infrastructure & development consulting

# Westmead South Precinct

Utilities Servicing Strategy

April 2024

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|---|---|---|---|
| **Project Number** | 23-014 | **Date** | 17 April 2024 |
| **Project Name** | Westmead South Precinct | **Status** | Final |
| **Client** | Cumberland City Council | **Revision** | D |
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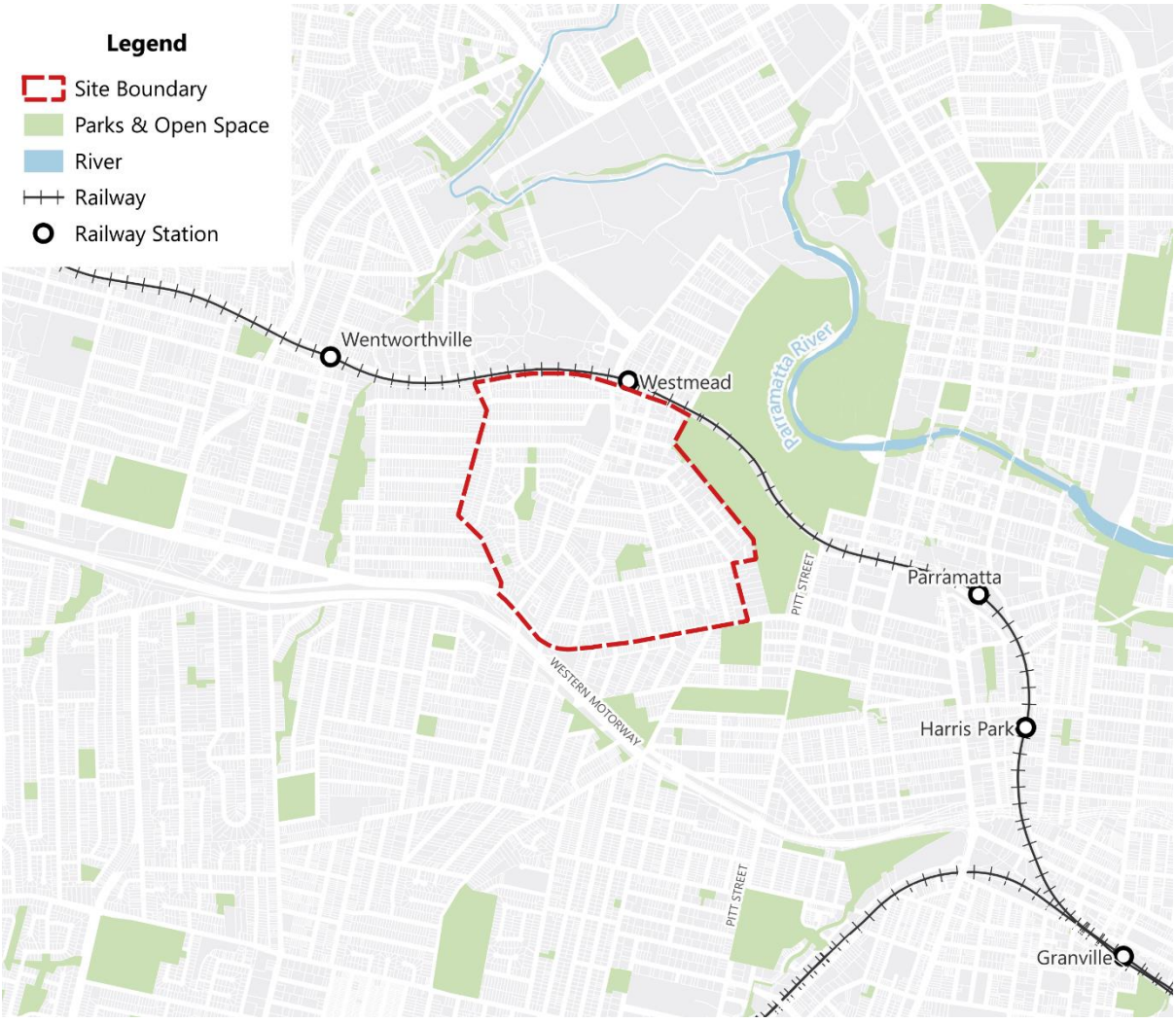
# 1 Introduction

Infrastructure & Development Consulting (IDC) have been engaged to undertake an existing utilities audit for the Westmead South Precinct. This report will outline the existing utilities infrastructure within and surrounding the Precinct and provide comment on constraints and opportunities for servicing future development. This report will inform the proposed master plan currently being prepared for the Precinct.

The Westmead South Precinct is located within the Cumberland City Council Local Government Area (LGA) and covers an area of approximately 131 hectares. The Precinct is bound by the Main Western Railway to the north, Parramatta Park and Aquatic Centre to the east, the Great Western Highway to the south and Bridge Road to the west. The Westmead South Precinct is shown in Figure 1 below.

**Figure 1 - Westmead South Precinct**



## 1.1 Greater Parramatta & Olympic Peninsula

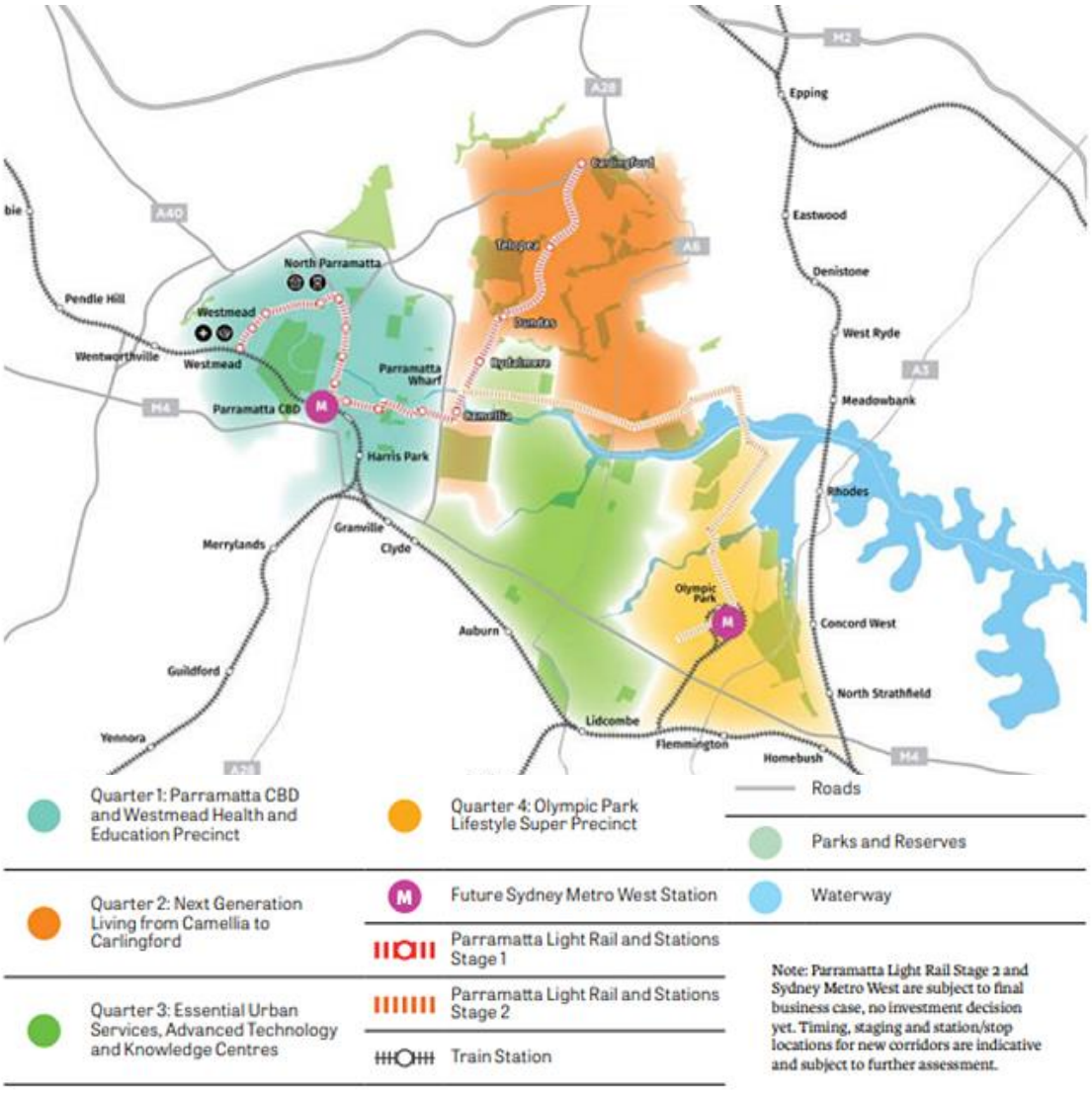
The Westmead South Precinct forms part of the larger Greater Parramatta and Olympic Peninsula (GPOP) corridor. GPOP covers a total area of approximately 6,000 hectares and has been divided into 26 precincts. The corridor is characterised by four Quarters:

- Quarter 1 – Parramatta CBD and Westmead Health & Education Precinct
- Quarter 2 – Next Generation Living from Camellia to Carlingford
- Quarter 3 – Essential Urban Services, Advanced Technology and Knowledge Centres
- Quarter 4 – Olympic Park Lifestyle Super Precinct

The Westmead South Precinct is located within Quarter 1. The GPOP corridor is shown in Figure 2 below.

In 2020, the NSW Department of Planning & Environment (DPE) announced that a strategic plan would be prepared for GPOP to establish a land use vision for each of the 26 precincts. This strategic plan will investigate potential growth options and infrastructure needs.

**Figure 2 - GPOP Corridor**

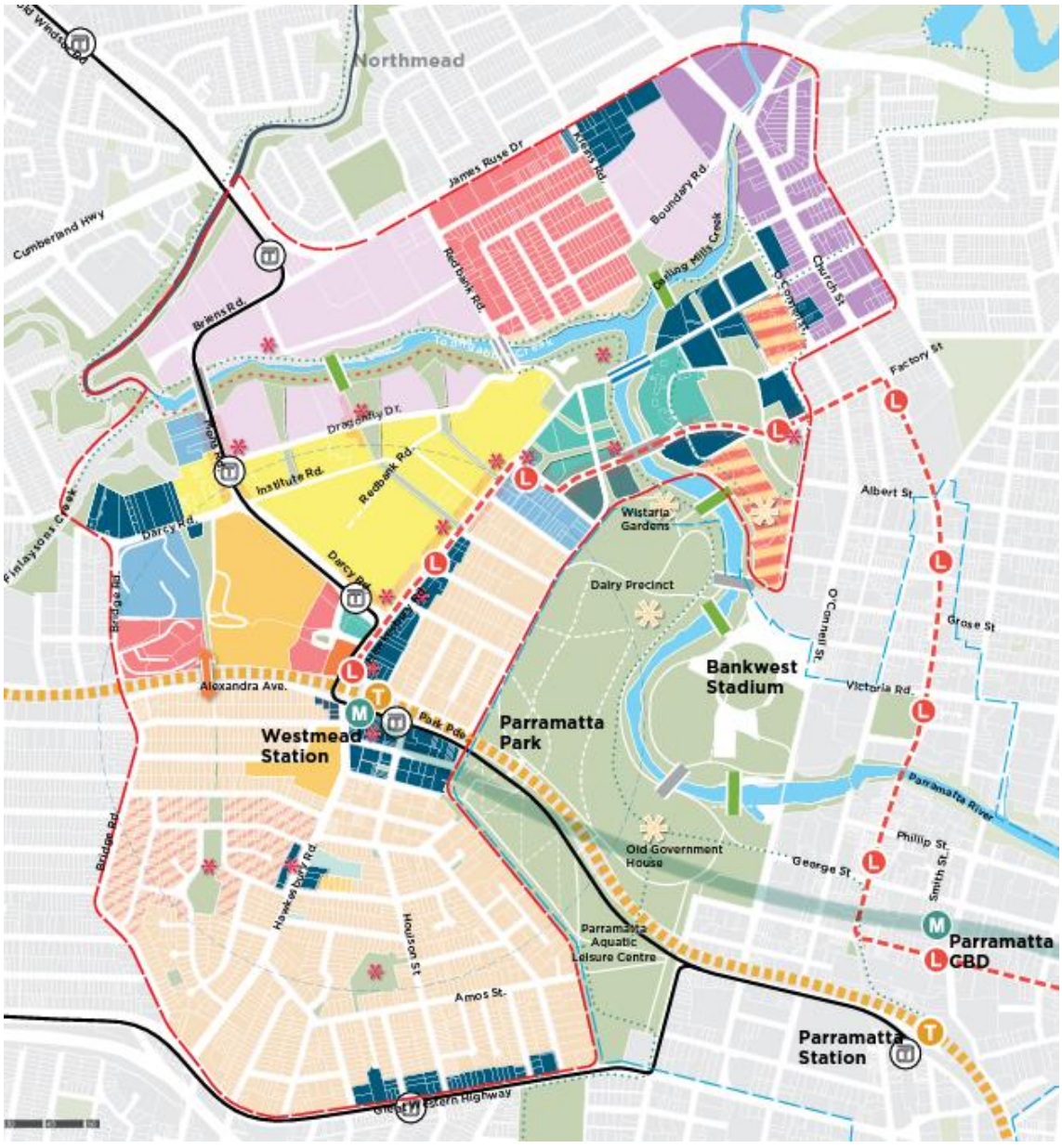


## 1.2 Westmead Place Strategy

A place strategy for Westmead was prepared in 2022 and aims to guide the continued evolution of Westmead to 2036. The Westmead Precinct, which includes areas to the north of the rail corridor within the Parramatta LGA, will benefit from the proposed Sydney Metro West line, which will connect the Sydney CBD to Greater Parramatta. The 24km line will double the existing rail capacity between the two CBDs and includes a station to be co-located with the existing Westmead Station.

The vision for Westmead is to be Australia's premier health and innovation district which delivers a highly integrated mix of uses, including health and medical care, education and training, research and development, innovation commercialisation and industry.

**Figure 3 - Westmead Precinct Structure Plan**




Source: Westmead 2036 Place Strategy – *NSW Department of Planning & Environment* (August 2022)

## 1.3 Draft Master Plan

Cumberland City Council have prepared a draft Master Plan for the Westmead South Precinct which builds on the work undertaken as part of the Westmead Place Strategy. The draft Master Plan aims to develop design principles and define the planning framework to support future development of the Precinct. This includes proposed planning controls relating to zoning, floor space ratio, building heights, setbacks and heritage.

The proposed changes outlined in the draft Master Plan will be enacted through a Planning Proposal, which will be prepared following the public exhibition period. A draft structure plan has been prepared for the Westmead South Precinct, and is shown in Figure 4. A summary of the proposed development is provided in Table 1 and Table 2.

**Figure 4 - Proposed Structure Plan**

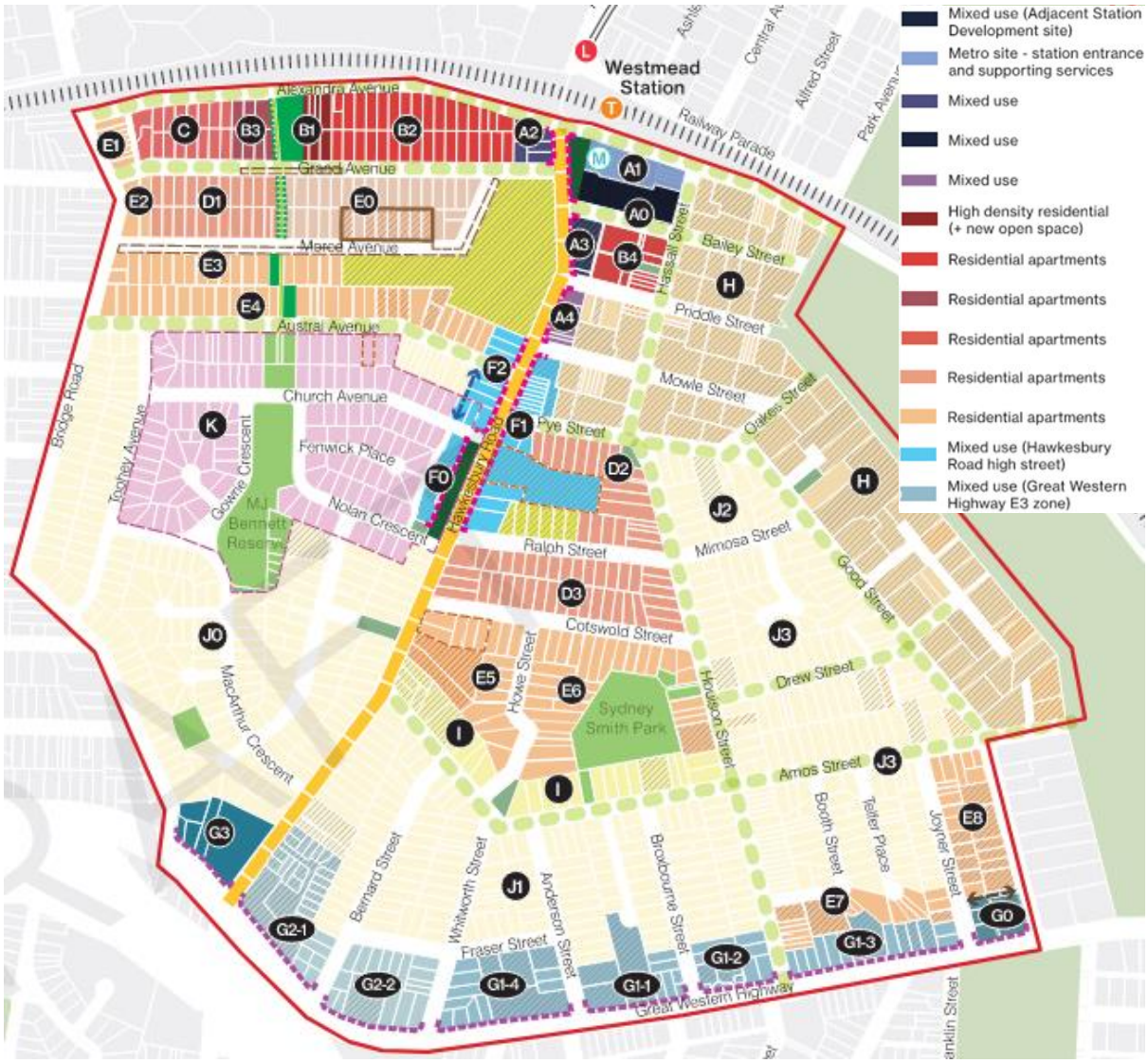


**Table 1 - Residential Development Summary**

| Development Type | Existing Dwellings (Retained) | Future Dwellings | Total Dwellings |
|---|---|---|---|
| **High Density Residential** | 1,099 | 4,597 | 5,696 |
| **Medium Density Residential** | 375 | 1,220 | 1,595 |
| **Low Density Residential** | 177 | 234 | 411 |
| **Mixed Use (Medium/High Density)** | 670 | 1,509 | 2,179 |
| | **2,321** | **7,559** | **9,880** |

**Table 2 – Non-Residential Development Summary**

| Development Type | Existing GFA ($m^2$) (Retained) | Future GFA ($m^2$) | Total GFA ($m^2$) |
|---|---|---|---|
| **Mixed Use (GFA)** | 2,500 | 44,617 | 47,177 |

# 2 Water

## 2.1 Existing Infrastructure

The precinct is located within the Sydney Water Prospect North water supply zone. The closest reservoirs to the precinct are the Mt Dorothy Reservoir, located 1.5km to the north-west on Coloola Road, and the Holroyd Reservoir, located 3.5km to the south-west on Benaud Street.

A series of trunk mains extend from each reservoir towards the precinct. From the Mt Dorothy Reservoir, a 500mm diameter main extends along Warra Street. This main reduces in size to 375mm then extends along Darcy Road and Bridge Road. This main crosses the rail corridor and traverses Bridge Road throughout the extent of the precinct. This trunk main connects to a 450mm main on the northern side of the Great Western Highway, which connects back to the Holroyd Reservoir via Old Prospect Road and Cumberland Road.

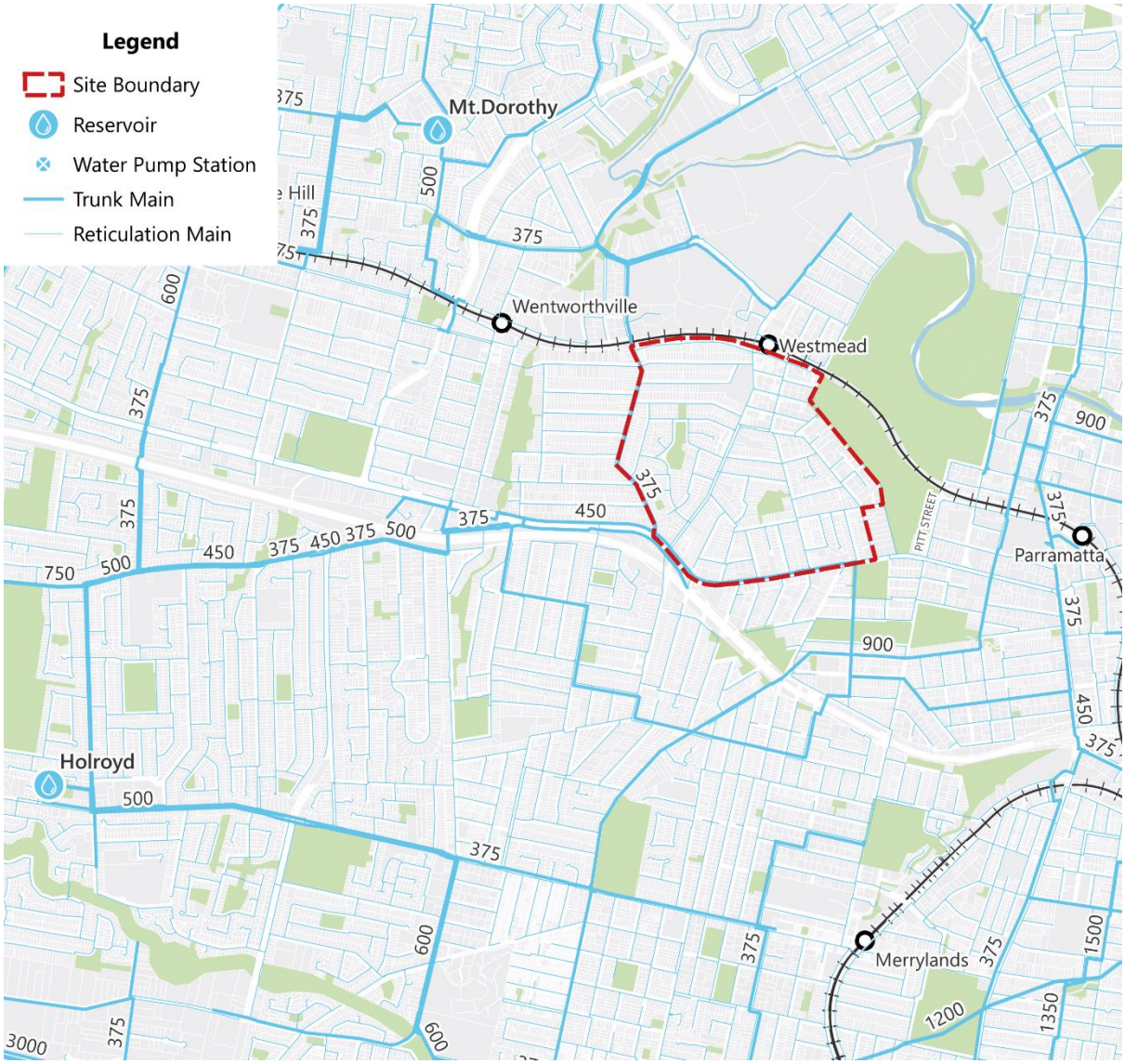
A series of smaller reticulation mains extend along existing roads within the precinct from the trunk mains in Bridge Road and the Great Western Highway to supply development. The existing potable water infrastructure within the vicinity of the precinct is shown in Figure 5.

## 2.2 Sydney Water Growth Servicing Plan

Sydney Water's 2022 Growth Servicing Plan (GSP) outlines the servicing strategy to support planned growth in Greater Sydney up to 2027. The GSP has assessed the Greater Parramatta to Olympic Peninsula (GPOP) growth area, which includes the precinct. For the Westmead South Precinct, Sydney Water anticipate that there is adequate existing trunk capacity in the potable water network to support the planned growth.

It should be noted that while the GSP focuses on short term growth over a five-year period, Sydney Water also undertake medium and long-term planning for growth areas identified by the NSW Government. As plans progress and development yields become more certain, Sydney Water can refine their infrastructure servicing strategies for these growth areas. It is expected that future revisions of the GSP will cover more of the Westmead Place Strategy horizon, which extends to 2036.

**Figure 5 - Existing Potable Water Infrastructure**



## 2.3 Demand Calculations

A high-level assessment was undertaken using the Water Supply Code of Australia (WSA) to determine the trunk infrastructure requirements to support the proposed development. This involved calculating the peak-hour demand to estimate the likely infrastructure required.

The maximum water demand rates were extracted from the WSA. These rates were used to determine the peak hour demand for each land use type. The results of this assessment are provided in Table 3. This assessment includes both existing dwellings and non-residential GFA within the Precinct which are expected to be retained, as well as proposed additional dwellings and GFA.

**Table 3 - Calculated Water Demand**

| Land Use | Max Demand Rate (kL/Unit/Day) | Unit | Peak Hour Demand (L/s) |
|---|---|---|---|
| Low Density Residential (<30 dw/ha) | 1.4 | Dwelling | 40.0 |
| Medium Density Residential (30-60 dw/ha) | 60 | Ha | 6.1 |
| gh Density Residential (60-100 dw/ha) | 80 | Ha | 35.8 |
| High Density Residential 100-140 dw/ha) | 100 | Ha | 17.2 |
| High Density Residential (>140 dw/ha) | 0.8 | Dwelling | 116.5 |
| Suburban Retail & Commercial | 41 | Ha | 5.6 |
| | | **Total** | **221.1** |

Based on the above assessment and assuming a target velocity of 1.4m/s, a main of approximately 450mm diameter could support the proposed development.

The same assessment was undertaken for the existing scenario to determine the expected increase in demand generated by the development. The existing dwellings within the Precinct produce a peak water demand of 119.3L/s, which could be supported by a 450mm diameter main.

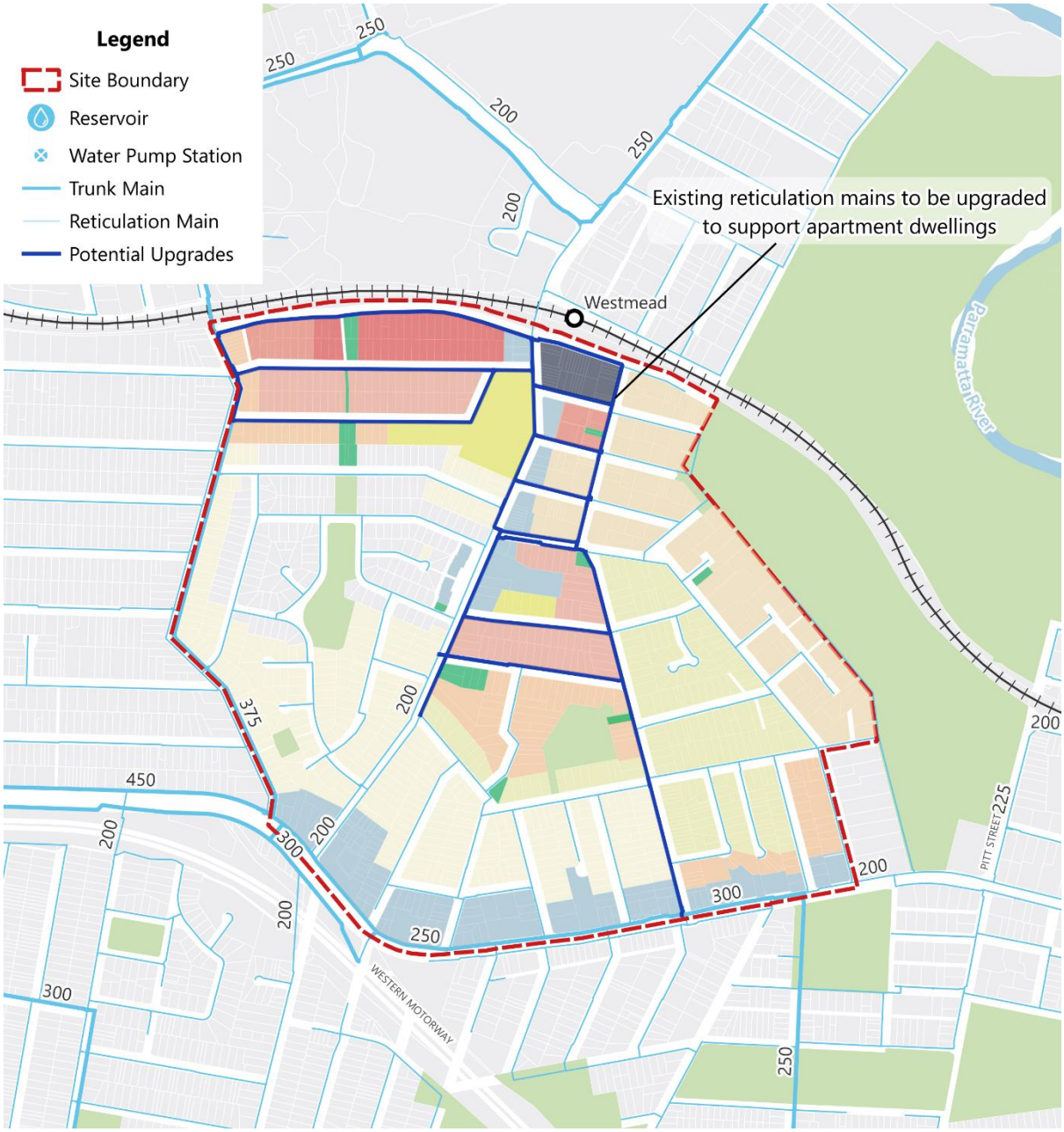
The draft master plan will yield over 6,600 new dwellings across the Precinct, which is expected to increase the potable water demand by approximately 85%. While the mains surrounding the Precinct are sufficiently sized to support the demand generated by the proposed development, the capacity of upstream infrastructure such as trunk mains and reservoirs to support additional demand is unknown. As discussed in Section 2.1, Sydney Water's GSP notes that there is currently adequate existing trunk capacity in the potable water network to support planned growth.

It is expected that Sydney Water will determine the servicing requirements as individual sites are developed and connection applications are lodged.

## 2.4 Proposed Servicing Strategy

Localised upgrades may be required to support particular land uses such as apartment blocks greater than 8-storeys, which require a minimum 200mm diameter main. Potential upgrades have been identified in Figure 6. Any required upgrades will be confirmed by Sydney Water as individual Development Applications are lodged.

**Figure 6 - Proposed Water Infrastructure**



# 3 Sewer

## 3.1 Existing Infrastructure

The existing uses in the precinct are serviced by the Sydney Water sewer network. The Precinct falls within the North Head wastewater system catchment.

The Westmead South Precinct falls into two sewer catchments:

- Areas east of Hawkesbury Road drain northwards to the Westmead Submain, which crosses the rail corridor and connects to a pump station (SP0103) on the northern side of Toongabbie Creek.
- Areas west of Hawkesbury Road drain northwards to the Hainsworth Street Carrier. This carrier is 300mm in diameter and also services Westmead Hospital. It connects to the Westmead Submain on the southern side of Toongabbie Creek.

From SP0103, flows are pumped northwards to the Northern Suburbs Ocean Outfall Sewer (NSOOS). The NSOOS traverses the northern side of the Parramatta River and transfers wastewater to the North Head Water Resource Recovery Facility in Manly. The NSOOS is 25km in length and services 1.7 million people in Sydney's western and northern suburbs including areas as far west as Blacktown.

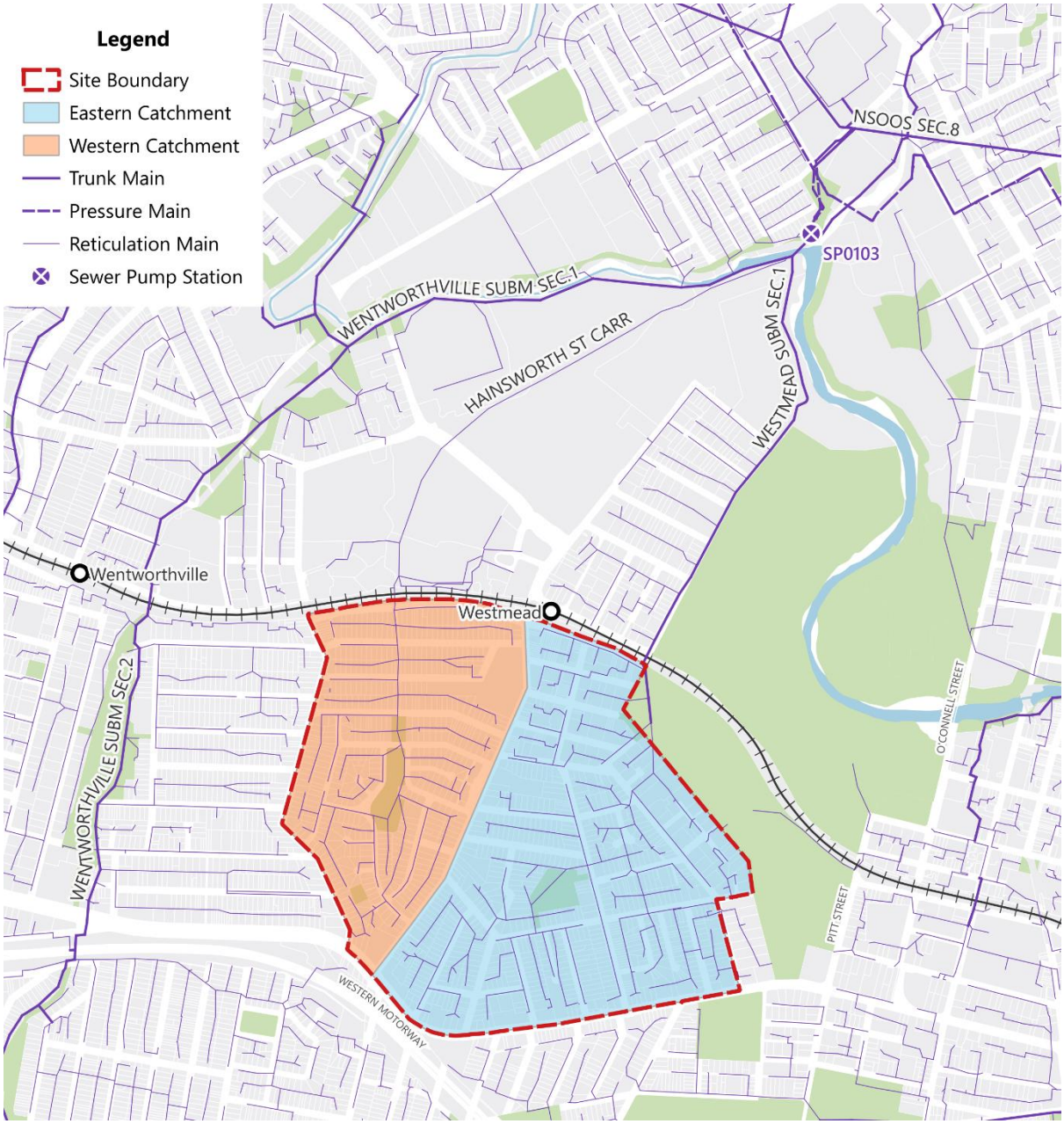
The existing sewer infrastructure within the vicinity of the precinct is shown in Figure 7 below.

## 3.2 Sydney Water Growth Servicing Plan

Sydney Water's 2022 GSP outlines the servicing strategy to support planned growth in Greater Sydney up to 2027. The GSP has assessed the GPOP growth area, which includes the precinct. For the Westmead South Precinct, Sydney Water note that there is limited existing trunk capacity, however new infrastructure to support growth is currently in the design and delivery phase. No information is currently available on the extent of proposed works or the expected delivery timeframe.

It should be noted that while the GSP focuses on short term growth over a five-year period, Sydney Water also undertake medium and long-term planning for growth areas identified by the NSW Government. As plans progress and development yields become more certain, Sydney Water can refine their infrastructure servicing strategies for these growth areas. It is expected that future revisions of the GSP will cover more of the Westmead Place Strategy horizon, which extends to 2036.

**Figure 7 - Existing Sewer Infrastructure**



## 3.3 Demand Calculations

A high-level assessment was undertaken to determine the sewer loads generated by the development, and the corresponding sewer infrastructure required to support the proposed development of the Precinct. This assessment was based on loading rates outlined in the Sewage Supply Code of Australia (SSA).

The load on the sewer network is calculated by first determining the Equivalent Population (EP) expected within the Precinct. The EP for each land use was extracted from the SSA. For residential uses, EP is expressed as a rate per dwelling. For non-residential uses, EP is expressed as a rate per hectare of gross development. The proposed land uses were split based on the catchments shown in Figure 7. The approximate total EP for each catchment was then calculated using the EP rates tabulated below.

The calculated EP was then used to determine the expected peak dry weather flow (PDWF), which was used to estimate the main size that would be needed to support each catchment. The results are provided in Table 4.

**Table 4 - Calculated Sewer Demand**

| Land Use | Total Yield | EP Rate | EP Total | Western Catchment (EP) | Eastern Catchment (EP) | Western Catchment PDWF (L/s) | Eastern Catchment PDWF (L/s) |
|---|---|---|---|---|---|---|---|
| Apartments (12 storeys) | 534 | 2.5 | 1,317.5 | 797.4 | 537.2 | 2.86 | 1.99 |
| Apartments (15+ storeys) | 1,280 | 2.5 | 3,200.0 | 3,199.6 | - | 10.59 | - |
| Apartments (6 storeys) | 1,442 | 2.5 | 3,605.8 | 775.6 | 2,830.2 | 2.65 | 9.01 |
| Apartments (8 storeys) | 1,369 | 2.5 | 4,792.5 | 1,643.6 | 1,777.8 | 5.39 | 5.77 |
| Apartments (existing) | 1,193 | 2.5 | 3,102.5 | 1,383.5 | 1,599.0 | 4.38 | 5.00 |
| Low Density | 289 | 3.5 | 1,960.0 | 572.9 | 438.6 | 1.80 | 1.38 |
| Medium Density | 1,595 | 3 | 4,784.6 | - | 4,784.6 | - | 14.93 |
| Mixed Use | 1,577 | 2.5 | 3,942.7 | 511.4 | 3,431.4 | 1.77 | 10.78 |
| Mixed Use (Station) | 602 | 2.5 | 1,720.0 | - | 1,504.5 | - | 5.24 |
| **Total** | **9,880** | | **25,787.3** | **8,884** | **16,903** | **29.45** | **54.10** |

Based on the above assessment, both catchments would require a 375mm diameter main to support the full development proposed. As discussed in Section 3.1, the western catchment drains to the 300mm diameter Hainsworth Street Carrier and the eastern catchment drains to the 400mm diameter Westmead Submain.

The Westmead Submain also supports a high-density residential area located on the northern side of the rail corridor. The proposed development within the eastern catchment, combined with

the existing high-density residential area would exceed the capacity of the 400mm Westmead Submain.

The downstream infrastructure within both catchments is therefore insufficiently sized to support the planned growth.  To support future development within the Precinct, upgrades to existing infrastructure will be required. A potential servicing strategy is presented below, however it should be noted that alternative options should also be considered during a subsequent stage of planning, in consultation with Sydney Water.

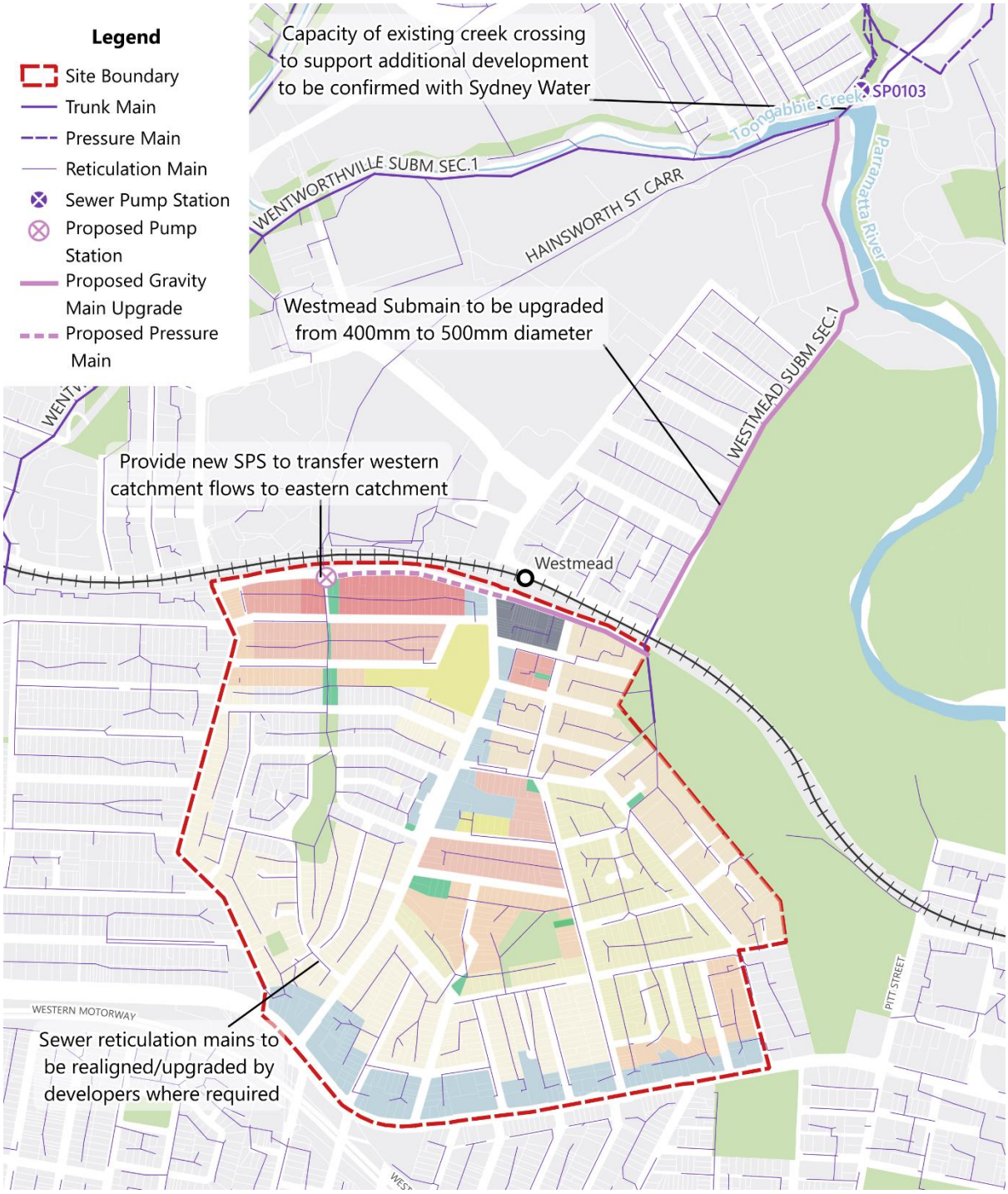
## 3.4 Proposed Servicing Strategy

The Hainsworth Street Carrier bisects the Westmead Hospital site and may prove challenging to upgrade. To minimise disruptions to the hospital, this strategy has assumed that flows from the Precinct will be transferred to the Westmead Submain which supports the eastern catchment.

To transfer flows from the western catchment to the Westmead Submain, a sewer pump station would be required at the low point of the Precinct, adjacent the rail corridor. An indicative location for this infrastructure is shown in Figure 8.

The Westmead Submain would then need to be upgraded between the north of the rail corridor and Toongabbie Creek. The Westmead Submain drains to a 750mm diameter creek crossing, which also receives flows from the Hainsworth Carrier and Wentworthville Submain. The capacity of this crossing to support additional demand is unknown at this stage, and will be confirmed with Sydney Water. The potential servicing strategy for the site is shown in Figure 8 below.

**Figure 8 - Potential Sewer Servicing Strategy**



# 4 Electricity

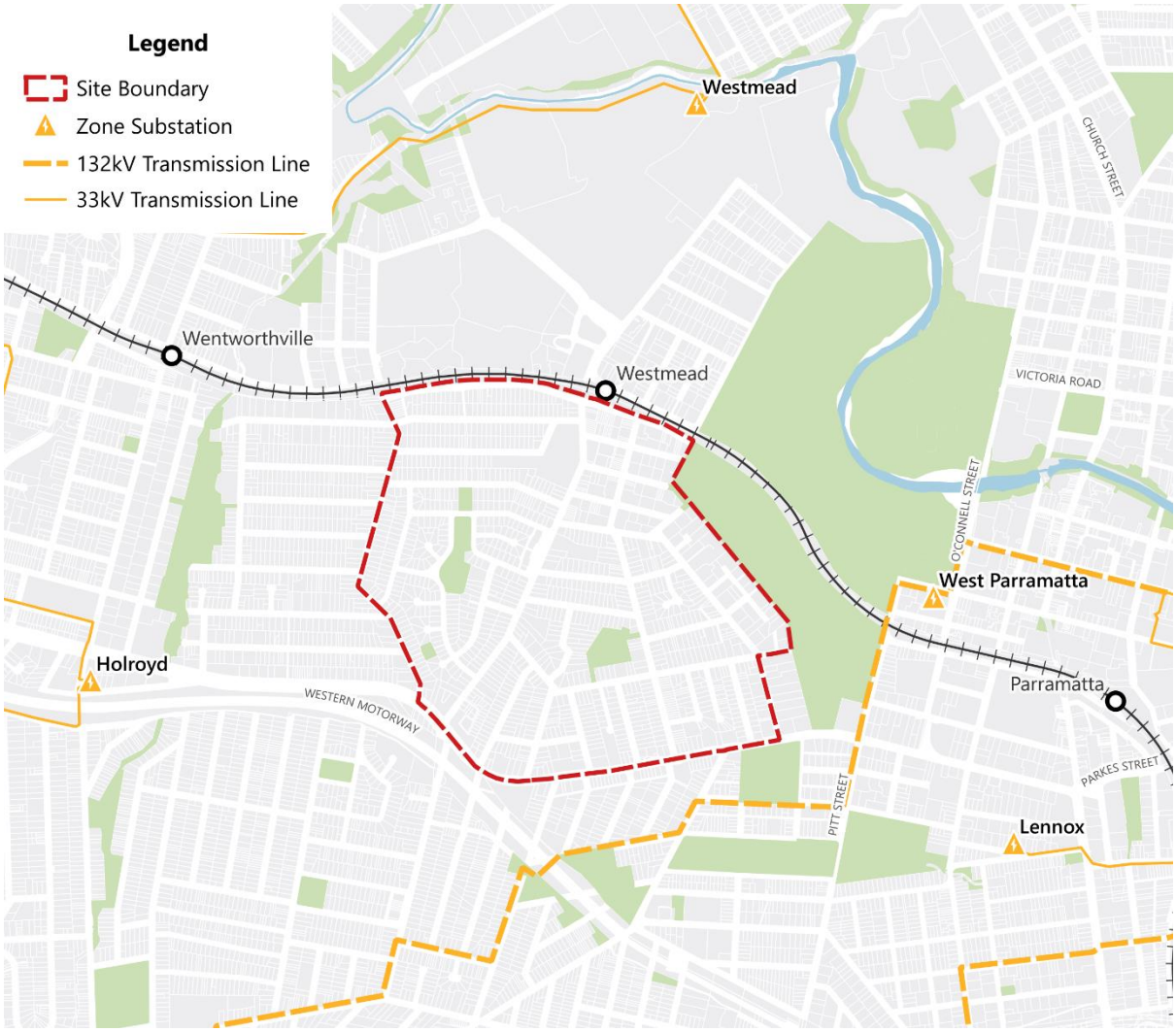
## 4.1 Existing Infrastructure

The precinct is located within the Endeavour Energy (EE) electrical supply zone. The closest zone substations (ZS) to the precinct are:

- The West Parramatta ZS, located 500m east of the precinct. This zone substation has a firm capacity of 90MVA and is estimated to have 3.5MVA of spare capacity in 10 years' time.
- The Lennox ZS, located 800m south east of the precinct. This zone substation has a firm capacity of 50MVA and is estimated to have 9.6MVA of spare capacity in 10 years' time.
- The Holroyd ZS, located 900m west of the precinct. This zone substation has a firm capacity of 42.25MVA and is estimated to have 6.65MVA of spare capacity in 10 years' time.
- The Westmead ZS, located 1km north of the precinct. This zone substation has a firm capacity of 35MVA, however EE are in the progress of delivering an additional transformer which will provide an additional 45MVA of capacity.

The above zone substations are connected via a series of 33kV and 132kV transmission lines, however the precinct is unconstrained by this infrastructure. The existing electrical infrastructure within the vicinity of the precinct is shown in Figure 9.

**Figure 9 - Existing Electrical Infrastructure**




## 4.2 Endeavour Energy Regulatory Proposal & Greater Parramatta Area Plan

Endeavour Energy's latest Regulatory Proposal outlines their planned investment to maintain and support growth in the electricity network from 2024-2029. Within the Greater Parramatta area, EE plan to invest approximately $40 million on growth projects to ensure connection capacity is available to meet planned growth in the area.

This includes an upgrade to the Westmead ZS to provide a third 45MVA transformer, which is expected to be commissioned in 2027. To supply the additional transformer, a new 132kV sub-transmission line will be constructed from the West Parramatta ZS. The new transformer will provide additional capacity to the Westmead Hospital switchboard and will relieve load off the ZS which currently supplies the entire Westmead Health Precinct and other residential and commercial loads in the surrounding area.

Noting that the Westmead ZS is supplied via the Sydney West Bulk Supply Point (BSP) and the West Parramatta ZS is supplied via the Holroyd BSP, the additional transformer and associated

sub-transmission line will allow for the primary and backup supply for the hospital to originate from two separate bulk supply points, providing increased load security.

EE's Greater Parramatta Area Plan, which accompanies the Regulatory Proposal, also notes that a second zone substation within the Westmead Health Precinct may eventually be required to support future growth, however the construction of an additional 45MVA transformer at the Westmead ZS has pushed back the need date for the second zone substation beyond a 10-year timeframe. EE will continue to monitor growth in the precinct to confirm the need and timing of the second zone substation.

## 4.3 Demand Calculations

A high-level assessment was undertaken to determine the electrical servicing requirements for the site. The electrical demand generated by the proposed development was calculated using electrical demand rates provided by Endeavour Energy and supplemented with rates extracted from *AS/NZS 3000 Electrical Installation Wiring Rules*. This assessment represents the additional demand expected as a result of the proposed development, and excludes the load resulting from the existing development within the Precinct.

A diversification factor of 0.8 was applied to the total load to provide an estimate of the peak load generated by the proposed development of the Precinct. The results are presented in Table 5.

**Table 5 - Calculated Electrical Demand**

| Land Use | Load/Unit (VA) | Unit | Diversified Load (MVA) |
|---|---|---|---|
| Low Density Residential | 6500 | Dwelling | 1.2 |
| Medium Density Residential | 5000 | Dwelling | 4.9 |
| High Density Residential | 3500 | Dwelling | 17.1 |
| Retail/Commercial | 100 | $m^2$ GFA | 3.8 |
| | | **Total** | **27.0** |

The proposed development is expected to generate an additional 27.0 MVA of electrical demand. Based on the assumption that a single 11kV feeder can supply approximately 4.5-5MVA, the Precinct will likely require six new feeders to supply all future development over time.

## 4.4 Endeavour Energy Consultation

A meeting was conducted with Endeavour Energy to discuss the project and determine a suitable electrical servicing strategy to support future development within the Westmead South Precinct.

EE advised that due to the increase in electrical load expected to be generated by the proposed development, an additional zone substation will be required. Based on EE's forecasting, it is anticipated that this zone substation won't be required until 2040, however this timeframe might change if additional capacity is required earlier due to increased development activity.

EE are currently undertaking due diligence assessments for the zone substation, and it is expected that a suitable location for this infrastructure will be determined in a subsequent stage of the project. EE have advised that the location should be central to the expected load, and appropriately spaced from existing assets.

## 4.5 Proposed Servicing Strategy

As discussed in Section 4.1, there are several zone substations located within the vicinity of the Precinct which each have varying levels of utilisation. EE have advised that initial stages of development will be supplied via the Holroyd ZS. The Holroyd ZS is currently forecast to reach its firm capacity in 10 years.

As discussed in Section 4.2, Endeavour Energy are currently delivering an additional transformer at the Westmead ZS, which will provide an additional 45MVA of capacity. EE have advised that once the Holroyd ZS has reached capacity, future feeders will originate from the Westmead ZS, until the new zone substation within the precinct is delivered. Potential feeder routes are shown in Figure 10.

The servicing requirements for each development lot within the site will be confirmed by Endeavour Energy as development applications are lodged. It should be noted that spare capacity cannot be reserved for developments and connection applications are assessed as they are received.

**Figure 10 – Proposed Electrical Servicing Strategy**

# 5 Telecommunications

## 5.1 Existing Infrastructure

### 5.1.1 NBN

NBN Co. is the wholesale provider for new broadband connections. NBN Co. provides services on its local access network on equivalent terms to retail phone and internet providers, to provision for end users.

The Westmead South Precinct is serviced via fixed line technology, where a physical line connects to each property to provide a connection. Existing infrastructure is located within the standard trench allocation of all road reserves.

It is anticipated that any future development within the Precinct will leverage this existing infrastructure to receive telecommunications servicing.

NBN Co. assess each application request separately to negotiate commercial terms, however connection fees of up to $400/unit may apply.

### 5.1.2 Telstra 5G

Rollout of Telstra's 5G network has commenced across Western Sydney. The Westmead South Precinct has blanket existing Telstra 5G network coverage across the precinct.

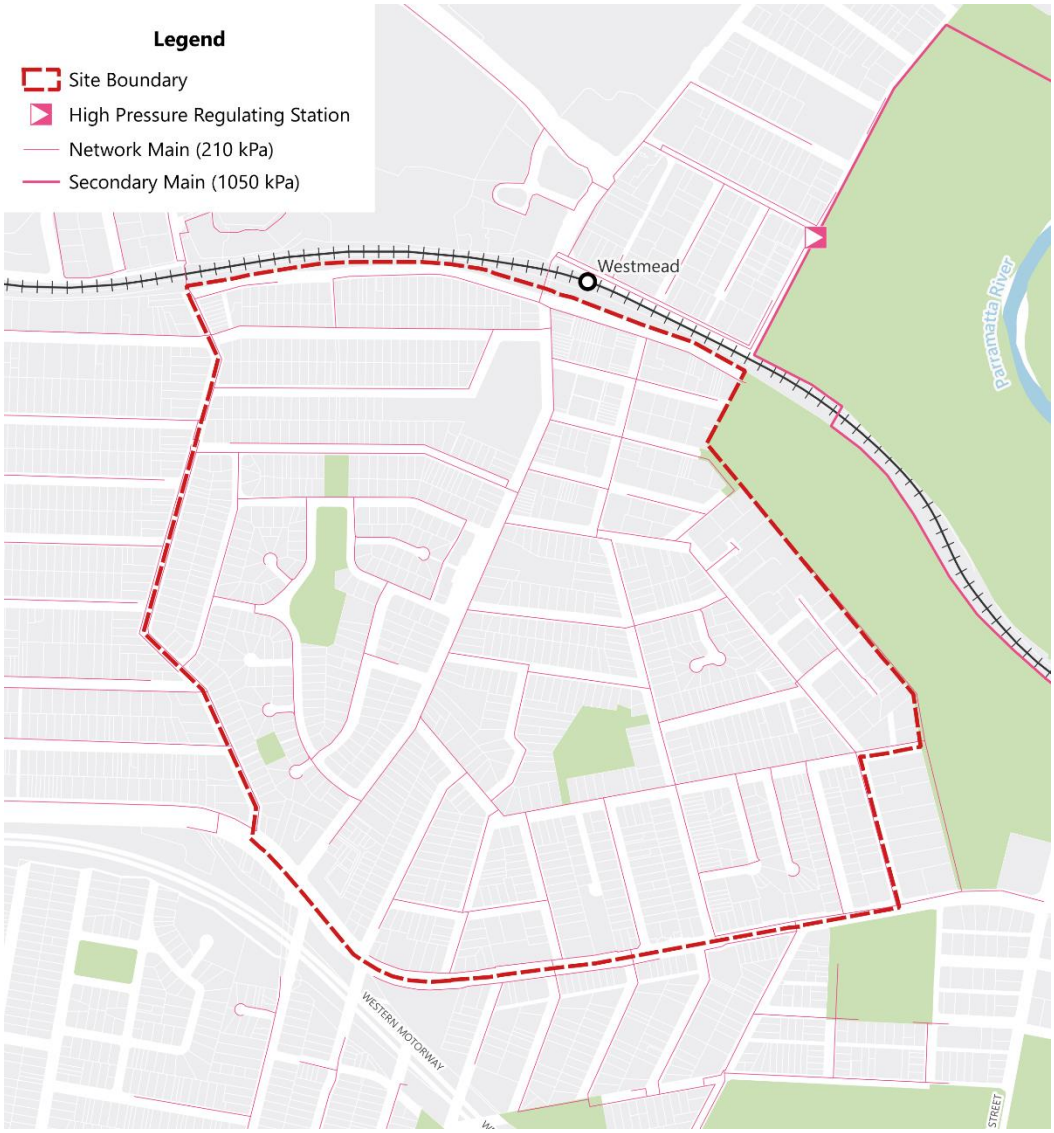
# 6 Gas

## 6.1 Existing Infrastructure

Gas is supplied to the precinct and surrounding area by Jemena. A high-pressure secondary gas main traverses the southern side of the rail corridor. This main crosses the rail corridor near the precinct boundary and traverses Park Avenue to a high-pressure regulating station located near Queens Road. From the regulating station, 210 kPa network mains extend along most streets within and surrounding the precinct, supplying existing homes. The existing gas infrastructure located within the vicinity of the precinct is shown in Figure 11.

As gas is a non-essential utility, rollout of gas infrastructure will be dependent on the appetite of each individual development. Generally, little demand for gas can be expected from non-residential development. Jemena will support the demand generated by residential development as required.

**Figure 11 - Existing Gas Infrastructure**



# 7 Sustainable Utilities Servicing Opportunities

There are generally two options for the provision of sustainable utilities infrastructure:

- Services connections can be made from the business as usual (BAU) infrastructure with sustainably sourced electricity or water; and
- The implementation of sitewide (internal) generation and recycling initiatives for water and electricity

At a precinct level, there are several initiatives and ratings schemes for sustainable utility services in Australia including Green Star Communities, Green Star Buildings, NABERS and ISCA. Some recent examples of sustainably serviced precincts in Australia are discussed below.

## Parramatta Square

This project in Sydney aspired to be Australia's first carbon-neutral, water-positive urban precinct. Using LED lighting, rooftop solar and regenerative drive lifts the precinct aims to generate more renewable energy than it consumes. Water efficiency initiatives include waterless fixtures and fittings and a precinct wide rainwater harvesting scheme.

## Fishermans Bend

This Melbourne precinct is being developed with a net-zero emissions strategy. It has an integrated water management strategy that includes street and precinct level initiatives such as a water recycling plant, third "purple" pipe reticulation, street scale water sensitive urban design and green roofs & walls. Greenhouse gas reductions are achieved through efficient design, construction and operation of buildings, through renewable energy generation, energy storage and significant reductions in the use of private cars.

## Central Park

Situated in Ultimo on the site of the former Carlton United Brewery, this development was the gold standard in sustainability at the time of construction. It included a thermal trigeneration power plant that generates hot and chilled water for the precinct as well as power generation and a precinct wide water recycling plant.

**Figure 12 - Central Park, Ultimo**

## 7.1 Integrated Water Management

On a precinct of this scale there are several integrated water management initiatives worthy of investigation. These include flood resilience, stormwater harvesting, stormwater detention, SQUIDs (stormwater quality improvement devices) and non-potable water.

### 7.1.1 Stormwater Harvesting

Precinct-level stormwater initiatives such as a localised stormwater harvesting and re-use scheme could be implemented. Stormwater harvesting involves collecting stormwater from drains and creeks and treating this water for use as recycled water. This recycled water can be used to water public parks, gardens, sports fields and golf courses. The benefits of a stormwater harvesting scheme include:

- Reduces stress on urban streams and rivers by capturing some of the pollutants and nutrients that would otherwise enter waterways from stormwater flows
- Enables users to access alternative sources of water for non-drinking use
- Increases opportunities for sustainable water management which is an important consideration in WSUD

Stormwater harvesting schemes operate by capturing stormwater from drains, creeks or ponds and transferring this water to a dam or storage tank. Water is then treated to ensure it is suitable and safe for use. A network of pipes then distributes the treated water for use.

A stormwater harvesting scheme could be implemented on a precinct scale, and would require modification to the existing stormwater infrastructure situated within existing roads and reserves. The feasibility of this scheme should be further explored during a subsequent stage of the project.

### 7.1.2 Recycled Water

Recycled water can be used for domestic purposes such as flushing toilets, washing clothes and watering gardens, as well as to irrigate public open spaces such as sports fields, parks and golf courses.

Recycled water can be produced through sewer mining, where wastewater is extracted from a local wastewater system and treated on-site at a small treatment plant. As recycled water is not treated to drinking water standards, plumbing must be kept separate from potable water pipes and clearly identified as recycled water.

Use of recycled water would reduce the demand for potable water generated by the development. Sydney Water estimate that for a typical dwelling with a backyard, approximately 23% of household daily water consumption is used outdoors, with a further 20% used for toilet flushing.

A high-level assessment was undertaken to determine the potential reduction in potable water demand that could be achieved through the implementation of a recycled water scheme. For this assessment, it was assumed that 43% of daily water demand could be supplied via recycled water

for low and medium density dwellings (toilet flushing and outdoor irrigation), and 20% for high density dwellings (toilet flushing only). The results of this assessment showed that a potential reduction of 24% in potable water demand across the precinct could be expected if recycled water reticulation is provided to all residential dwellings. If the development of the site was supplied via a single trunk main, implementation of a recycled water scheme would reduce the size of the required potable water main from 450mm to 400mm in diameter.

Given the size of the Precinct, the infill nature of the proposed development and the high fragmentation of the existing landholdings, implementation of a private localised recycled water scheme is unlikely to be feasible.

Recycled water infrastructure is supplied within some parts of the Sydney Water servicing catchment, however this infrastructure is not currently available within the Precinct or surrounding suburbs. Should Sydney Water expand their recycled water network to the Westmead area, opportunities to provide this infrastructure to future development could be explored.

## 7.2 Energy

### 7.2.1 Solar Panels

Solar panels can be installed on rooftops, walls, and in open spaces to generate electricity from the sun. In high-density precincts, rooftop solar installations can be particularly suitable, as they take advantage of available space and can help to reduce demand on the electricity grid.

Solar panels fitted to rooftops for both residential and non-residential buildings could be used to reduce or completely offset the demand on the electricity network. The potential electricity generation from solar panel is dependent on the available roof area, the panel orientation and the hours of sunlight the panel is exposed to.

A typical residential solar panel covers an area of approximately 1.7m$^2$, and for a freestanding home a solar system might include 14-18 panels. A system of this size could produce 5-6.5kW of electricity, which might reduce the total load on the electricity network, but likely not completely offset it.

Provision of solar panels would be provided on a site by site basis, and would be the responsibility of each individual developer to implement.

## 7.3 Electric Vehicles

New developments, particularly apartment buildings, could encourage the uptake of electric vehicles (EVs) by providing infrastructure which supports uptake. This could include assigned parking spaces for EVs which include charging stations, or by providing electrical cabling for each parking space for owners to install chargers.

Council could also consider providing on-street EV charging stations, where appropriate. City of Sydney Council are currently undertaking a trial of on-street electric vehicle charging to determine the demand and identify suitable locations for this infrastructure.

Nine on-street EV charging stations have been installed across the LGA, and kerbside restrictions have been changed to allow for a 4-hour parking time during the day and a longer stay for overnight charging. The trial is operating under a user-pays model, however parking fees will not be charged during the trial.

### 7.3.1 Microgrids

A microgrid is a small-scale, localized electrical grid that can operate independently or in conjunction with the regional Endeavour Energy traditional electrical grid. It would typically include distributed energy resources (DERs) such as solar panels, wind turbines, geothermal, batteries and can be used to supply power to a single building or a group of buildings in a precinct.

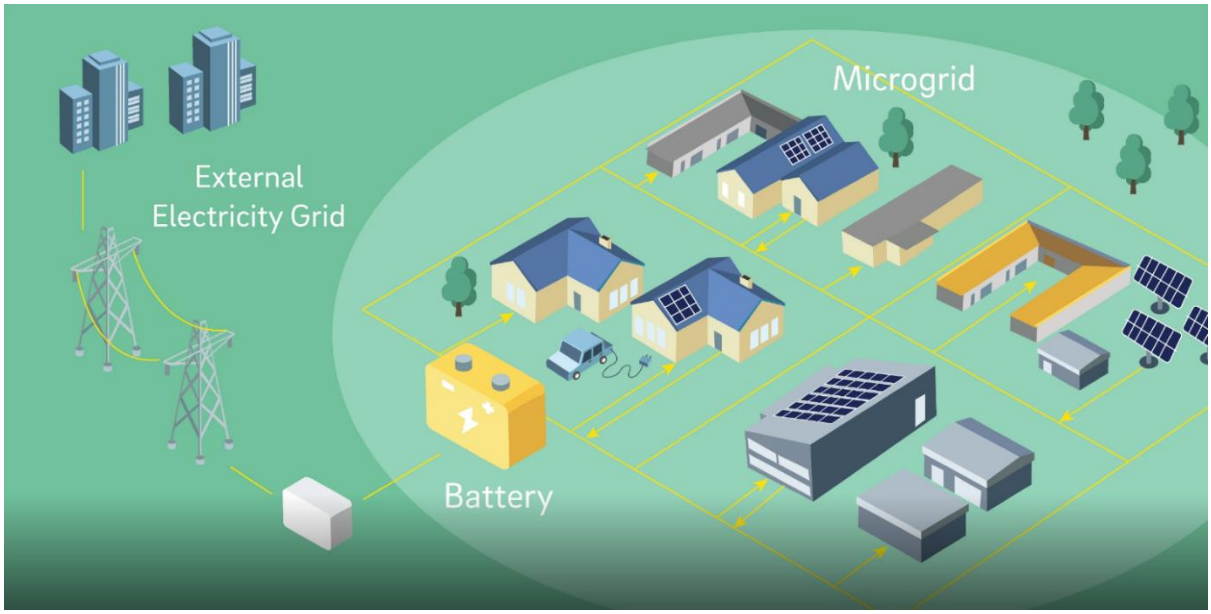
A Microgrid can operate in "island mode", where the system is disconnected from the main electricity grid and operates autonomously during power outages or other disturbances. The ability of a precinct to generate adequate power to remain self-sufficient depends on both demand-side and supply-side initiatives.

Demand initiatives include thermal architectural design, building materials, orientation, appliances, etc. while supply side initiatives depend on the size of the precinct, building/land use types (including roof areas) and the availability of the various renewable energy sources.

Electric vehicles are a significant consideration in electricity planning for precincts. Whilst they can be charged overnight at low-peak times they are large electricity consumers and need to be taken into account.

Typically, solar power generation is considered the most cost efficient and pragmatic form of power generation. The amount of power generation available is proportional with the area available for photovoltaic (PV) cells, usually link to roof area and their orientation.

**Figure 13 - Microgrid Example**



Batteries are another important aspect of microgrids, as they can be implemented to store energy during the day when solar electricity generation is high and electricity demand is low and then used for power during the evening peak electricity demand window. These batteries can be large, community wide installations or much smaller at the building level.

The governance of a microgrid can be rather complex and involves managing the ownership, operation, and coordination of the various energy resources and stakeholders within the microgrid. This can affect the land titling, involve numerous complex services easements, etc. and take the following into consideration:

**Coverage area:** The coverage area of the microgrid can be modified to suit the site-specific conditions. Within a fragmented development such as the Westmead South Precinct, coverage might be limited to high-density areas with larger building footprints and greater potential for solar panel coverage.

**Ownership:** The ownership of the microgrid needs to be determined. This could be Endeavour Energy, a community title entity or a third-party operator. Ownership affects the decision-making power and the financial responsibility for the microgrid and easement requirements.

**Regulatory Framework:** The regulatory framework for the microgrid needs to be established to ensure compliance with the relevant laws and regulations. This could include permits, licenses, and approvals from various regulatory bodies.

**Financing:** The financing and commercial feasibility of the microgrid needs to be secured to ensure ongoing viability. This may involve bringing a commercial and/or operational partner into the project development team and could be supplemented by government grants, reduced rate loans, or additional private investment.

**Coordination with the electricity grid:** The coordination between the microgrid and the main grid needs to be managed to ensure that energy supply and demand are balanced. This could include negotiating power purchase agreements with the main grid, establishing energy export and import charges, and coordinating the operation of the microgrid with the external main grid.

# 8 Summary of Infrastructure Requirements

The potential utilities infrastructure upgrades required to support the development of the Westmead South Precinct, as discussed in the previous sections of this report, are summarised in Table 6.

Each infrastructure upgrade has been classified as either lower priority or high priority. Lower priority items are those which support smaller areas within the Precinct and are expected to be completed by developers in line with development rollout. Lower priority items also include items which are not expected to be required for a number of years, such as a future zone substation within the Precinct. High priority items include infrastructure items which are required to support a large part of the proposed development, or items expected to be required in the short term.

**Table 6 - Westmead South Precinct Utility Requirements**

| Utility | Infrastructure Item | Delivery Timing & Priority |
|---|---|---|
| Potable Water | Reticulation main upgrades | Lower priority upgrades. To be undertaken as development progresses where required. |
| Sewer | Upgrade of Westmead Submain | High priority upgrade required to support growth in the Precinct. Delivery timing will be confirmed by Sydney Water during a subsequent phase of the master plan process. |
| Sewer | New pump station and pressure main | High priority item required to support future development of the western catchment. Delivery timing will be confirmed by Sydney Water during a subsequent phase of the master plan process. |
| Sewer | Reticulation main upgrades | Lower priority upgrades. To be undertaken as development progresses where required. |
| Electricity | 6x new 11kV feeders | High priority upgrade, to be provided in a staged manner as development progresses. Feeders will originate from Holroyd ZS until capacity is exhausted. Future feeders may be supplied from the Westmead ZS. |
| Electricity | New zone substation | Lower priority item. Endeavour Energy have indicated that this substation may be required in 2040 based on current development forecasting. |