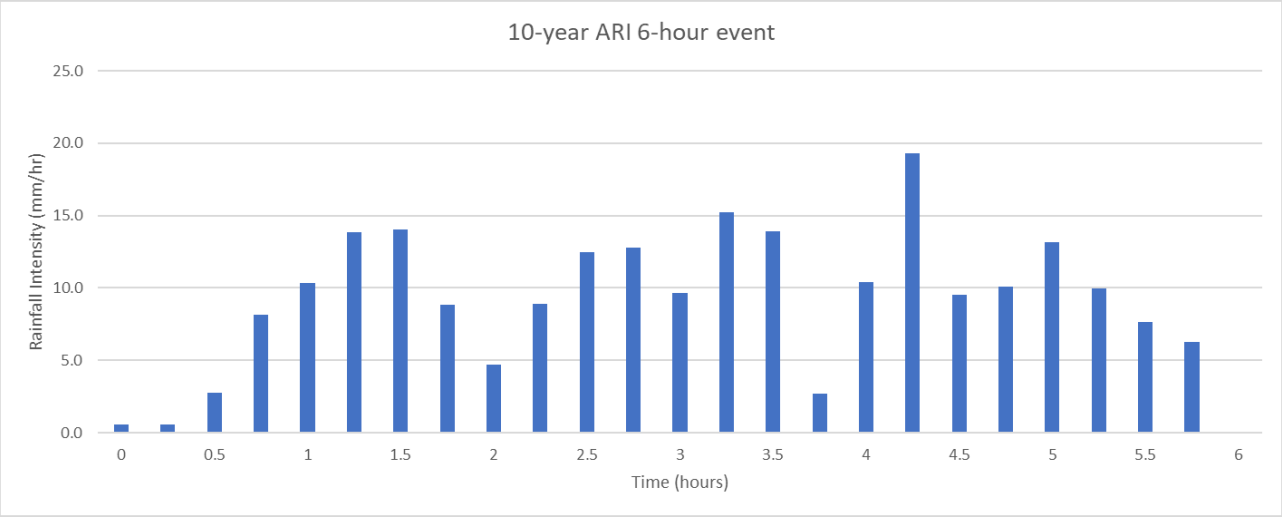


Figure 7-5 | Adopted hyetograph for 10-year ARI 6-hour storm event

A summary of ADWF, PDWF and PWWF inflows from the existing Jerrabomberra Catchment to the Queanbeyan STP is provided in Table 7–2 below, also included is the PWWF associated with the Hunter H2O 2-year ARI event analysis for comparison of wet weather flows.

Table 7–2 | Summary of ADWF, PDWF and PWWF (2yr & 10yr ARI) from Jerrabomberra Catchment to Queanbeyan STP

| Development Area | ADWF (kL/d) | PDWF (L/s) | PWWF (10yr ARI) (L/s) | PWWF (2yr ARI) (L/s) |
|---|---|---|---|---|
| Existing | 3,307 | 64.8 | 189 | 123 |
| Stage 1 – 2026 | 4,912 | 99.5 | 256 | 173 |
| Stage 2 – 2031 | 6,323 | 131.7 | 306 | 219 |
| Stage 3 – 2036 | 7,572 | 158.7 | 343 | 250 |
| Stage 4 – 2041 | 8,574 | 181.1 | 372 | 276 |

### RJP Demands

Wastewater demands for the RJP have been estimated based on the land uses proposed in the draft Master Plan for the study area.

The generalised land uses for the South Jerrabomberra RJP are as follows and a summary of composition has been defined as part of the Master Plan provided, and include potential uses such as:

- **Local Business & Industry**, comprising; light industrial (~50%), freight and logistics (~20%), big box retail (~20%) and high-tech manufacturing (~10%)
- **Space, Defence & Technology**, comprising; high-tech manufacturing (~50%), light industrial (~20%), business park (~20%) and heavy manufacturing (~10%)
- **Activity Centre**, comprising; shops, cafes, medical centres, etc.
- **Education;** representing the proposed new 500 student school within the South Poplars development area
- **Residential**; representing the proposed residential development in South Tralee
- **Open Space**, comprising; the regional sports park, sporting field and indoor recreation area

EP loading rates for each land use type have been developed in accordance with QPRC Development Design Specification - D12 Sewerage System and utilising Water Service Association of Australia (WSAA), Gravity Sewerage Code of Australia, WSA 02 – 2014; Appendix B Estimation of Equivalent Population (EP). A summary of the proposed development area, EP loading rate and associated EP for each land use type has been provided in Table 7–3 below.

Table 7–3 | Summary of Contributing EP per land use type

| Land Use Type | Development Area (Ha) | Contributing EP | Average EP Loading Rate (EP/Ha) |
|---|---|---|---|
| Local Business & Industry | 77.6 | 5,823 | 75 |
| Space, Defence & Technology | 77.7 | 6,406 | 82.5 |
| Activity Centre | 19.7 | 1,480 | 75 |
| Education | 4.7 | 300 | 63.4 |
| Residential | 114.6 | 5,731 | 50 |
| Open Space | 20.7 | 699 | 33.8 |
| **TOTAL** | **315.1** | **20,439** | **64.9** |

A summary of the anticipated ADWF wastewater flows for each land use type is provided in Table 7–4 below assuming 230 L/EP/d, and a breakdown of each EP per development area for each stage is provided in Table 7–5.

Table 7–4 | Summary of South Jerrabomberra RJP ADWF for nominated land use types (assuming 230 L/EP/d)

| Land Use Type | Stage 1 – 2026 (L/s) | Stage 2 – 2031 (L/s) | Stage 3 – 2036 (L/s) | Stage 4 – 2041 (L/s) |
|---|---|---|---|---|
| Local Business & Industry | 4.5 | 8.5 | 10.7 | 15.5 |
| Space, Defence & Technology | 6.0 | 9.8 | 14.4 | 17.1 |
| Activity Centre | 2.6 | 3.6 | 3.9 | 3.9 |
| Education | 0.8 | 0.8 | 0.8 | 0.8 |
| Residential | 2.5 | 8.0 | 13.0 | 15.3 |
| Open Space | 1.1 | 1.9 | 1.9 | 1.9 |
| **TOTAL** | **17.5** | **32.5** | **44.7** | **54.4** |

Table 7–5 | Summary of Estimated Populations for each development area and stage

| Development Area | Stage 1 – 2026 | Stage 2 – 2031 | Stage 3 – 2036 | Stage 4 – 2041 | Total |
|---|---|---|---|---|---|
| **Tralee** | **3,018** | **2,361** | **1,890** | **850** | **8,118** |
| North Tralee | 1,694 | 0 | 0 | 0 | 1,694 |
| South Tralee | 1,324 | 2,361 | 1,890 | 850 | 6,425 |
| **Poplars** | **3,116** | **1,088** | **0** | **0** | **4,204** |
| North Poplars | 570 | 370 | 0 | 0 | 940 |
| South Poplars | 2,546 | 718 | 0 | 0 | 3,264 |
| **Environa** | **429** | **2,206** | **2,697** | **2,786** | **8,117** |
| Environa | 0 | 1,936 | 2,697 | 2,786 | 7,418 |
| Sports Precinct | 429 | 270 | 0 | 0 | 699 |
| **TOTAL** | **6,563** | **5,654** | **4,587** | **3,636** | **20,439** |

#### 7.3.1.3 Performance Criteria

**Dry Weather**

The following general performance criteria has been adopted for peak dry weather scenarios based on QPRC Design Specification - D12 and WSA 02:

- Flow depth at PDWF for existing sewers to be no more than 100% full

**Wet Weather**

The following general performance criteria has been adopted for existing infrastructure under design flow scenarios based on QPRC Design Specification - D12 and WSA 02:

- No overflows from constructed overflow structure or maintenance holes under the 1 : 10 year ARI design storm
- Pump station capacity exceeds design flows under the 1 : 10 year ARI design storm
- Existing rising main capacity is considered acceptable if maximum velocity is less than 3 m/s

**New Infrastructure**

The following assumptions have been adopted for sizing of any new infrastructure based on QPRC Design Specification - D12:

- New gravity sewers to achieve the following at the existing 'as-constructed' pipe grade:
  - Flow depth at Ultimate PDWF to be no more than 50% full
  - Infiltration / inflow from the 1 : 10 year ARI design storm must be contained within the sewer pipe
- Pump Stations:
  - Rising main and pump station capacity to avoid surcharges under design flow conditions
  - Nominal rising main velocity of 1.0-1.5 m/s (adopted). Pending pump head requirements
  - Emergency storage equivalent to 8hr at ADWF

#### 7.3.1.4 Network Modelling Scenarios

The existing network will be assessed against the above performance criteria to identify possible upgrades associated with anticipated flows from the RJP.

Staging of the development has been outlined in the draft Master Plan and is summarised below. Modelling will be undertaken for dry and wet weather flows for the existing base case and each stage as per loading outlined in Section 7.3.1.2:

- Stage 1 – 2026 (years 1-5)
- Stage 2 – 2031 (years 6-10)
- Stage 3 – 2036 (years 11-15)
- Stage 4 – 2041 (years 16-20)

For modelling purposes, each load in the RJP will adopt the existing diurnal pattern within the model based on the land use type Residential, Commercial, Industrial, etc. and design wet weather flows will adopt the 1 : 10 year ARI rainfall event outlined in Section 7.3.1.2.

### 7.3.2 Performance Assessment

Assessment of the travel path in Figure 7-4 identified the following general outcomes for the proposed modelling scenarios.

**Dry Weather Performance**

- No existing sewers in the RJP or existing catchment were found to be fully surcharged under ultimate dry weather flows, indicating they have sufficient capacity for anticipated inflows.

Dry weather inflows to the Queanbeyan STP for each planning horizon are provided in Table 7–6. Further discussion regarding inflows and capacity for Queanbeyan STP is provided in Section 7.4.3.

Table 7–6 | Summary of dry weather inflows to Queanbeyan WWTP (Jerrabomberra Catchment only)

| Planning Horizon | ADWF (kL/d) ^ | PDWF (L/s) | EP* |
|---|---|---|---|
| Existing | 3,307 | 64.8 | 14,377 |
| Stage 1 – 2026 (years 1-5) | 4,912 | 99.5 | 21,358 |
| Stage 2 – 2031 (years 6-10) | 6,323 | 131.7 | 27,492 |
| Stage 3 – 2036 (years 11-15) | 7,572 | 158.7 | 32,920 |
| Stage 4 – 2041 (years 16-20) | 8,574 | 181.1 | 37,277 |

Notes:
* Existing EP for Jerrabomberra extracted from *Queanbeyan Sewer Model Calibration Report* (Hunter H20, October 2021)
^ ADWF assumes 230 L/EP/d

### Wet Weather Performance

- Capacity of gravity sewers in the RJP sewer network are anticipated to be sufficient for the modelled 10-year ARI event with no overflows expected. Proposed inflows to the new Tralee SPS are provided in Table 7–7 for each planning horizon.
- It can be seen that the current 88 L/s capacity for the new Tralee SPS is exceeded during Stage 3, leading to surcharging and overflows in the upstream network. Further discussion on addressing under-capacity issues for New Tralee SPS is provided in Section 7.4.1.

Table 7–7 | Summary of wet weather inflows to new Tralee SPS (10-year ARI, 6hr storm event)

| Planning Horizon | Tralee SPS Inflows (L/s) |
|---|---|
| Stage 1 – 2026 (years 1-5) | 36.8 |
| Stage 2 – 2031 (years 6-10) | 76.7 |
| Stage 3 – 2036 (years 11-15) | 115.6 |
| Stage 4 – 2041 (years 16-20) | 145.1 |

- 
- Wet weather inflows to the existing Bayside Ct SPS (SPS 9) are provided in Table 7–8, including the contributing flows from the RJP South Poplars precinct. Capacity for SPS 9 is approximately 53.5 L/s, which exceeds anticipated inflows from the contributing catchments, therefore capacity of the SPS 9 is anticipated to be sufficient for all planning horizons.

Table 7–8 | Summary of wet weather inflows to existing Bayside Ct SPS (SPS 9) (10-year ARI, 6hr storm event)

| Planning Horizon | Bayside Crt SPS Inflows (L/s) | RJP contributing flows to SPS 9 (L/s) |
|---|---|---|
| Stage 1 – 2026 (years 1-5) | 27.1 | 9.5 |
| Stage 2 – 2031 (years 6-10) | 32.9 | 15.2 |
| Stage 3 – 2036 (years 11-15) | 32.9 | 15.2 |
| Stage 4 – 2041 (years 16-20) | 32.9 | 15.2 |

- 

- Overflows are anticipated along the main trunk sewer with initial overflows anticipated to occur under Stage 3 at MH9253. A cluster of overflow manholes can also be seen near Kendall Avenue. The overflow locations are highlighted in Figure 7-6. Also included in Figure 7-6 are manholes with a maximum HGL within 0.5m of surface level.

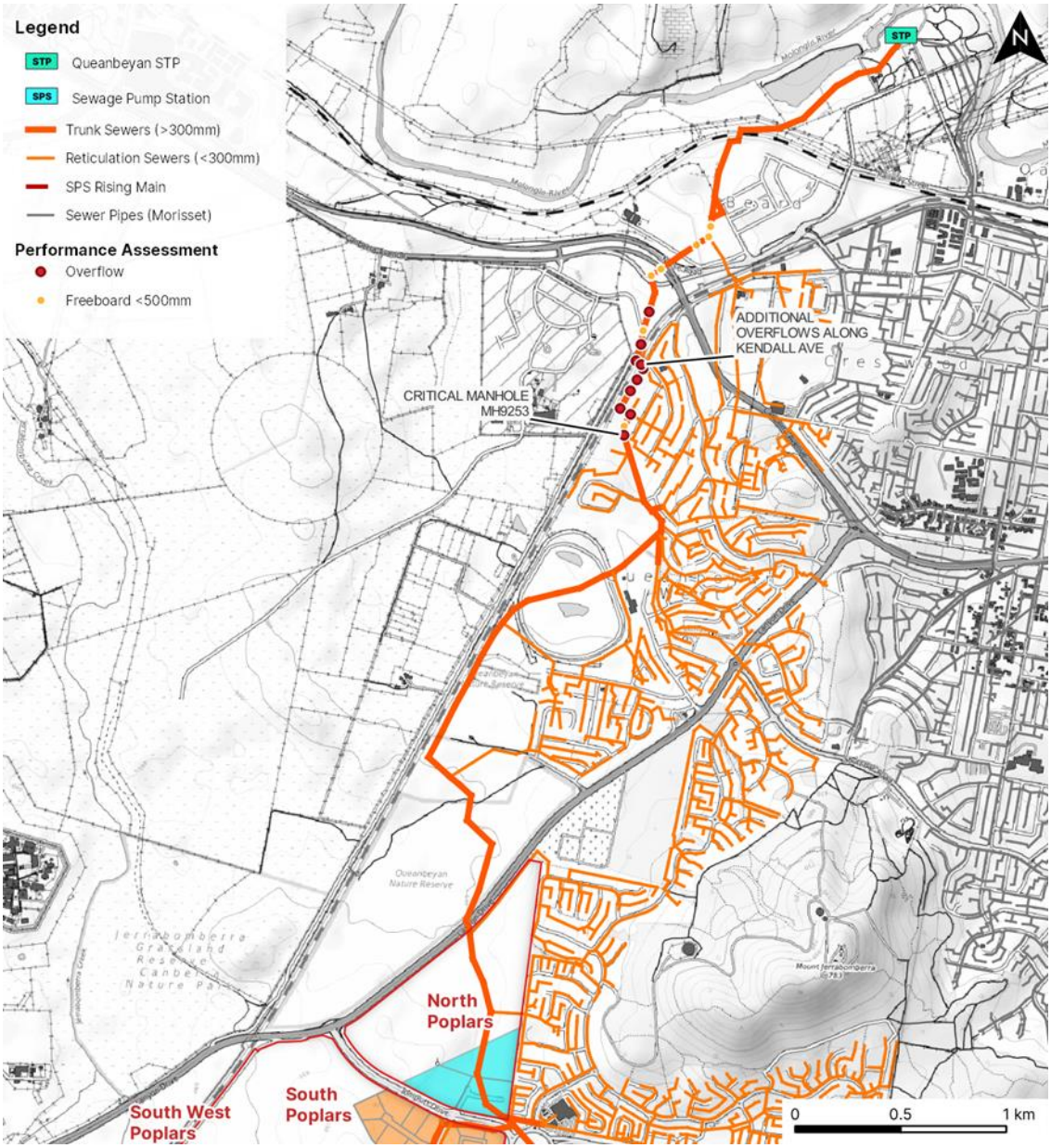


Figure 7-6 | Summary of results for Ultimate wet weather scenario

- The overflows within this section are caused by the main trunk sewer being under capacity, leading to surcharging and eventual overflow at the low points. As noted above, the critical manhole is identified to be MH9253, which appears to be located in a localised low elevation area. A long section of the HGL at the point of overflow is provided in Figure 7-7 with capacity generally limited to 330 L/s before overflows are triggered.
- A long section of the HGL between Queanbeyan WWTP and MH9253 under the ultimate peak wet weather flow is provided in Figure 7-8 and it can be seen that manholes between MH2897 and MH9254 are also considered to be at risk of overflow due to the low surface areas and under-capacity. Further discussion on addressing the under-capacity areas is provided in Section 7.4.2.
- The remainder of the main trunk sewer through to discharge point of the Tralee SPS rising main is anticipated to experience localised periods of surcharging under peak wet weather flows; however the HGL in these areas is not anticipated to exceed an available freeboard of 0.5m and is therefore not

considered to be at risk of overflow under the design wet weather flows. A long section of the main trunk sewer between Queanbeyan WWTP and Tralee rising main discharge point is provided in Figure 7-9.

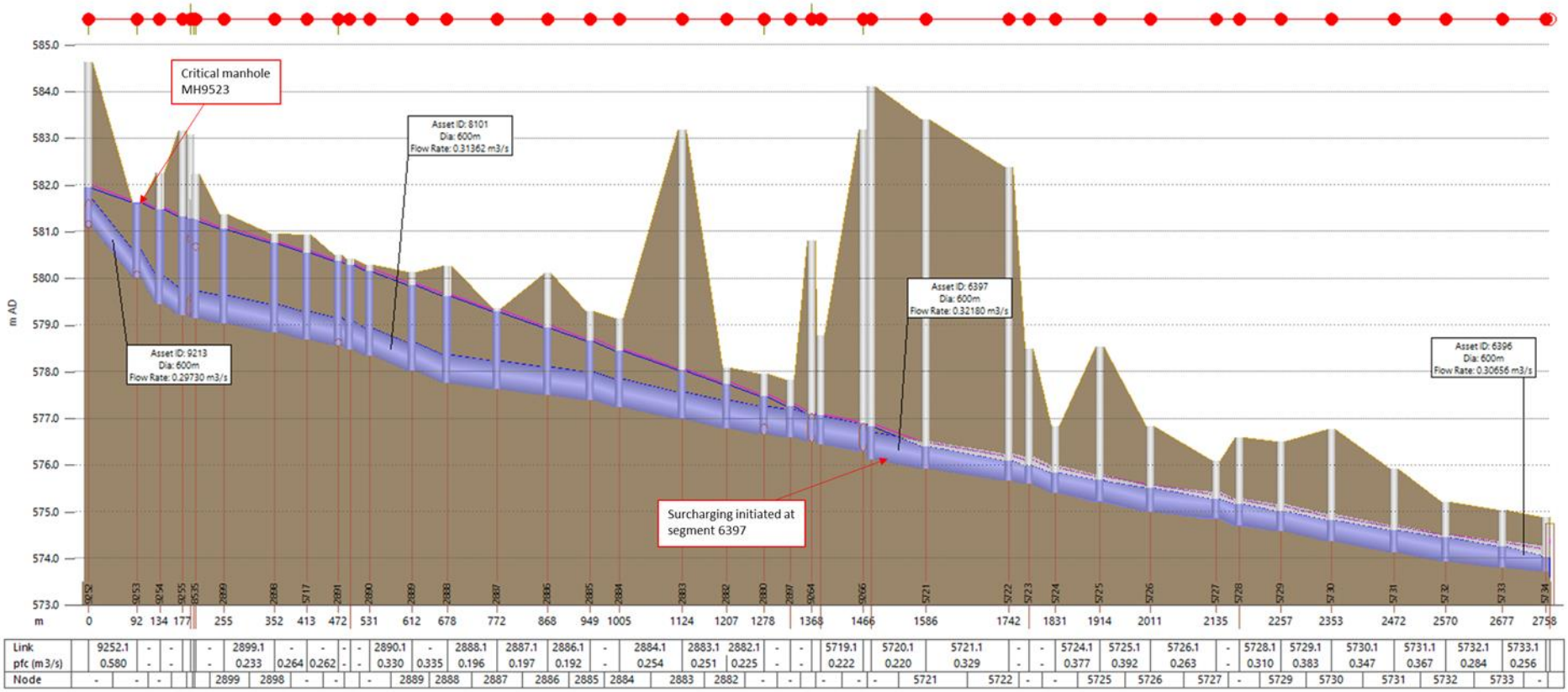


Figure 7-7 | HGL long section Queanbeyan WWTP to MH9253 at first overflow

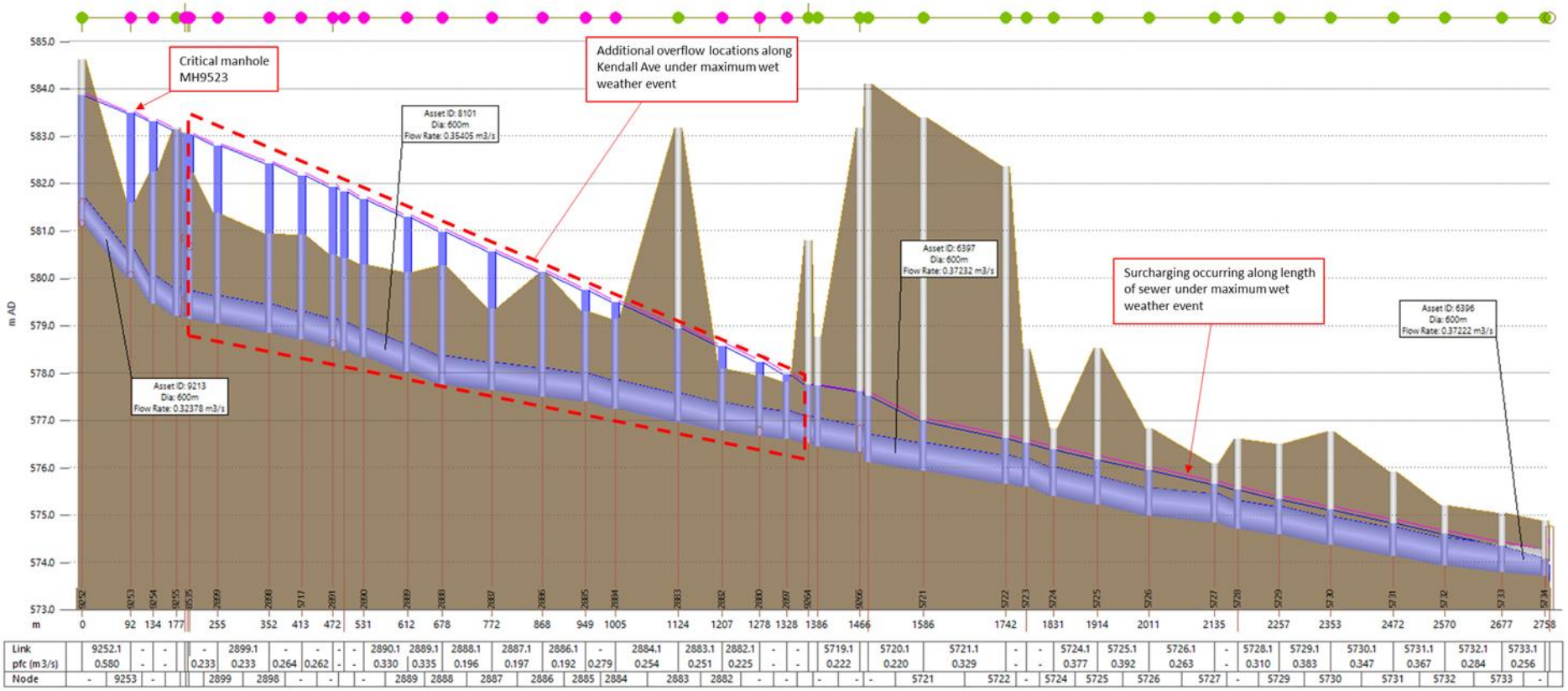


Figure 7-8 | HGL long section Queanbeyan WWTP to MH9253 under Ultimate peak wet weather flows

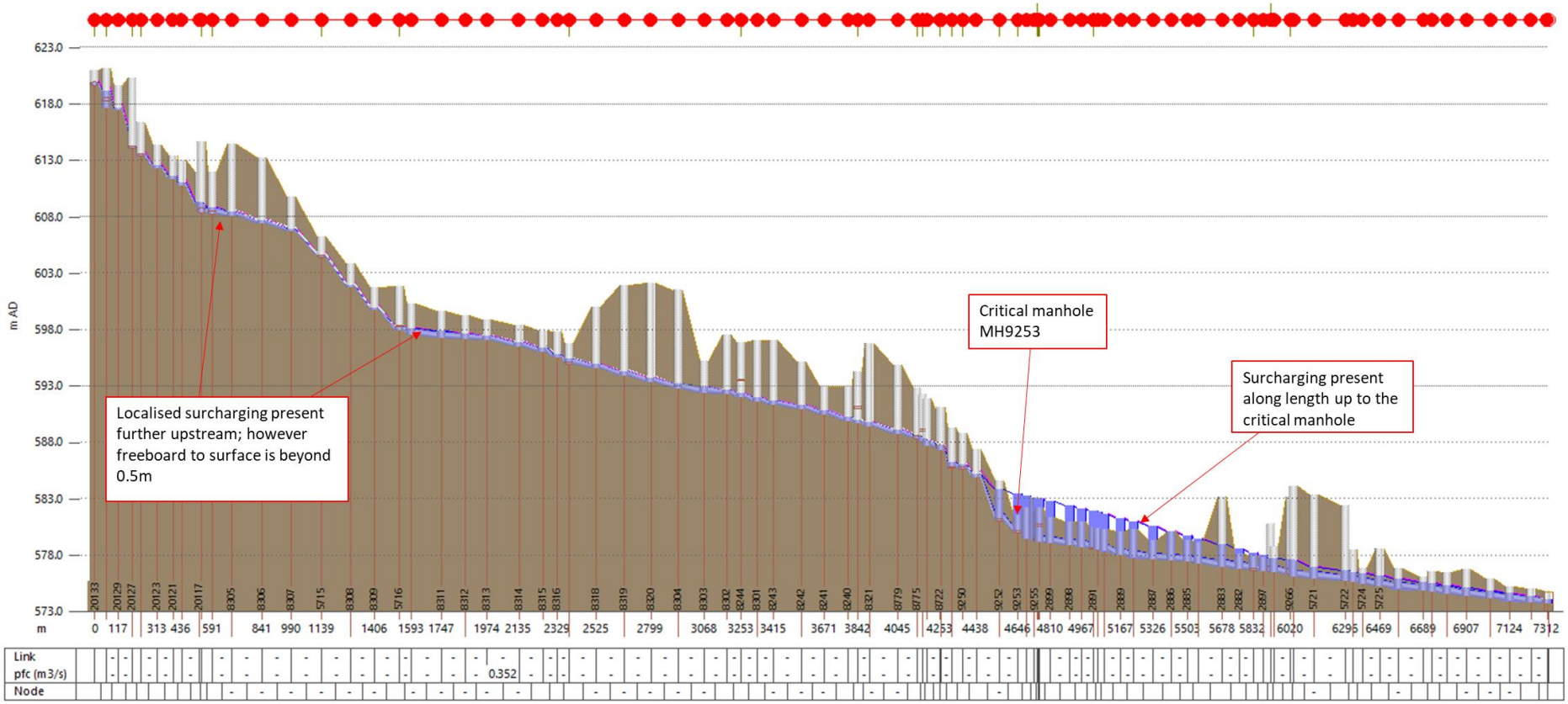


Figure 7-9 | HGL long section Queanbeyan WWTP to South Poplars under Ultimate peak wet weather flows

## 7.4 Identified Upgrades

### 7.4.1 New Tralee SPS

As noted in Section 7.3.2 the existing 88 L/s capacity proposed for the new Tralee SPS is anticipated to be insufficient by the end of Stage 2 (~2031), thus requiring further upgrade. It is noted the draft *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O) also highlighted upgrade requirements for Tralee SPS with an initial augmentation to 140 L/s in 2030 and a further augmentation in 2040 to an ultimate capacity of 240 L/s, refer Section 7.2.

A summary of the anticipated wet weather inflows for the new Tralee SPS is provided in Table 7–9. It can be seen that an upgrade to ~120 L/s is required for Stage 3 inflows with a further augmentation to ~150 L/s being required to accommodate the ultimate inflows that are anticipated in Stage 4.

Table 7–9 | Summary of wet weather inflows to new Tralee SPS (10-year ARI, 6hr storm event)

| Planning Horizon | Tralee SPS PWWF Inflows (L/s) | Comment |
|---|---|---|
| Stage 1 – 2026 (years 1-5) | 36.8 | Existing temporary arrangement sufficient, assuming capacity of 53 L/s |
| Stage 2 – 2031 (years 6-10) | 76.7 | Proposed 88 L/s capacity sufficient |
| Stage 3 – 2036 (years 11-15) | 115.6 | Upgrade to 120 L/s required |
| Stage 4 – 2041 (years 16-20) | 145.1 | Upgrade to 150 L/s required |

The current permanent rising main identified for the Tralee SPS is a DN250 DICL PN35, which is assumed to have an internal bore of approximately 265 mm (including concrete liner). A summary of the associated velocity for each planning horizon is provided in Table 7–10 and remains within 3m/s through to Ultimate capacity requirements. Estimated head requirements for the Tralee SPS under the ultimate pumping requirements is approximately 118.5m (assuming roughness of 0.6mm).It is recommended that Council further investigate the viability of these pumping requirements.

Table 7–10 | Summary of Tralee SPS rising main velocities for DN250 DICL PN35 (ID = 265mm)

| Planning Horizon | Tralee SPS PWWF Inflows (L/s) | Tralee SPS Capacity (L/s) | Velocity (m/s) |
|---|---|---|---|
| Stage 1 | 36.8 | 88 | 1.60 |
| Stage 2 | 76.7 | 88 | 1.60 |
| Stage 3 | 115.6 | 120 | 2.18 |
| Stage 4 | 145.1 | 150 | 2.72 |

WAE drawings for the Tralee SPS have identified an emergency storage of 400kL for the site. A summary of the storage availability for this volume compared to anticipated ADWF inflows is provided in Table 7–11. Also included is the required emergency storage volume for 8hr of ADWF, based on the new infrastructure requirements outlined in Section 7.3.1.3.

Table 7–11 | Summary of Tralee SPS emergency storage requirements

| Planning Horizon | Tralee SPS ADWF Inflows (L/s) | Storage for 400kL (hr) | Required Emergency Storage (8hr ADWF) (kL) |
|---|---|---|---|
| Stage 1 | 9.2 | 12.1 | 264 |
| Stage 2 | 21.3 | 5.2 | 614 |
| Stage 3 | 33.5 | 3.3 | 966 |
| Stage 4 | 43.2 | 2.6 | 1,245 |

The analysis above demonstrates that by the end of Stage 2, the proposed 400kL emergency storage volume is less than the nominal 8hr ADWF storage requirements, which would trigger an augmentation of the emergency storage volume to 614kL. Further augmentations to 966kL and 1,245kL are required for Stages 3 and 4 respectively. Pending viability and availability of space for the emergency storage requirements, Council may consider alternatives such as incorporation of a permanent onsite generator with an Automatic Transfer Switch (ATS) to improve redundancy at the site and reduce emergency storage requirements.

A summary of the proposed upgrades and timing for the Tralee SPS are as follows. It is recommended that Council monitor inflows and investigate upgrades earlier, if required:

- 2031 (Stage 2):
  - Decommission existing temporary arrangement and incorporate proposed 88 L/s capacity, including DN250 rising main and emergency storage.
  - Augmentation of emergency storage to 614kL. Council to confirm viability and possibility of alternatives such as an emergency onsite generator.
- 2036 (Stage 3):
  - Upgrade pump station capacity to 120 L/s @ 91m head, including electrical, instrumentation, controls, etc.
  - Augmentation of emergency storage to 966kL. Council to confirm viability and possibility of alternatives such as an emergency onsite generator.
- 2041 (Stage 4):
  - Upgrade pump station capacity to 150 L/s @ 118.5m head, including electrical, instrumentation, controls, etc.
  - Augmentation of emergency storage to 1,245kL. Council to confirm viability and possibility of alternatives such as an emergency onsite generator.

### 7.4.2 Existing Sewer Network

As noted in Section 7.3.2, portions of the existing DN600 trunk main have been identified as being under-capacity leading to overflows along Kendall Avenue. General capacity of the existing DN600 trunk sewer is approximately 330 L/s, which is first experienced under the Stage 3 wet weather inflows. Critical manhole MH9523 is located approximately 2,675m upstream of the Queanbeyan STP with approximately 2,170m of the sewer identified as being under-capacity for the adopted 10-year ARI storm event (approximately 81%). Refer to Figure 7-10 for identified sections of the existing sewer network that are under-capacity.

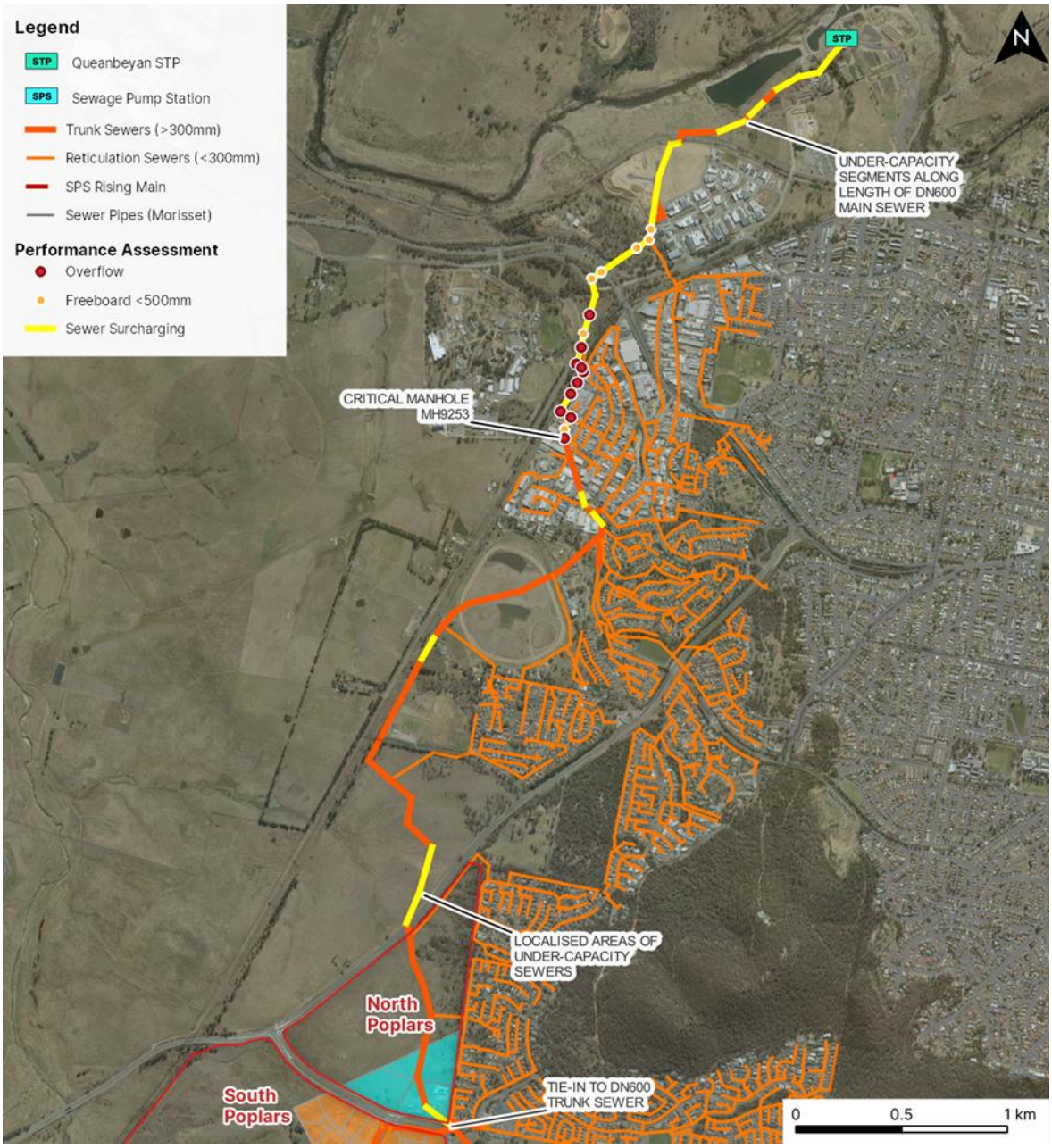


Figure 7-10 | Identified under-capacity sewers between Queanbeyan STP and RJP tie-in

The *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O) identified similar under-capacity issues and recommended construction of a new 55 L/s wet weather pump station near 67 Kendall Avenue and a 2.75 km DN250 rising main discharging upstream of the Queanbeyan WWTP. Consideration was also provided to construction of a new parallel DN600 gravity sewer main (approx. 2.2km), but it was not preferred due to the higher capital costs.

It is noted that the existing DN600 trunk main in question has sufficient capacity for dry weather flows through to ultimate conditions, therefore it is considered likely that incorporation of a wet weather pump station would remain the most economical option when compared to construction of a parallel trunk main. It is recommended a full feasibility assessment be undertaken on the options to allow incorporation of operational expenses associated with the wet weather pump station; however the intermittent operating nature would be unlikely to result in any significant operational costs.

The proposed 55 L/s wet weather pump station proposed in the revised augmentation strategy was found to be undersized for the adopted 10-year ARI storm event, with overflow issues remaining prevalent at MH9253 and freeboard within 500mm along Kendall Avenue.

The minimum wet weather pump station capacity required to prevent overflowing at MH9253 is approximately 83 L/s; however a risk of overflow would remain due to the minimal freeboard available. A wet weather pump station with a nominal capacity of 130 L/s was found to provide 500mm freeboard at MH9253 under the adopted peak wet weather flows. The associated rising main would require a nominal internal bore of 333mm to maintain a velocity of 1.5 m/s at the proposed 130 L/s, equating to a pump head requirement of 17.6m (assuming roughness of 0.6mm).

Proposed alignment for the rising main requires further investigation from Council; however for the purposes of this assessment, the previously proposed alignment identified in the *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O) has been adopted, which assumes location of the new pump station at 67 Kendall Avenue and is approximately 2,750m in length, refer Figure 7-11.

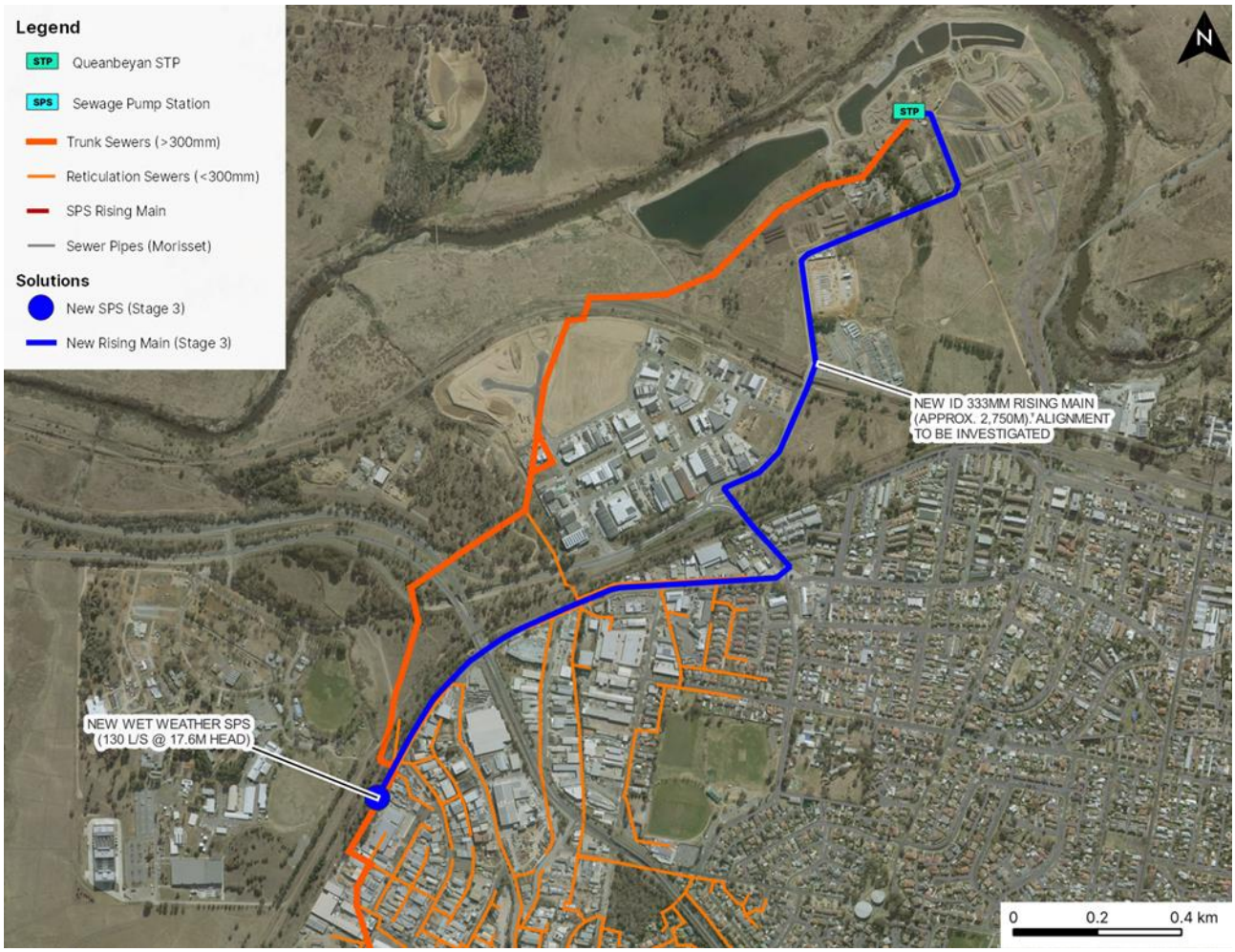


Figure 7-11 | Proposed location for the recommended new wet weather pump station and rising main

### 7.4.3 Queanbeyan STP

As noted in Section 7.2, there is an existing project to upgrade the Queanbeyan STP to a new facility to cater for up to 75,000 EP and this is anticipated to be completed by mid-2024. It is also noted that a Stage 2 upgrade is also planned for the new STP, which would increase capacity to 150,000 EP; however, timing for Stage 2 is yet to be confirmed.

A summary of the existing and forecasted EPs for the Queanbeyan STP are provided in Table 7–12 below and have been split across the proposed South Jerrabomberra RJP and existing Morisset and Jerrabomberra Catchments, including forecasted residential and non-residential EPs from *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O).

The current Stage 1 augmentation for the Queanbeyan STP appears to be sufficient for the anticipated EPs through to Stage 4. However ongoing monitoring of population forecasts and inflows to the Queanbeyan STP will be

required as part of continued review and updating to the sewer servicing strategy to ensure adequate capacity is maintained and possible timing for a Stage 2 STP upgrade.

Table 7–12 | Summary of contributing EPs for the Queanbeyan STP

| Planning Horizon | South Jerrabomberra RJP | Existing Catchments* | |
|---|---|---|---|
| | | Morisset | Jerrabomberra |
| Existing | 0 | 29,466 | 14,377 |
| Stage 1 | 6,563 | 31,639 | 14,796 |
| Stage 2 | 12,217 | 33,251 | 15,276 |
| Stage 3 | 16,804 | 35,676 | 16,117 |
| Stage 4 | 20,439 | 37,303 | 16,838 |
| **Total** | **74,580** | | |

* EP estimates and forecasts for Morisset and Jerrabomberra Catchments extracted from *Queanbeyan Sewer Model Calibration Report* (Hunter H20, October 2021) and *Queanbeyan Sewer Model Revised Augmentation Strategy* (March 2022, Hunter H2O)

# 8 Funding Recommendations

There are various funding mechanisms to support the cost effective, equitable and timely delivery of public infrastructure associated with growth. This section considers the potential to update the existing infrastructure contributions plans and other mechanisms such as Special Infrastructure Contribution (SIC) levies and Voluntary Planning Agreements (VPAs).

Development contributions are payments made by developers to help fund public infrastructure that is needed as a result of development. Development contributions are a key source of funding for NSW councils and state agencies.

Sections 7.11 and 7.12 of the Environmental Planning and Assessment Act 1979 (EP&A Act) permit the collection of local development contributions by councils, in accordance with local infrastructure plans. These plans cover the construction of public infrastructure that will ultimately be owned by the local council such as open space, community facilities and stormwater upgrades. Funding for State infrastructure is levied through Special Infrastructure Contributions (under Clause 7.24 of the EP&A Act) or through planning agreements. In addition, Section 64 of the Local Government Act 1993 allows a Council to levy fees for water, sewer and stormwater infrastructure where the Council has a Development Servicing Plan. Section 64 contributions typically only apply in non-metropolitan areas, where the Council is the water supply authority.


Figure 8-1 | Types of infrastructure funded through development contributions in NSW (source DPIE, 2021)

The South Jerrabomberra Local Infrastructure Contributions Plan 2018 levies development contributions under Section 7.11 of the EP&A Act for local infrastructure associated with previously anticipated development in Poplars, Environa, North and South Tralee, Forest, Morrison and Walsh. The contributions under the South Jerrabomberra Local Infrastructure Contributions Plan 2018 are at the maximum permitted levy, and cover planned infrastructure for the land associated with Stage 1 to 3 of the master plan, based on current zonings.

The Jerrabomberra Innovation Precinct Infrastructure Planning Agreement 2020 is also active, and is a Voluntary Planning Agreement which was reached between QPRC, Village Building Company and Poplars Development. The South Tralee Essential Infrastructure Planning Agreement is a historical agreement that supported the provision of sewer and water infrastructure to initially service the region.

Given that the growth anticipated by the RJP Master Plan (particularly for Stage 4) is greater than that previously contemplated in this contributions plan, it is recommended that an updated development contributions plan be prepared by QPRC to address the rezoning of additional land in Environa. This will help QPRC raise funding for new infrastructure to support this growth precinct in a cost effective, equitable and timely manner.

As Council has considerable history negotiating Voluntary Planning Agreements with proponents in this growth area, potentially this avenue could be a consideration to fund works-in-kind and enable the timely delivery of essential infrastructure associated with the development of land within Stage 4.

Section 64 of the Local Government Act 1993 allows contributions to be levied towards the provision of water, sewerage and stormwater infrastructure, provided a Developer Servicing Plan is in place. A contributions plan can cover both Section 7.11 and Section 64 contributions. When updating the provisions of the South Jerrabomberra Local Infrastructure Contributions Plan 2018 to accommodate the increased demand associated with the new and changed land uses in the RJP, Council should also consider ensuring sufficient levying of Section 64 contributions to cover the additional upgrades that would be required to address land use changes associated with this master plan.

A more detailed feasibility study and separate costing of sewer and water infrastructure upgrades should be undertaken by Council to determine suitable levies. A summary of the upgrades to sewer and water infrastructure that are recommended in this report is provided in Chapter 9.

Special Infrastructure Contributions (SICs) help to fund the delivery of state and regional infrastructure such as hospitals, schools, state and regional roads, public transport infrastructure, emergency services, biodiversity and some larger regional open space improvements. SICs are payable in addition to local contributions, and a determination made by the Planning Minister determines when and where a SIC levy applies. Given that the utility infrastructure upgrades required to support the Master Plan are predominantly to local infrastructure assets, the applicability of a SIC would be limited to supporting upgrades to the Queanbeyan STP. The use of a SIC to support this upgrade is recommended as it is expected that levies on the newly rezoned land would not be sufficient to also fund STP upgrades.

# 9 Summary of Recommended Upgrades

As discussed within this report, the existing utilities networks within the South Jerrabomberra RJP will require reasonably significant upgrades or augmentations to accommodate further development. There is no direct funding for infrastructure associated with the RJP project. As such, investment in increasing capacity of infrastructure will be tightly linked to the potential to release land in the precinct. Changes to zonings and permissibility of land within the precinct should not occur until there is confidence in how additional demand for potable water, sewer and power can be satisfied. As discussed within the SMEC Traffic and Transport Technical Report, securing additional vehicular access points is also essential prior to further development taking place.

Some of the infrastructure upgrades recommended in this report will be required to service growth beyond the RJP study area, and are already anticipated by QPRC. For example, the duplication of the Jerrabomberra Reservoir is partly associated with RJP load, but also services the larger Jerrabomberra Zone where growth is occurring. Council is planning this upgrade already, however the timing and funding of this infrastructure could be bought forward if demand associated with uptake of land within the RJP is greater than previously anticipated. Similarly, the new Wet Weather SPS at Kendall Drive is required partly to accommodate additional RJP loads, but also services the wider Jerrabomberra Catchment and its capacity constraints are already known to Council.

A tighter nexus can be established between assets such as the Tralee SPS and pipe infrastructure within the RJP that may be required to service additional development in Environa, and future expansion of South Tralee (if permitted). These infrastructure upgrades are wholly linked to development demand, and it would be expected that the funding of these works be the responsibility of the developers, subject to a precinct wide strategic design and feasibility study prepared under the guidance of Council.

Table 9-1 provides a summary of the upgrades that are required, and their tipping points based on the staged uptake of development opportunities envisaged by the masterplan.

Table 9–1 | Potable Water Infrastructure Upgrades Required

| Stage | Description | Item | Qty |
|---|---|---|---|
| **Stage 1** | | | |
| **Electricity and Gas** | | | |
| | Power Supply | Substation | 38.5MVA |
| **Potable Water Supply** | | | |
| | Regional Sports Precinct water mains | DN100 | 280 m |
| | North Tralee water mains | DN375 | 108 m |
| | North Tralee water mains | DN450 | 327 m |
| **Sewage** | | | |
| | Nil | | |
| **Stage 2** | | | |
| **Electricity and Gas** | | | |
| | Power Supply | Substation | 28 MVA |
| **Potable Water Supply** | | | |
| | Augmentation of Jerrabomberra Reservoir | Requires 1.6 ML of additional volume | 1.6 ML |
| | Trunk Supply Main from Jerrabomberra Parkway to North Tralee | DN450 | 1,250 |
| | Extension to NER main in Environa Drive | DN150 | 250 m |
| | Environa mains | DN150 | 211 m |
| | Environa mains | DN300 | 187 m |
| | Environa mains | DN375 | 475 m |
| | Regional Sports Precinct mains | DN100 | 216 m |
| **Stage 3** | | | |

| Stage | Description | Item | Qty |
|---|---|---|---|
| **Electricity and Gas** | | | |
| | Power Supply (supports stage 3 & 4) | Substation | 58.5MVA |
| **Potable Water Supply** | | | |
| | Augmentation of Jerrabomberra Reservoir | Requires 2.6 ML of additional volume | 2.6 ML |
| | Environa mains | DN150 | 482 m |
| | | DN225 | 393 m |
| | | DN300 | 822 m |
| **Sewage** | | | |
| | Upgrade Tralee SPS capacity | Upgrade to 88 L/s @ 85m | 1 |
| | Upgrade Tralee SPS emergency storage | Augment emergency storage to 614kL | +214kL |
| | Upgrade Tralee SPS Capacity | Upgrade to 120 L/s @ 91m | 1 |
| | Upgrade Tralee SPS emergency storage | Augment emergency storage to 966kL | +352kL |
| | New Wet Weather Pump Station on Kendall Avenue | New 2.75km rising main with internal bore 333mm | |
| **Stage 4** | | | |
| **Electricity and Gas** | | | |
| Refer to Stage 3 | | | |
| **Potable Water Supply** | | | |
| | Augmentation of Jerrabomberra Reservoir | Requires 2 ML of additional volume | 2 ML |
| | Environa mains | DN150 | 222 m |
| **Sewage** | | | |
| Upgrade Tralee SPS Capacity | Upgrade to 150 L/s @ 118.5m | 1 | |
| Upgrade Tralee SPS emergency storage | Augment emergency storage to 1,245kL | +279kL | |

It is expected that public infrastructure would be placed within road reservations, within existing easements or in the railway corridor to minimise the need for negotiating easements. These recommended upgrades are based on a range of assumptions to calculate demand, and further feasibility studies and strategic design would be required to support infrastructure contributions planning and guide the development of the precinct.

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