infrastructure & development consulting

Orchard Hills Investigation Area

Utilities Servicing Strategy

NSW Department of Planning, Housing & Infrastructure

June 2024

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1 Introduction

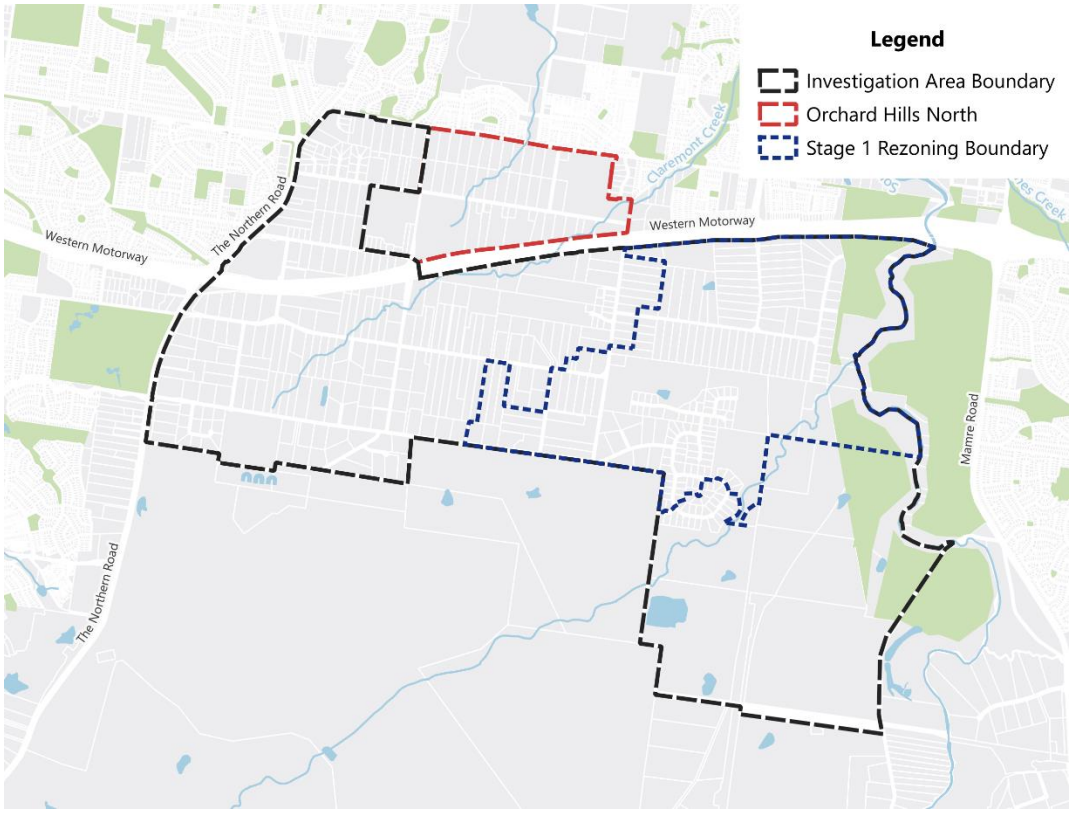
The NSW Department of Planning, Housing & Infrastructure (DPHI) has engaged Infrastructure & Development Consulting Pty Ltd (IDC) to prepare an infrastructure and servicing report to inform and support precinct planning for the Orchard Hills Investigation Area. This report outlines the existing utilities infrastructure within and surrounding the Investigation Area and provides comment on constraints and opportunities for servicing future development within Stage 1.

The Orchard Hills Investigation Area is located within the Penrith City Council Local Government Area (LGA) and covers an area of approximately 1,315 hectares. The site is bound by Caddens Road and the Western Motorway to the north, Wianamatta-South Creek and Luddenham Road to the east, Patons Lane and Wentworth Road to the south and The Northern Road to the west.

DPHI is proposing to rezone Orchard Hills in stages. The Stage 1 rezoning area is located in the east of the Investigation Area to leverage existing infrastructure capacity and connectivity to Greater Sydney via the Sydney Metro Western Sydney Airport line. The Investigation Area and Stage 1 rezoning area are shown in Figure 1 below.

Adjacent to the Investigation Area is the Orchard Hills North Planning Proposal site. The Planning Proposal has rezoned approximately 150 hectares to provide approximately 1,730 residential lots, a village centre, local open space, playing fields, bushland and riparian corridors. This area has been excluded from DPHI's Investigation Area, however DPHI is working with Penrith City Council to ensure alignment of outcomes across the Orchard Hills North Planning Proposal area and the work being undertaken for the precinct planning at Orchard Hills.

Figure 1 – Investigation Area and Stage 1 Rezoning Area Boundaries



1.1 Regional Context

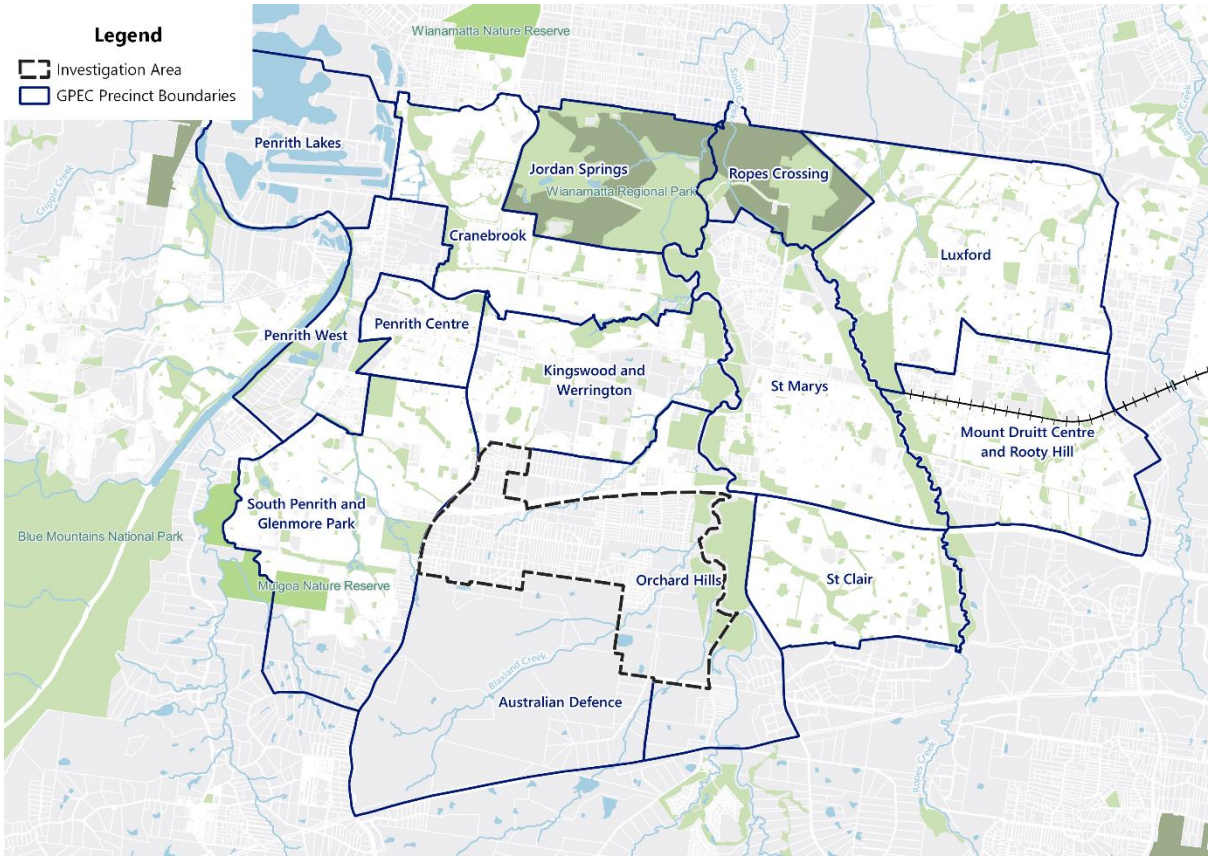
1.1.1 Greater Sydney Region Plan – A Metropolis of Three Cities

The *Greater Sydney Region Plan – A Metropolis of Three Cities*, prepared by the Greater Sydney Commission in 2018, provides a vision of three cities where most residents live within 30 minutes of their jobs, education and health facilities. The vision seeks to transform Greater Sydney into a metropolis of three cities being the Western Parkland City, the Central River City and the Eastern Harbour City. The Investigation Area is located within the Western Parkland City.

1.1.2 Greater Penrith to Eastern Creek Investigation Area

The Orchard Hills Investigation Area forms part of the larger Greater Penrith to Eastern Creek (GPEC) Investigation area. GPEC covers a total area of approximately 19,000 hectares and spans across the Penrith and Blacktown City Council LGAs. The GPEC Investigation Area is divided into 14 precincts based on physical boundaries, character and local government area. The Orchard Hills Investigation Area falls within the Orchard Hills GPEC Precinct. DPHI has prepared a Strategic Framework for GPEC to guide future detailed planning for the area. The framework sets out a vision for growth and planning priorities to deliver this vision.

Figure 2 - GPEC Precincts



2 Draft Precinct Plan

The Orchard Hills Investigation Area will be rezoned in stages to provide a mix of development typologies. Stage 1 will rezone land for approximately 11,600 new dwellings as well as local and neighbourhood centres, an urban services centre, a school (subject to review by SINSW), parks and playing fields. The proposed Stage 1 ILP is shown in Figure 3. A summary of the proposed development is provided in Table 1.

Figure 3 – Orchard Hills Draft Stage 1 ILP

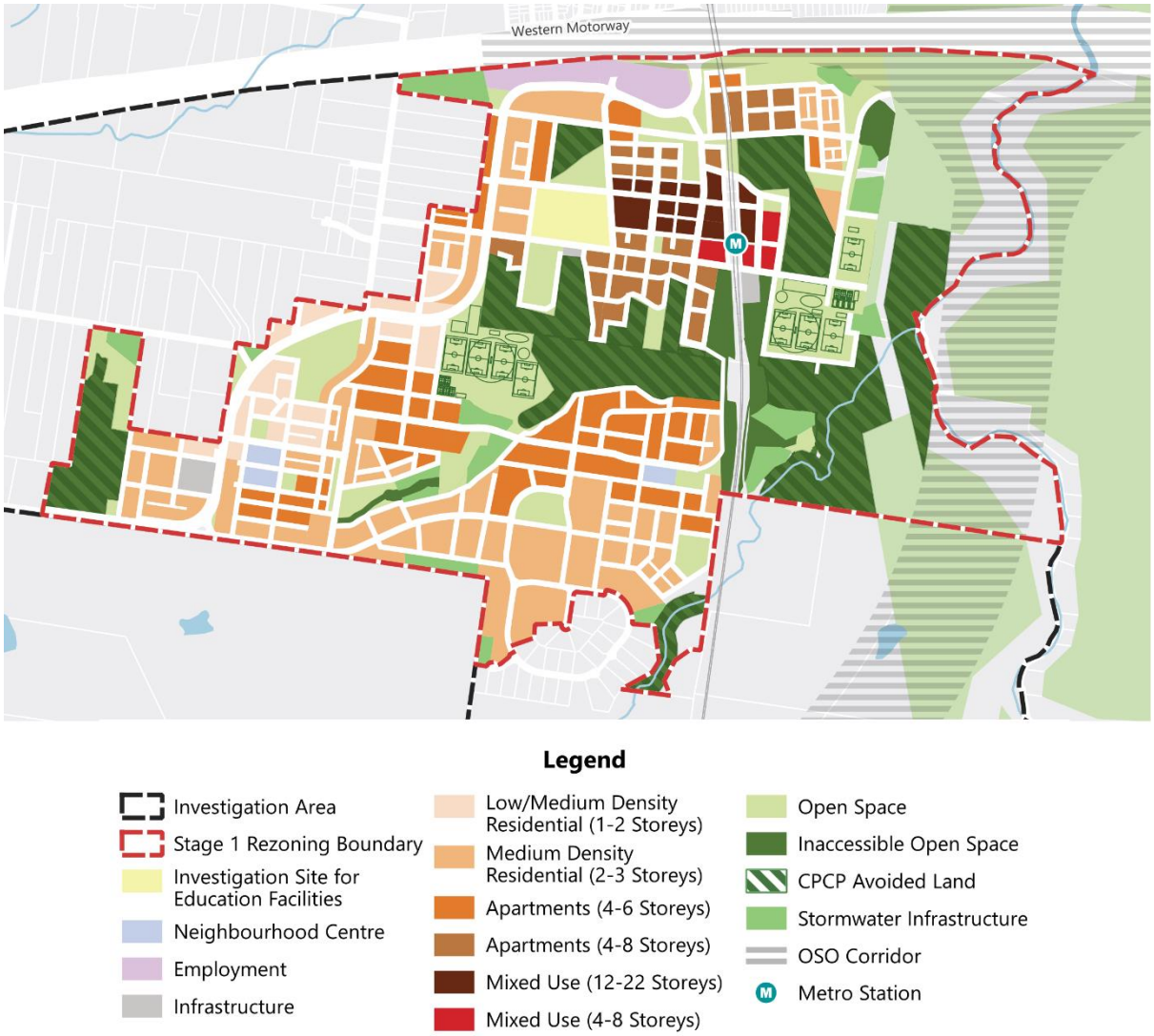


Table 1 - Orchard Hills Stage 1 Proposed Development Summary

Land Use	Quantity	Unit
Detached Dwellings (17.5 dw/Ha)	94	Dwellings
Semi-Detached & Terraces (27.5-50 dw/Ha)	5,204	Dwellings
Apartments (50+ dw/Ha)	6,308	Dwellings
School	4.5	Ha
Mixed Use (Retail & Commercial)	43,075	m^2 GFA
Community	5,000	m^2 GFA
Urban Services	6.53	Ha

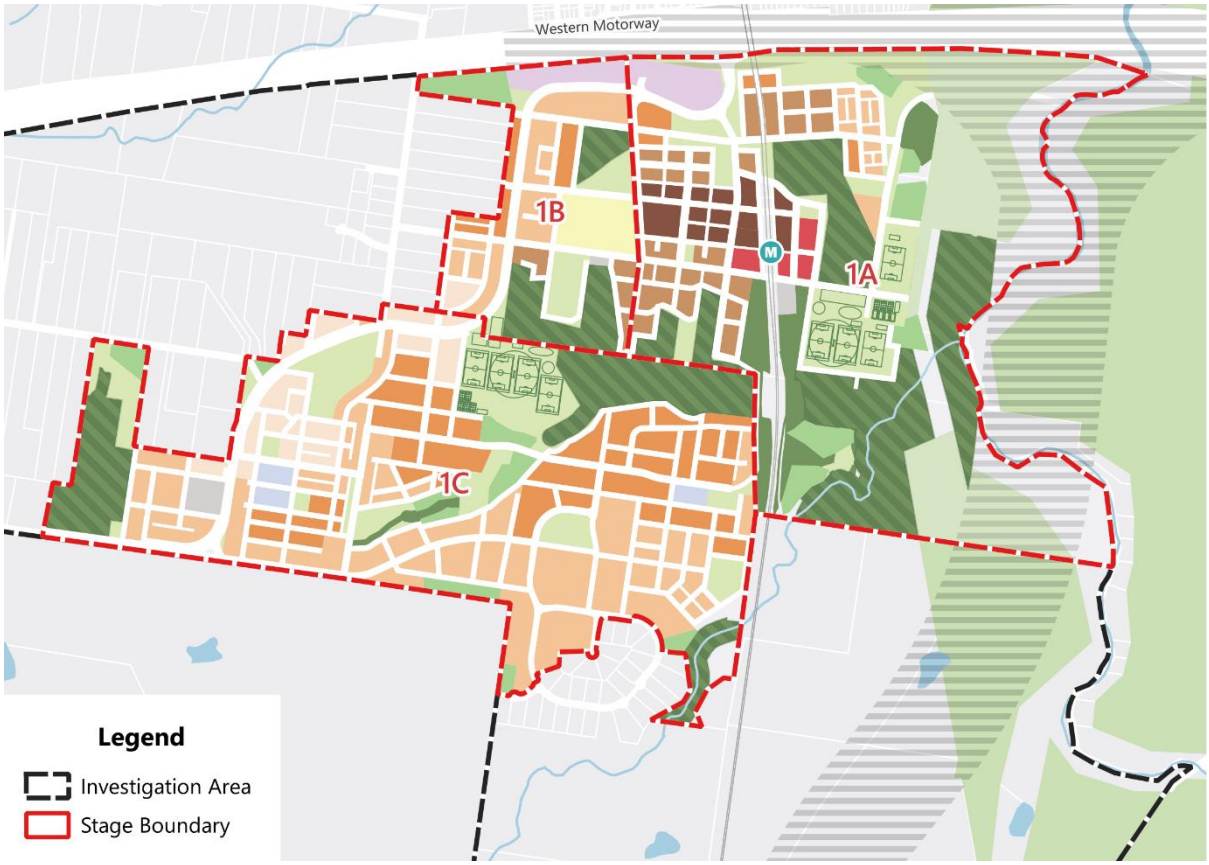
2.1 Stage 1 Areas

Development within Orchard Hills Stage 1 has been separated into three areas – A, B and C. These area boundaries are shown in Figure 4 and a summary of the residential development within each area is provided below. A more detailed discussion of these areas is included in Section 8.

Table 2 - Residential Breakdown by Neighbourhood

Stage	Detached	Semi Detached & Terraces	Apartments	Total
A	-	539	3,846	**4,385**
B	7	694	790	**1,491**
C	86	3,971	1,673	**5,730**

Figure 4 - Orchard Hills Stage 1 Areas



3 Potable Water

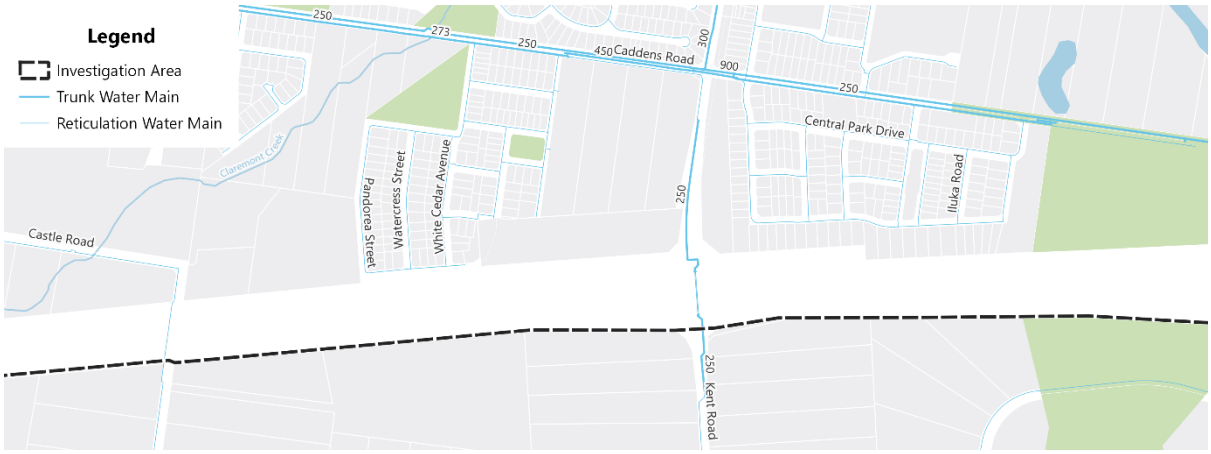
3.1 Existing Infrastructure

There is limited potable water supplied to Stage 1 and the broader Investigation Area by Sydney Water. Existing development within the Investigation Area receives potable water via the Orchard Hills Water Filtration Plant (WFP). The Orchard Hills WFP filters rainwater collected in Lake Burragorang, which is located adjacent to the Warragamba Dam. From Lake Burragorang, raw water is transferred to the Orchard Hills WFP via the Warragamba to Prospect Pipelines. 750mm and 900mm trunk raw water mains extend from the pipelines to the WFP. The Orchard Hills WFP can filter an average of 65 million and 120 million litres of water per day in the winter and summer periods respectively, and provides potable water to 200,000 people across St Marys, Emu Plains and the lower Blue Mountains.

There are two reservoirs located within the vicinity of the Investigation Area which are supplied via the Orchard Hills WFP (see Figure 6). The twin Bringelly Road reservoirs are located adjacent to the WFP opposite the southern boundary of the Investigation Area.

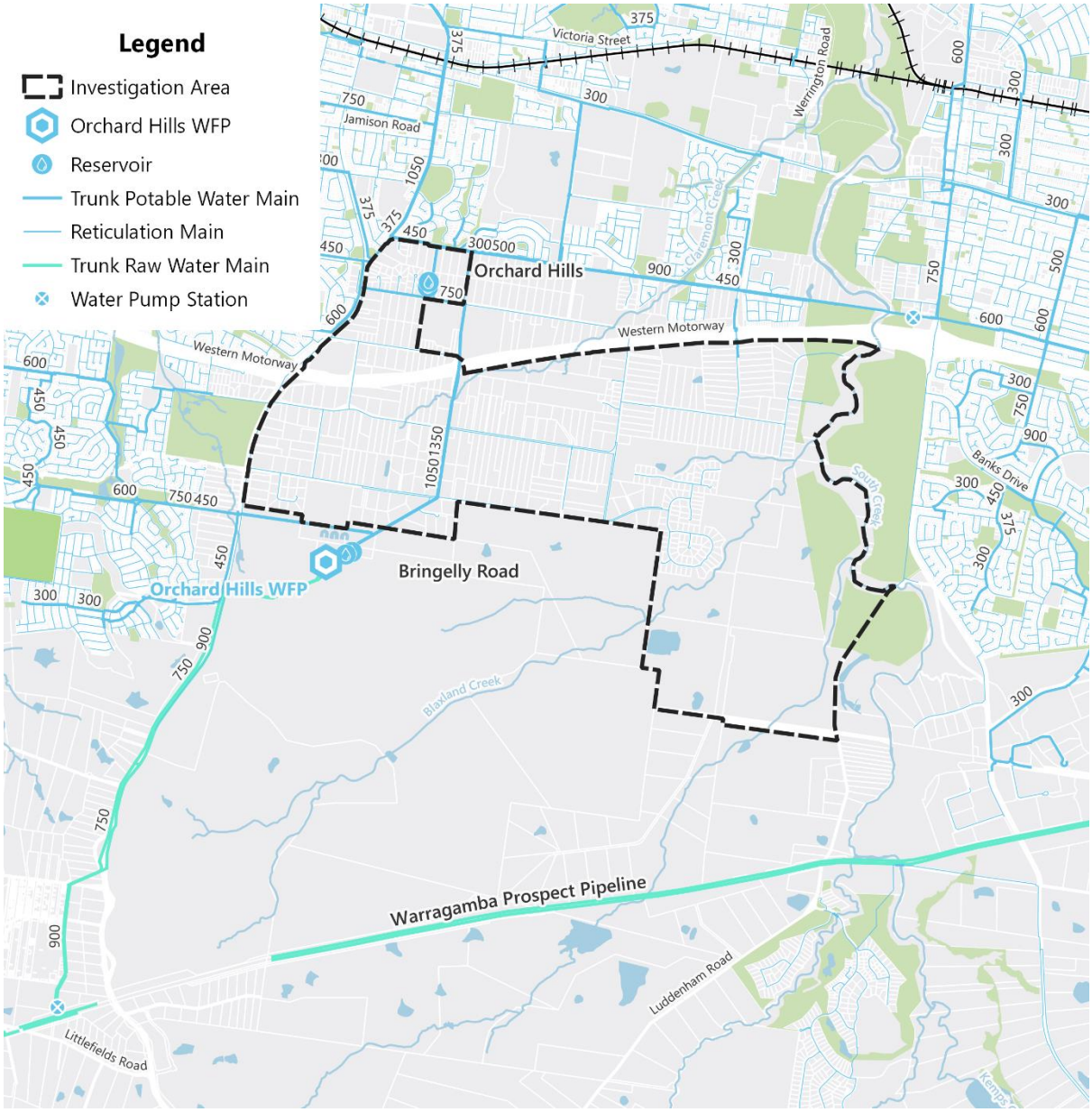
Of relevance to Stage 1 are twin 200mm diameter mains which form a crossing over the Western Motorway along the Kent Road overpass (see Figure 5). These mains could potentially be used to supply future development within Stage 1.

Figure 5 - Kent Road Water Crossing



Reticulation infrastructure extends along all roads within the Investigation Area, supplying the existing rural uses. The existing potable water infrastructure within the vicinity of the Investigation Area is shown in Figure 6.

Figure 6 - Existing Potable Water Infrastructure

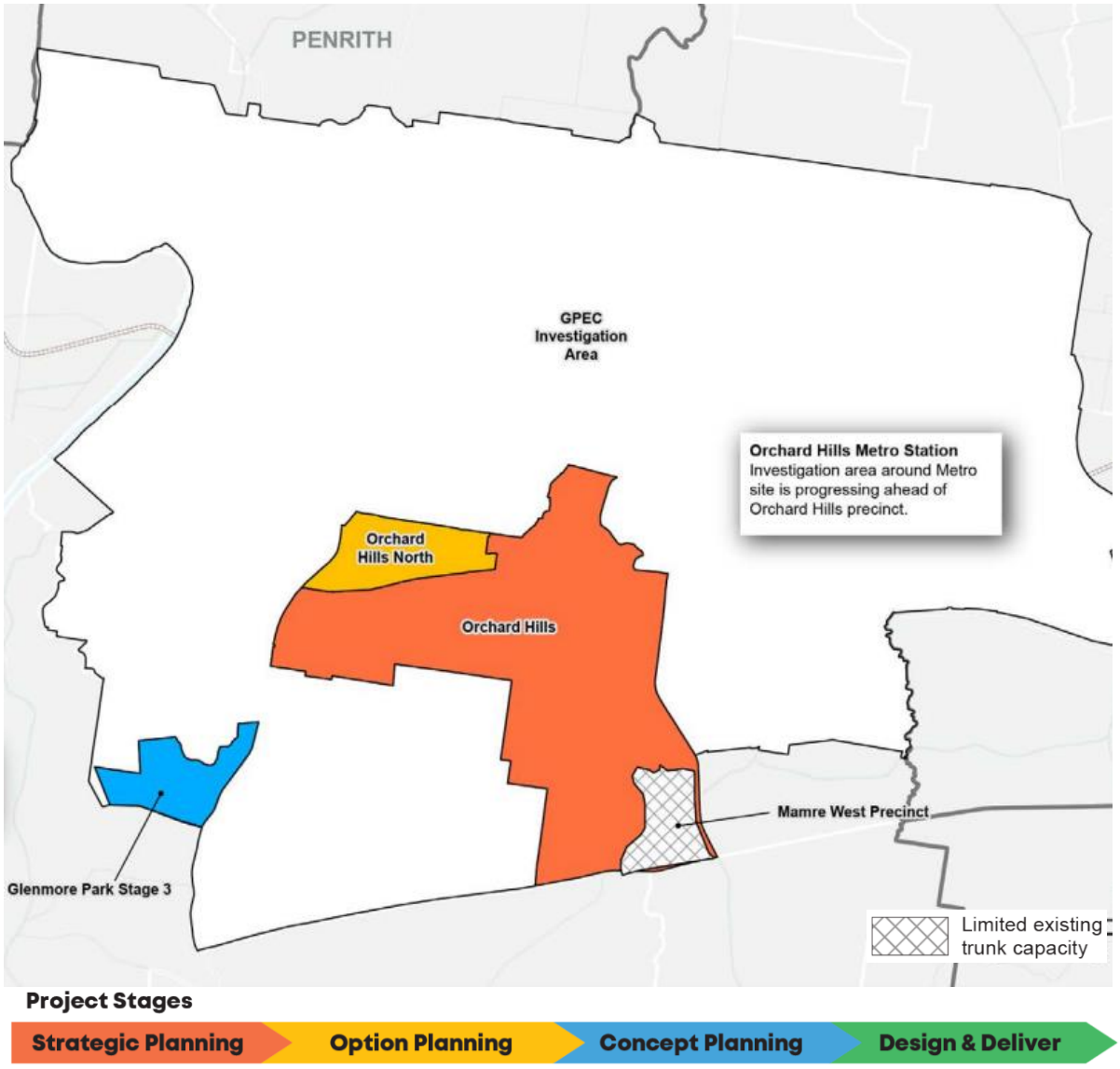


3.2 Sydney Water Growth Servicing Plan

Sydney Water's Growth Servicing Plan (GSP) outlines the servicing strategy to support planned growth in Greater Sydney from 2024 to 2029. Sydney Water is currently undertaking strategic planning for the Orchard Hills precinct. The GSP notes that planning for the area around the metro site is progressing ahead of the wider Orchard Hills Precinct. Sydney Water are currently undertaking an Options Planning Study for the Investigation Area, which is further discussed in Section 4.5**Error! Reference source not found.**.

Sydney Water has indicated that potable water infrastructure for Orchard Hills North is in the option planning phase, and in the concept planning phase for Glenmore Park Stage 3, with services to be delivered under a commercial agreement.

Figure 7 - Sydney Water GSP Potable Water Map - GPEC



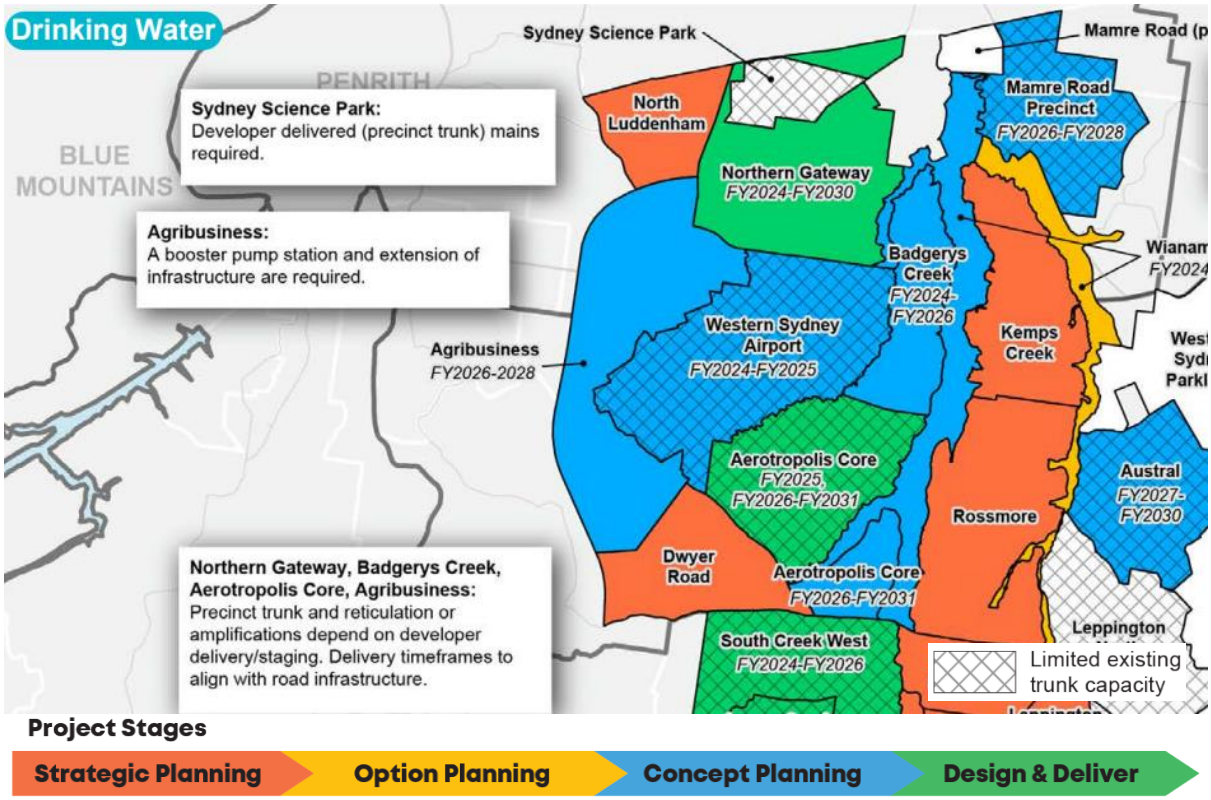
Source: Sydney Water Growth Servicing Plan 2024-2029 (30/9/23)

Within the Aerotropolis, Sydney Water is undertaking concept planning for the initial precincts including Badgerys Creek, Mamre Road and Agribusiness. Trunk infrastructure to support these precincts will be delivered from FY2024-FY2026 and FY2026-FY2028 respectively. Timeframes will be dependent on developer staging, however infrastructure delivery is expected to align with construction of roads within the precincts.

Trunk infrastructure to support the Sydney Science Park is being delivered by developers, while infrastructure for the wider Northern Gateway precinct is in the design and delivery phase, with services expected between FY2024-FY2030.

Trunk water supply to these areas will initially originate from existing reservoirs at Cecil Park, however it is understood that Sydney Water will deliver new reservoirs at Luddenham to support growth in the Aerotropolis. These reservoirs are currently planned for delivery in 2030, although Sydney Water may adjust the delivery timing to suit the pace of development.

Figure 8 - Sydney Water GSP Potable Water Map - Aerotropolis



Source: Sydney Water Growth Servicing Plan 2024-2029 (30/9/23)

Sydney Water has planned for two future upgrades to the Orchard Hills WFP. The first upgrade, anticipated to be commissioned in 2024, will increase the plant capacity to 290ML/day by upgrading the filter capacity, clear water pumping and rising mains. The second upgrade will be commissioned in 2031 and includes an upgrade to the raw water pumping and screening system. An additional 900mm diameter raw water supply pipeline will also be constructed, the location of this pipeline is unknown at this stage. These upgrades will increase the plant production capacity to 300ML/day, to supply the expected increase in population.

Pending the outcomes of the planning for the Orchard Hills Investigation Area, Sydney Water may need to provide additional upgrades, or bring forward scheduled upgrade works to the Orchard Hills WFP to meet the growing demand in the service area.

Any upgrades to support Orchard Hills will be subject to the provision of ultimate and annual staged demand data to Sydney Water, and agreement on acceleration and funding routes.

3.3 Proposed Servicing Strategy

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 in Stage 1. 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.

Table 3 - Calculated Water Demand

Land Use	Max Demand Rate (kL/Unit/Day)	Unit	Max Day Demand (ML/day)	Peak Hour Demand (L/s)
Low Density Residential (<30 dw/ha)	1.4	Dwelling	0.54	13.7
Medium Density Residential (30-60 dw/ha)	60	Ha	2.62	60.6
High Density Residential (60-100 dw/ha)	80	Ha	3.03	70.1
High Density Residential (100-140 dw/ha)	100	Ha	1.40	32.4
High Density Residential (>140 dw/ha)	0.8	Dwelling	1.92	44.5
Suburban Retail & Commercial	41	Ha	0.40	9.3
School*	0.04	Student	0.04	0.9
Light Industrial	66	Ha	0.43	8.0
Total			**10.4**	**239.5**

* Assumed 1,000 students

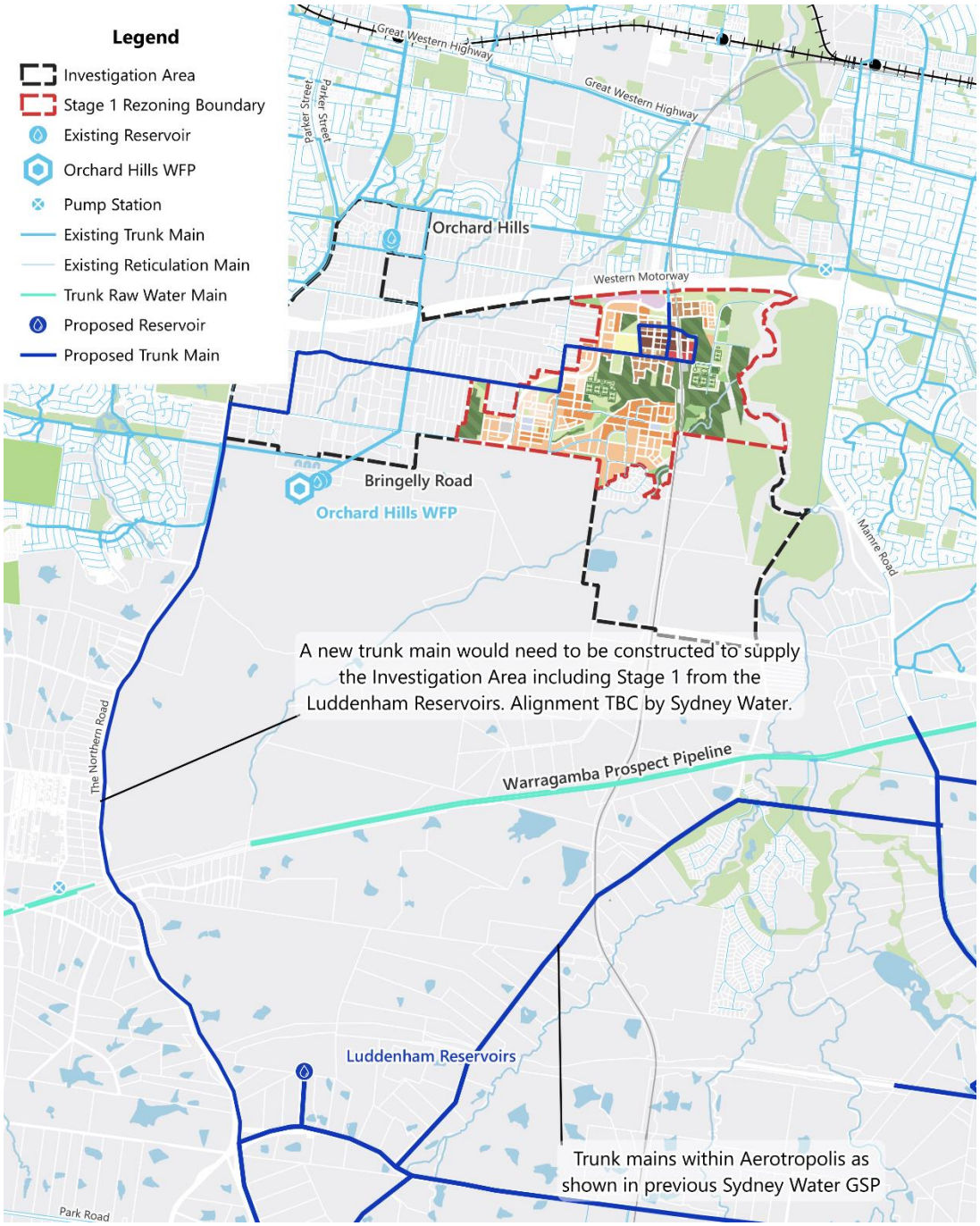
Sydney Water is planning to deliver a new reservoir at Luddenham, located within the Agribusiness Precinct in the Aerotropolis. This site is 6 hectares in size and will accommodate two 30ML potable water reservoirs, two 10ML recycled water reservoirs and two stormwater tanks as part of Sydney Water's integrated regional water management services. The potable water reservoirs are expected to be delivered around 2030.

In addition, Sydney Water will also upgrade the existing Cecil Park reservoirs to provide additional capacity. There are currently two reservoirs on the site, one 30ML and one 9.5ML. Sydney Water is considering options including a new 30ML reservoir or up grade of the 9.5ML reservoir to 40ML, these works are also expected to be delivered around 2030. The Cecil Park

reservoirs are located on the southern side of Elizabeth Drive, 12km south east of the site within Southern Parkland owned and operated by Greater Sydney Parklands (GSP). GSP developed a master plan with Sydney Water to help guide the best outcome for the new reservoir.

Sydney Water has indicated that the servicing of this precinct will be determined during detailed planning, however given the size and scale of the proposed development, a new potable water reservoir may potentially be required to service the Investigation Area in its entirety, and a site should be reserved for this purpose.

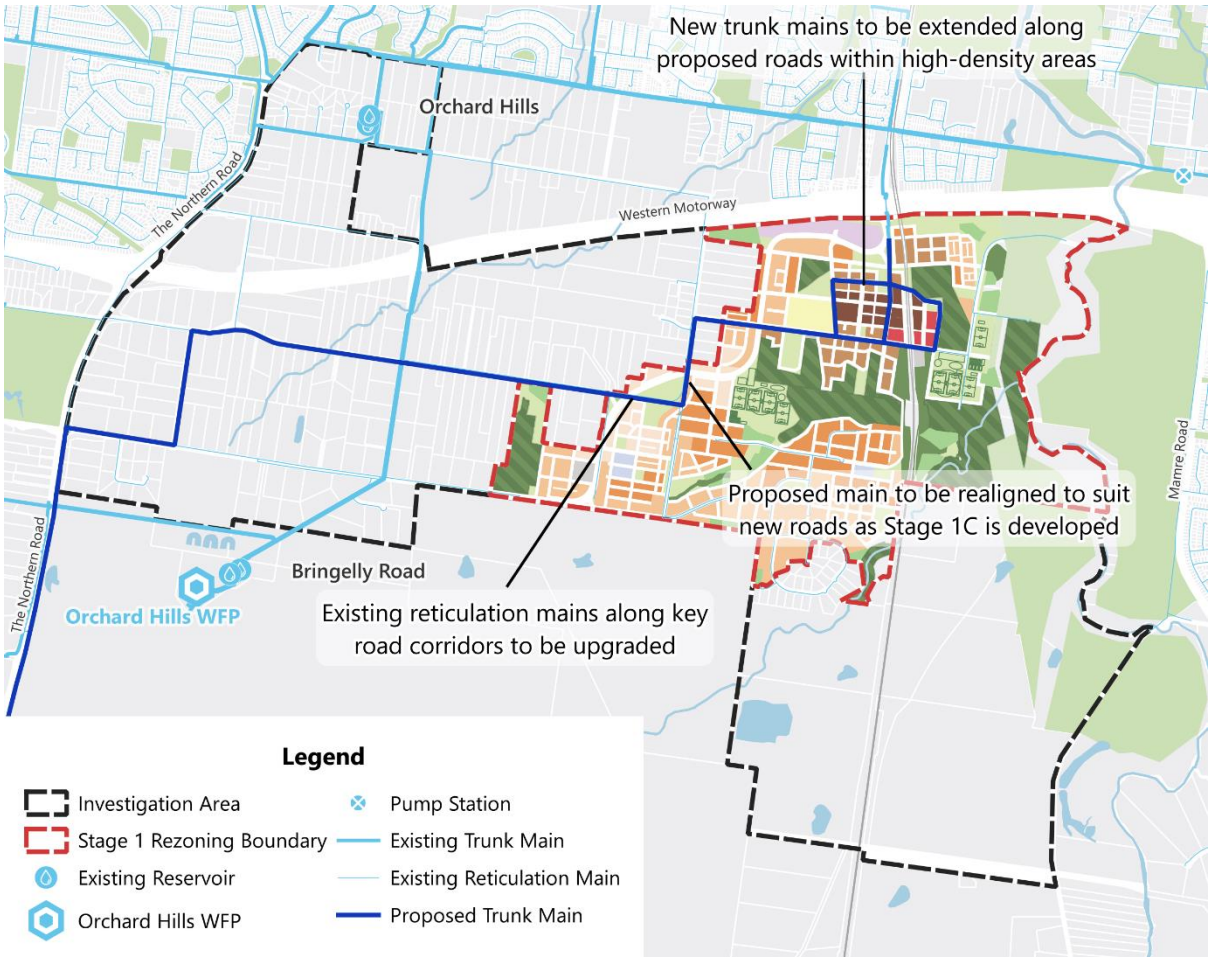
Figure 9 - Proposed Regional Trunk Water Infrastructure



A reservoir would likely require a site between 1-2 hectares in size and would need to be located on a relatively high point in the Investigation Area, however specific location and site requirements would be confirmed with Sydney Water during a future stage of the project. Additional trunk water mains are likely to be required to support the proposed development. Existing trunk mains are located along Kingswood Road, The Northern Road and Kent Road (to the north of the Investigation Area). New trunk mains to connect the Kingswood Road mains to the Kent Road mains may be required as part of the development of Stage 1. A high-level, indicative servicing strategy for Stage 1 is shown in Figure 10.

Future development will need to consider the condition of existing watermains. Sydney Water may advise when upgrades or replacements to existing mains are required. The alignment of new trunk infrastructure will be determined in consultation with the Western Sydney Utilities Collaboration Technical Group, council and TfNSW. The proposed road network and hierarchy will be able to accommodate the provision of new trunk mains, which should preferably be delivered during the construction of new or upgraded roads.

Figure 10 - Proposed Trunk Water Infrastructure



4 Sewer

4.1 Existing Infrastructure

The majority of the Investigation Area, including Stage 1, is not currently serviced by the Sydney Water sewer network. A small number of lots in the north west corner, adjacent to the Orchard Hills Reservoirs, are connected to reticulation sewer. This reticulation sewer drains to the St Marys Water Resource Recovery Facility (WRRF), located approximately 5km to the north.

The St Marys WRRF provides sewer servicing for a population of 160,000 across Cambridge Park, Werrington Downs, Blackett, Mt Druitt, Minchinbury and St Clair. The WRRF treats wastewater to a tertiary standard. Recycled water is used onsite, for golf course irrigation and environmental flows to creeks.

Sydney Water is currently upgrading the St Marys WRRF to introduce new technology to meet growing demand. By 2040, Sydney Water estimates the number of customers in the area to double. The proposed upgrades include new technology to improve biosolids treatment and enable the use of biogas as a renewable energy source. The cogeneration facility will reduce the WRRF's reliance on fossil fuels.

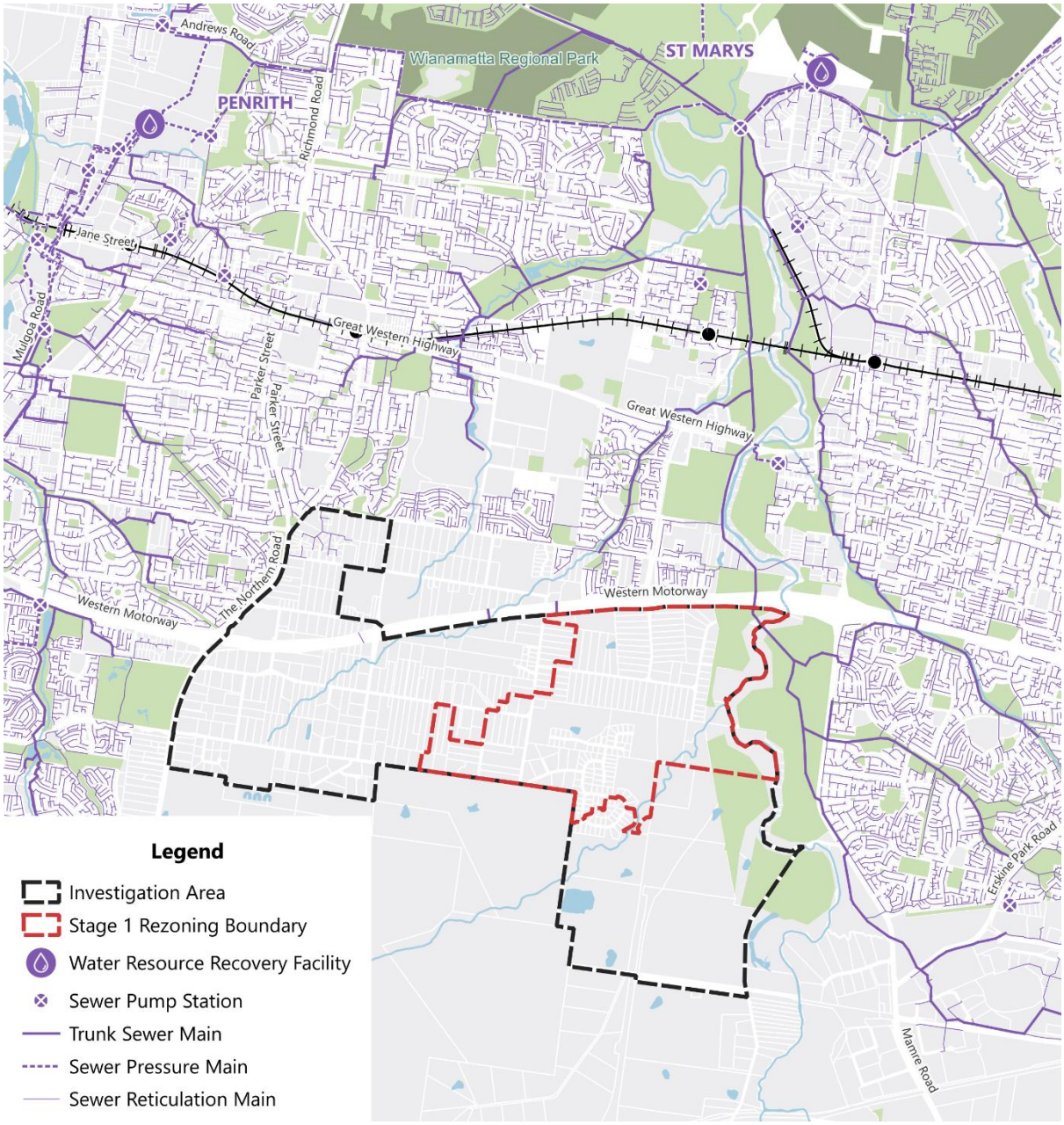
The balance of the Investigation Area is not located within Sydney Water's current sewer network coverage area. Existing rural properties utilise on-site septic tanks for sewage collection and disposal.

There are two sewer crossings beneath the Western Motorway located within Stage 1, and an additional crossing to the west of Stage 1 which supports the central drainage catchment. The easternmost crossing is a 1500mm diameter trunk main which forms part of the South Creek Submain. The South Creek Submain transfers flows from Erskine Park and St Clair to the St Marys WRRF. The two other crossings are 400mm and 750mm in diameter. These crossings do not connect to any existing reticulation infrastructure, however they will provide connection points for future development to discharge flows to existing sewer infrastructure to the north. The sewer crossings are shown in Figure 11.

Figure 11 - Sewer Crossings Beneath Western Motorway

The existing sewer infrastructure within the vicinity of the Investigation Area is shown in Figure 12.

Figure 12 - Existing Sewer Infrastructure



4.2 Drainage Catchments

The Investigation Area spans four main drainage catchments. Three of these catchments drain towards Wianamatta-South Creek:

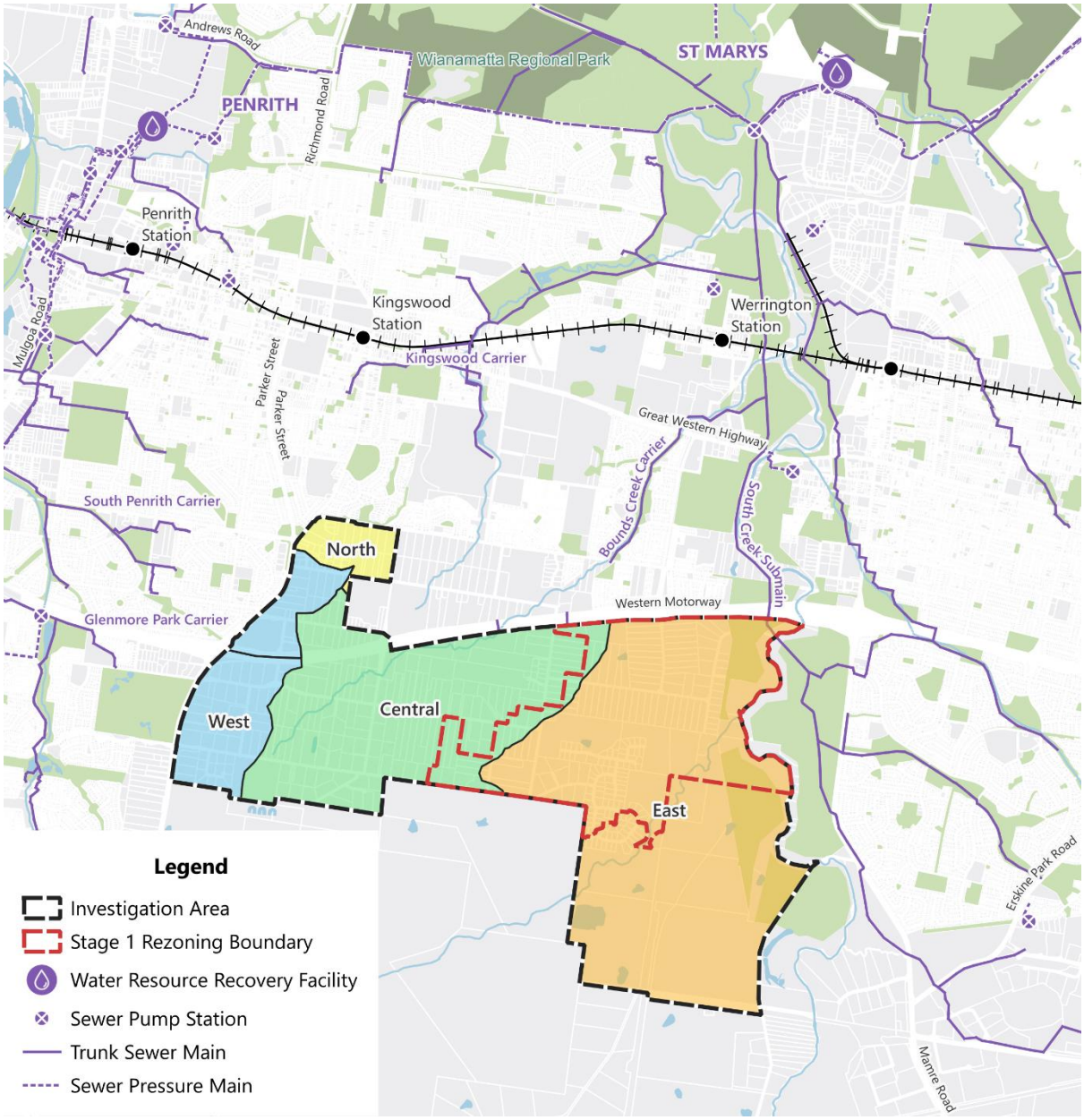
- The northern catchment, which naturally drains towards Werrington Creek. This includes the area connected to reticulation sewer, which drains northwards to the Kingswood Carrier;
- The central catchment, which naturally drains northwards to Claremont Creek. There are two crossings beneath the Western Motorway which could be utilised to drain this catchment to the Bounds Creek Carrier; and
- The eastern catchment, which drains directly to Wianamatta-South Creek. Stage 1 is largely located within the eastern catchment.

Two smaller sub-catchments in the western portion of the Investigation Area naturally drain westwards towards Surveyors Creek:

- Areas to the north of the Western Motorway which naturally drain towards a tributary of Surveyors Creek; and
- Areas to the south of the Western Motorway which naturally drain towards the Penrith Golf Club.

The potential servicing strategies discussed in Section 4.4 focus on development within Stage 1. The natural drainage catchments are shown in Figure 13 below.

Figure 13 - Drainage Catchments

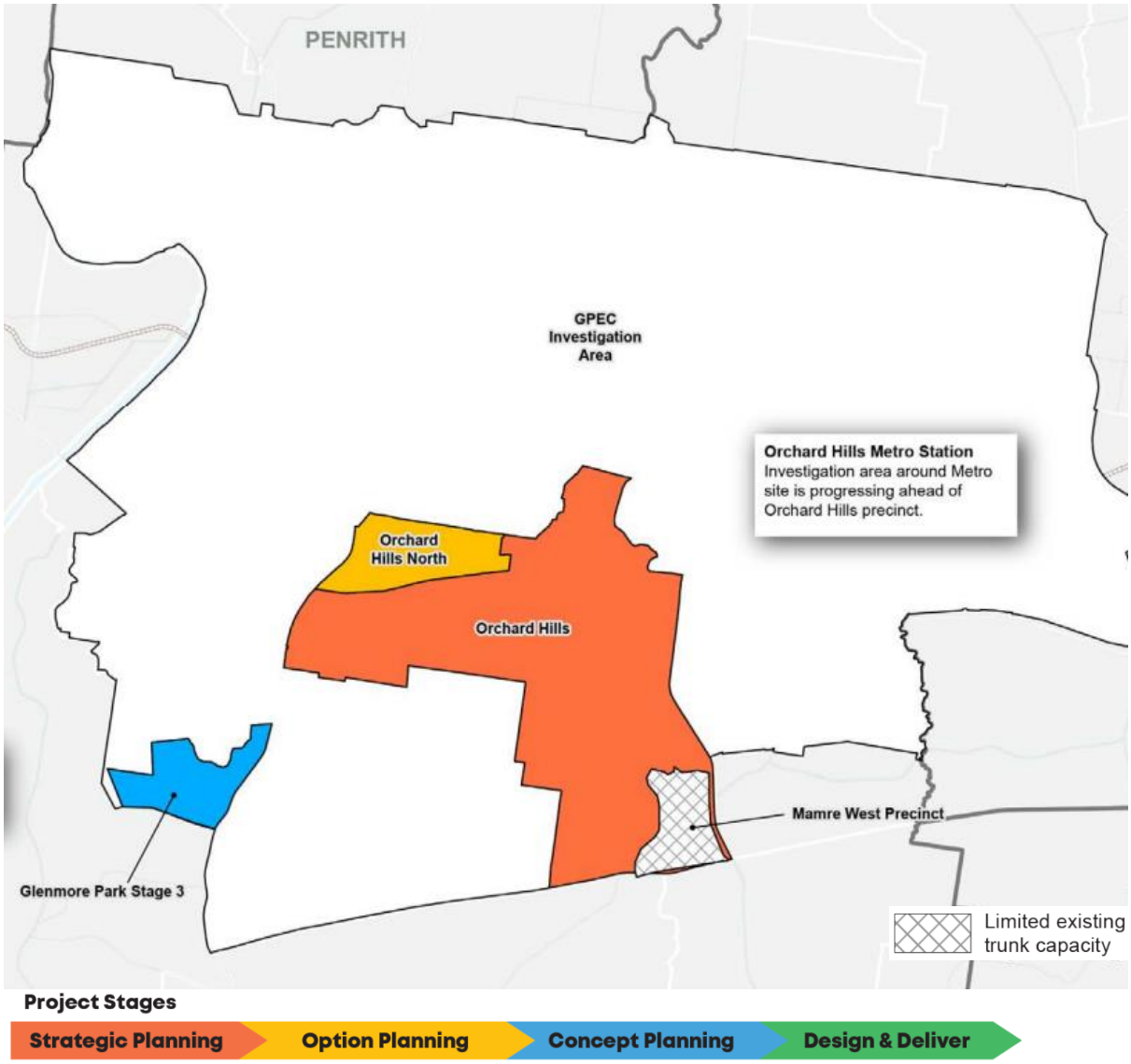


4.3 Sydney Water Growth Servicing Plan

Sydney Water is currently undertaking strategic planning for the Orchard Hills precinct. The GSP notes that planning for the area around the metro site is progressing ahead of the wider Orchard Hills Precinct. Sydney Water is currently undertaking an Options Planning Study for the Investigation Area, which is further discussed in Section 4.5.

Sydney Water has indicated that sewer infrastructure for Orchard Hills North is in the options planning phase, and in the concept planning phase for Glenmore Park Stage 3, with services to be delivered under a commercial agreement.

Figure 14 - Sydney Water GSP Sewer Map - GPEC



Source: Sydney Water Growth Servicing Plan 2024-2029 (30/9/23)

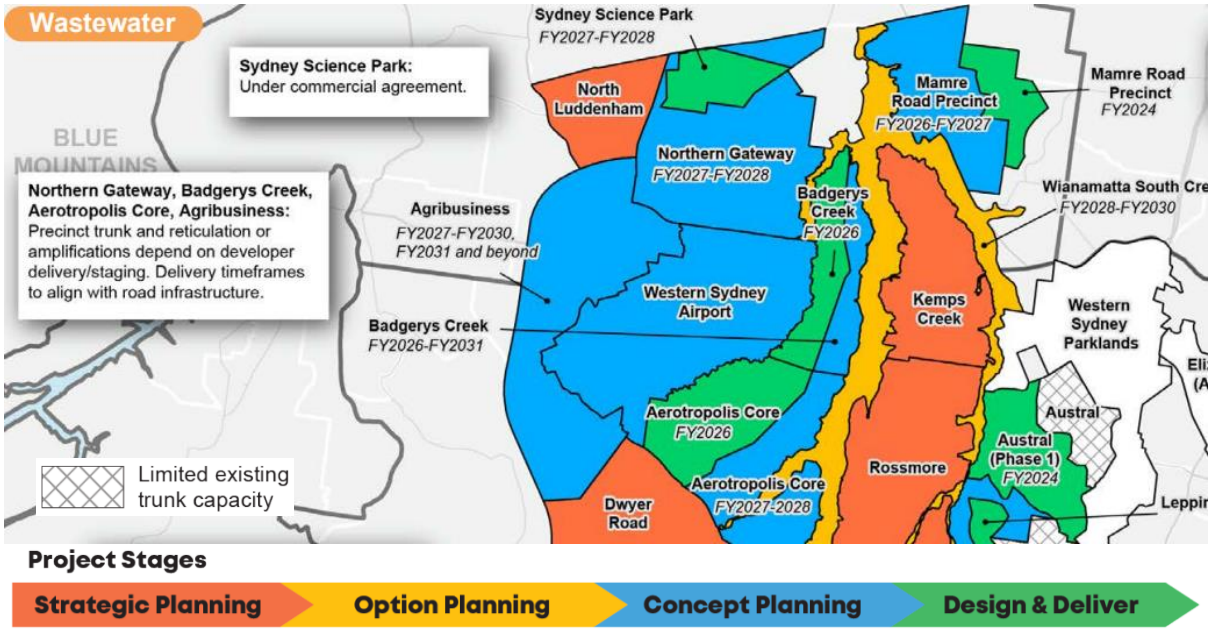
To the south of the Investigation Area, sewer infrastructure to support the initial precincts within the Aerotropolis is at various stages of planning and delivery. All development within the Aerotropolis will be serviced via the Upper South Creek Advanced Water Recycling Centre

(AWRC), which is located near the confluence of Badgerys Creek, Kemps Creek and Wianamatta-South Creek. The Upper South Creek AWRC is currently being delivered, and is expected to be operational by 2026, in line with the opening of the Western Sydney Airport.

Within the Northern Gateway precinct, the servicing strategy is in the concept planning phase and infrastructure is currently planned for delivery in FY2027-FY2028, with the exception of the Sydney Science Park. The Science Park is in the design and delivery phase and infrastructure will be delivered under commercial agreement. Given the AWRC is not expected to be operational until 2025 at the earliest, an interim operating procedure is likely to be required to provide servicing to development until the commissioning of the AWRC. The details of any potential interim servicing arrangement are unknown at this stage.

Within the Mamre Road precinct, infrastructure to support lots located west of Aldington Road is in the concept planning phase while areas to the east are in the design and delivery phase. Infrastructure for these areas will be delivered in FY2026-FY2027 and FY2024 respectively.

Figure 15 - Sydney Water GSP Sewer Map - Aerotropolis



Source: Sydney Water Growth Servicing Plan 2024-2029 (30/9/23)

4.4 Proposed Servicing Strategy

As discussed in Section 4.1, there is minimal existing sewer infrastructure within the Investigation Area. A new network of sewer mains and potentially pump stations due to undulating topography will therefore be required to provide sewer servicing to future development, and to connect this infrastructure to the existing sewer network.

Sydney Water's GSP indicates that nearby development between the Investigation Area and the Western Railway Line will deliver new infrastructure to support growth. The extent and size of these works are unknown at this stage, however it is expected that these works may bring sewer infrastructure closer to the Investigation Area and therefore reduce the length of lead-ins required to connect the Investigation Area to the sewer network. Further detail on this servicing infrastructure will be sought from Sydney Water to inform future stages of this study.

It is understood that Sydney Water is currently undertaking an Options Planning Study for Orchard Hills, which is expected to be completed in 2024. It is expected that once this planning work is completed, Sydney Water will be able to provide more detailed advice regarding the servicing requirements for the proposed development. Sydney Water has provided some high-level initial advice which is discussed in Section 4.5.

In lieu of detailed advice, three potential servicing options for Stage 1 have been explored. These options are summarised in the following sections.

4.4.1 Option 1 – Service via Existing Drainage Catchments

The first option explored involves constructing new sewer infrastructure within each drainage catchment which connects the development to the existing sewer network supplying downstream developments. A summary of the infrastructure requirements for each drainage catchment is provided below. Note that these may be limited by capacity constraints and will be considered in Sydney Water's Options Planning Study.

Eastern Catchment

New mains would be constructed along low points in the eastern catchment, generally following the alignment of Blaxland Creek and South Creek and connect to the South Creek Submain near the north east corner of the Investigation Area. The South Creek Submain is a 1050mm diameter trunk main which drains beneath the M4 Motorway, along the South Creek alignment and discharges to the St Marys WRP.

Central Catchment

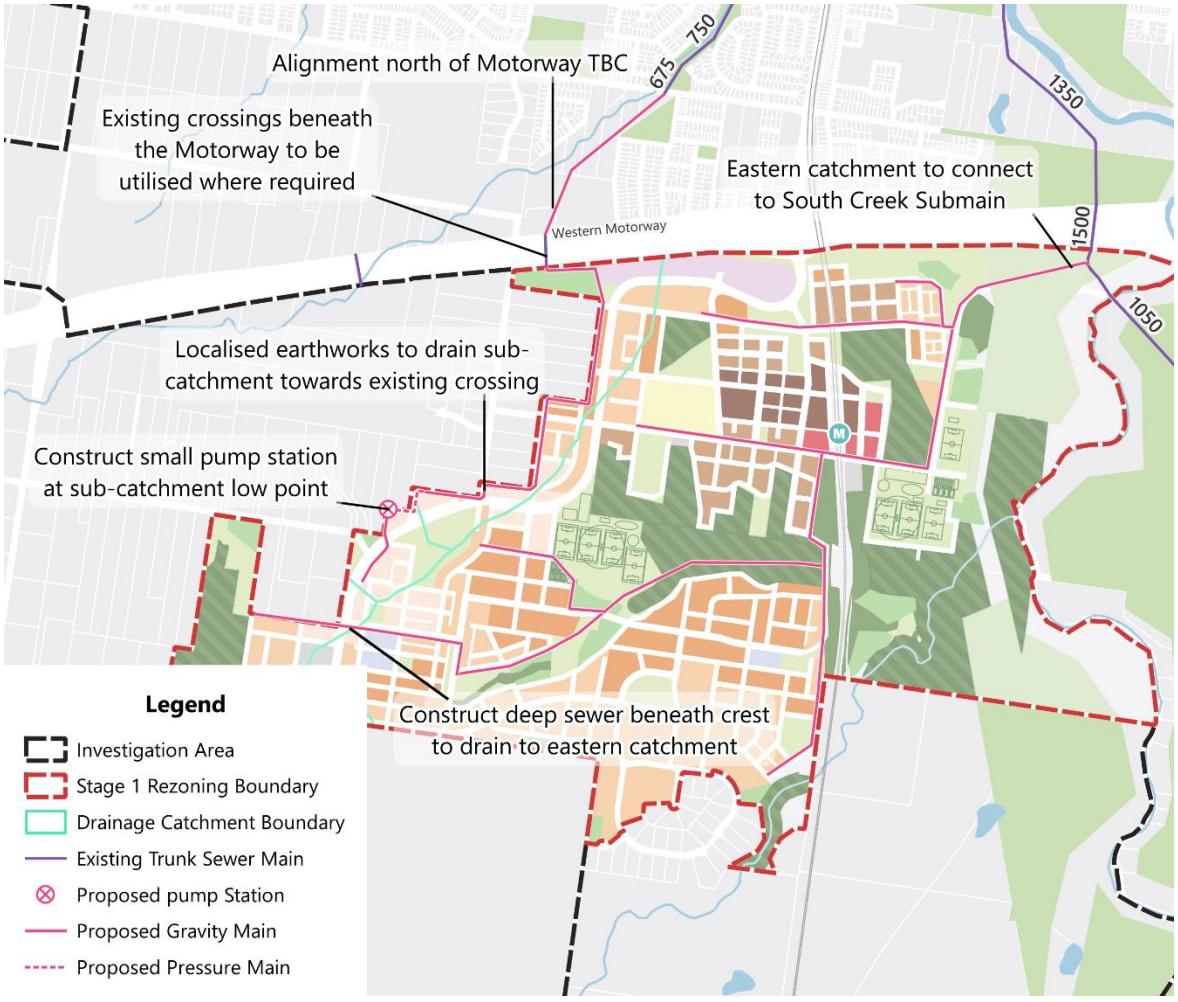
A small portion of development within Stage 1 falls within the central catchment. The parts of Stage 1 within the central catchment fall into three smaller sub-catchments. Two of these sub-catchments naturally drain to the 400mm diameter motorway crossing, while one drains to the 750mm crossing.

There are several servicing options available for these sub-catchments, including:

- Constructing gravity mains to the low point within each sub-catchment, and utilizing an Interim Operating Procedure (IOP) to tanker flows from these low points to discharge elsewhere in the existing sewer network. This option would be subject to detailed investigations by Sydney Water, and would operate until downstream gravity infrastructure supporting the balance of the Investigation Area is available for connection.
- Construct a pump station at the sub-catchment low point and pump flows to a neighbouring sub-catchment or to the eastern catchment
- Undertake localised earthworks to drain sub-catchment to a neighbouring sub-catchment or the eastern catchment
- Construct a deep gravity main beneath the crest and connect to infrastructure within the eastern catchment

The above options will be further explored in future stages of the project. For the purpose of this report, it has been assumed that the southern sub-catchment will connect to infrastructure within the eastern catchment via a deep sewer main, the central sub-catchment will utilise a pump station to transfer flows northwards, and the northern sub-catchment will drain via gravity to the existing Motorway crossing. Key proposed sewer mains for each catchment and sub-catchment are shown in Figure 16.

Figure 16 - Proposed Sewer Infrastructure – Option 1



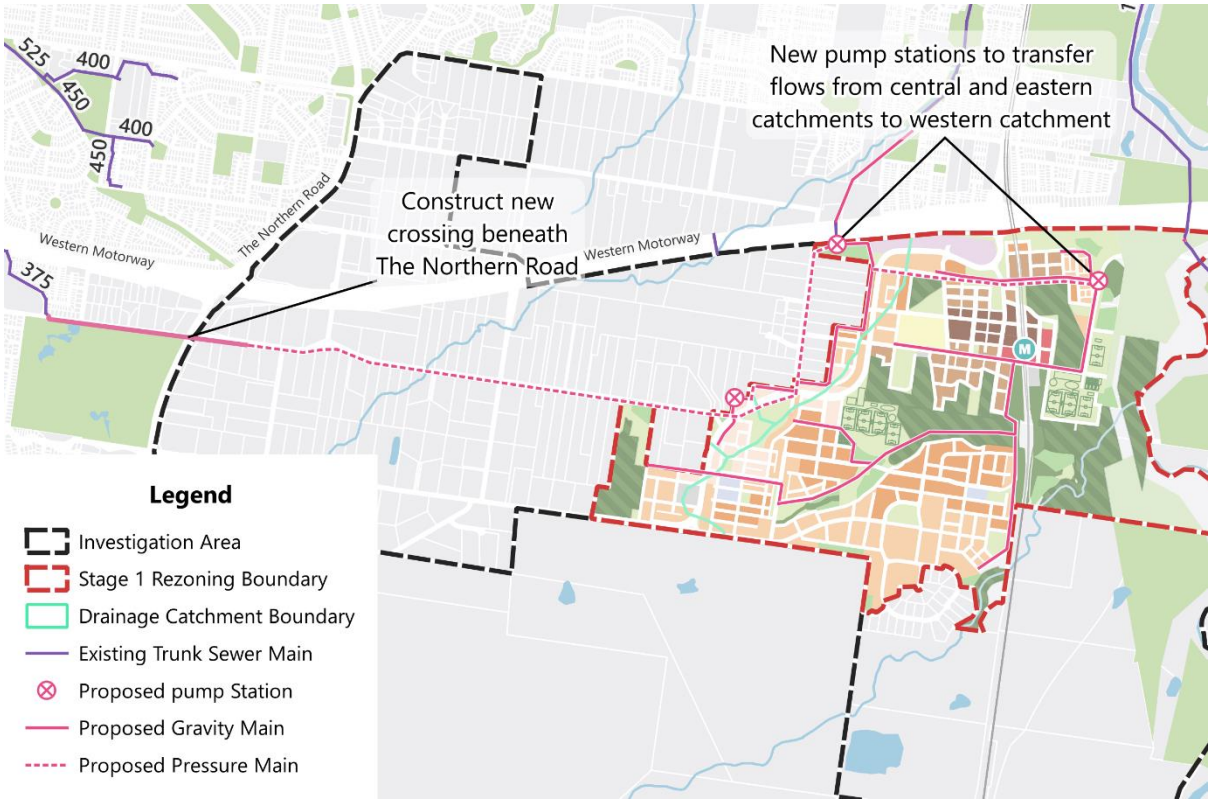
4.4.2 Option 2 – Pump to Penrith WRRF

Sydney Water's initial planning for GPEC assumed that the Orchard Hills Precinct would be serviced via the Penrith WRRF. Sydney Water has advised that there may be some initial capacity at Penrith WRRF to service the site, however this would need to be evaluated as part of an options assessment. After initial capacity is exhausted, upgrades to the WRRF would be required. Any potential upgrades will be assessed by Sydney Water as part of their assessment of the site.

In addition, this option would potentially require upgrades to existing downstream infrastructure, which has not been sized to support the proposed development of Orchard Hills.

To service Stage 1 via the Penrith WRRF, flows from the central and eastern catchments would need to be transferred to the western catchment via a series of pump stations. An indicative arrangement is shown in Figure 17.

Figure 17 – Proposed Sewer Infrastructure - Option 2



4.4.3 Option 3 – Initial Servicing via Upper South Creek AWRC

Sydney Water has advised that the St Marys WRRF does not currently have capacity to service all of the proposed development in Stage 1. As discussed in Section 4.1, St Marys WRRF is being upgraded to introduce new technology to meet growing demand. It is expected that further upgrades would be required to the St Marys WRRF to service the proposed development at Orchard Hills.

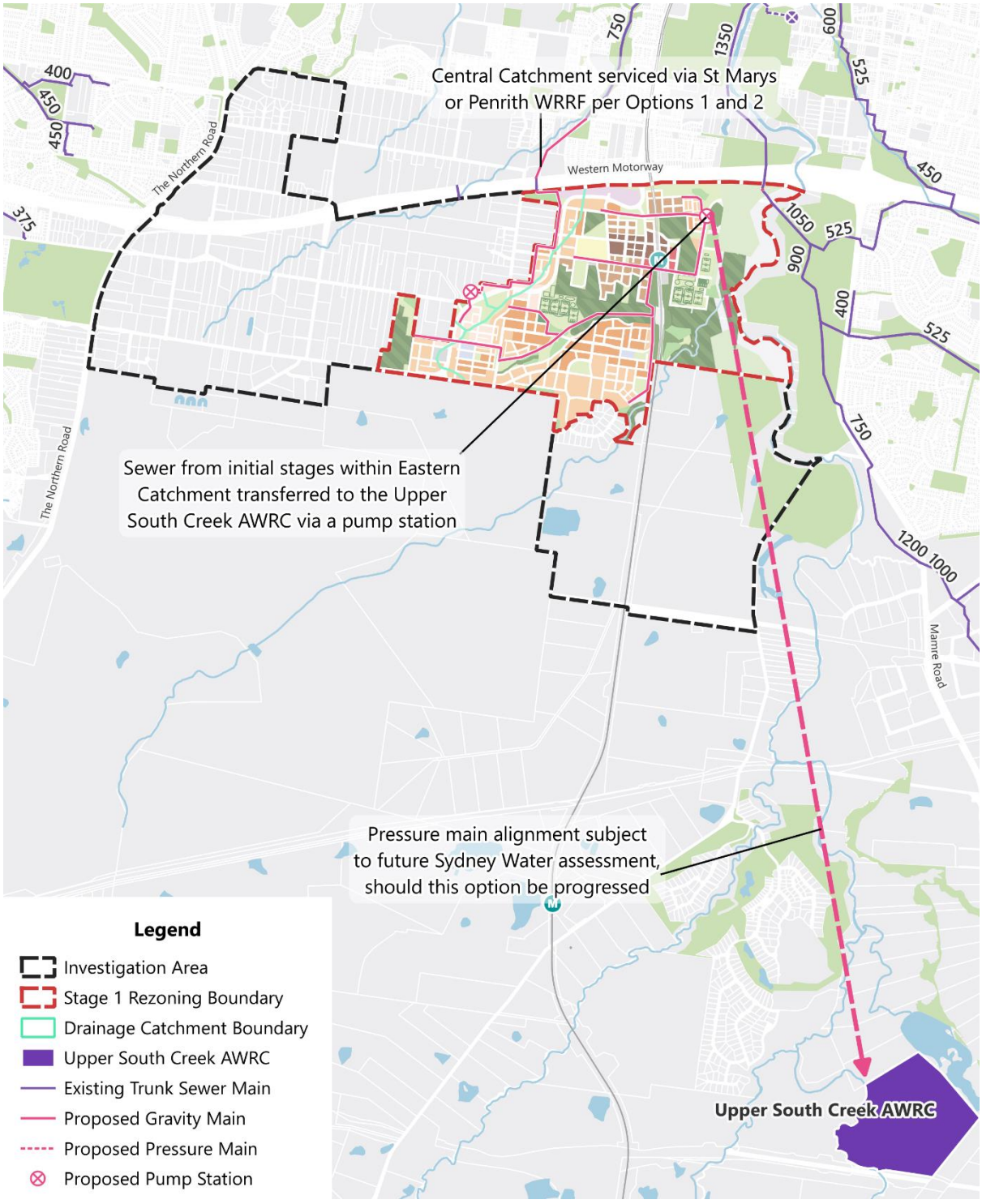
During preliminary discussions, Sydney Water advised that there may be opportunities to service initial stages of development within the eastern catchment via the Upper South Creek AWRC. This would reduce pressure on St Marys WRRF and delay any potential upgrades that may be required to allow development within the Investigation Area to be serviced at this facility.

The AWRC is expected to be operational by 2026. Transferring flows from Orchard Hills to the AWRC would assist in the supply of adequate baseflows, which are required to ensure the ongoing viability of the centre.

To transfer flows from the eastern catchment to the Upper South Creek AWRC, development sites would drain via gravity mains to the catchment low point, located in the north-eastern corner, near Samuel Marsden Road. Flows would then be transferred to the AWRC via a sewer pump station and rising main. This arrangement is shown in Figure 18.

The portion of the eastern catchment that could be serviced under this arrangement will be confirmed with Sydney Water. Servicing for the balance of Stage 1 could be achieved via the arrangements outlined in Options 1 and 2.

Figure 18 - Proposed Sewer Infrastructure - Option 3



4.5 Sydney Water Orchard Hills Options Planning Study

Sydney Water is currently undertaking an Options Planning Study for Orchard Hills, which is expected to be completed in 2025. It is anticipated that the Options Planning Study will provide servicing advice for the whole of the Orchard Hills Investigation Area. Ahead of the completion of this study, Sydney Water has provided the following high-level advice for the servicing of Stage 1.

Sydney Water is supporting the delivery of the Orchard Hills Metro Station, located within Stage 1, Area A. Sydney Water has advised that there is capacity within the potable water and wastewater networks to service up to 3,786 dwellings in Stage 1. Given the location of existing servicing and the upgrades required to the network, it is likely that the majority of the available capacity will ultimately service Stage 1 Area A. Sydney Water will provide further advice regarding the capability of the available capacity to extend into Areas B and C.

The servicing requirements for the remaining neighbourhoods will be confirmed through the Options Planning Study for Orchard Hills.

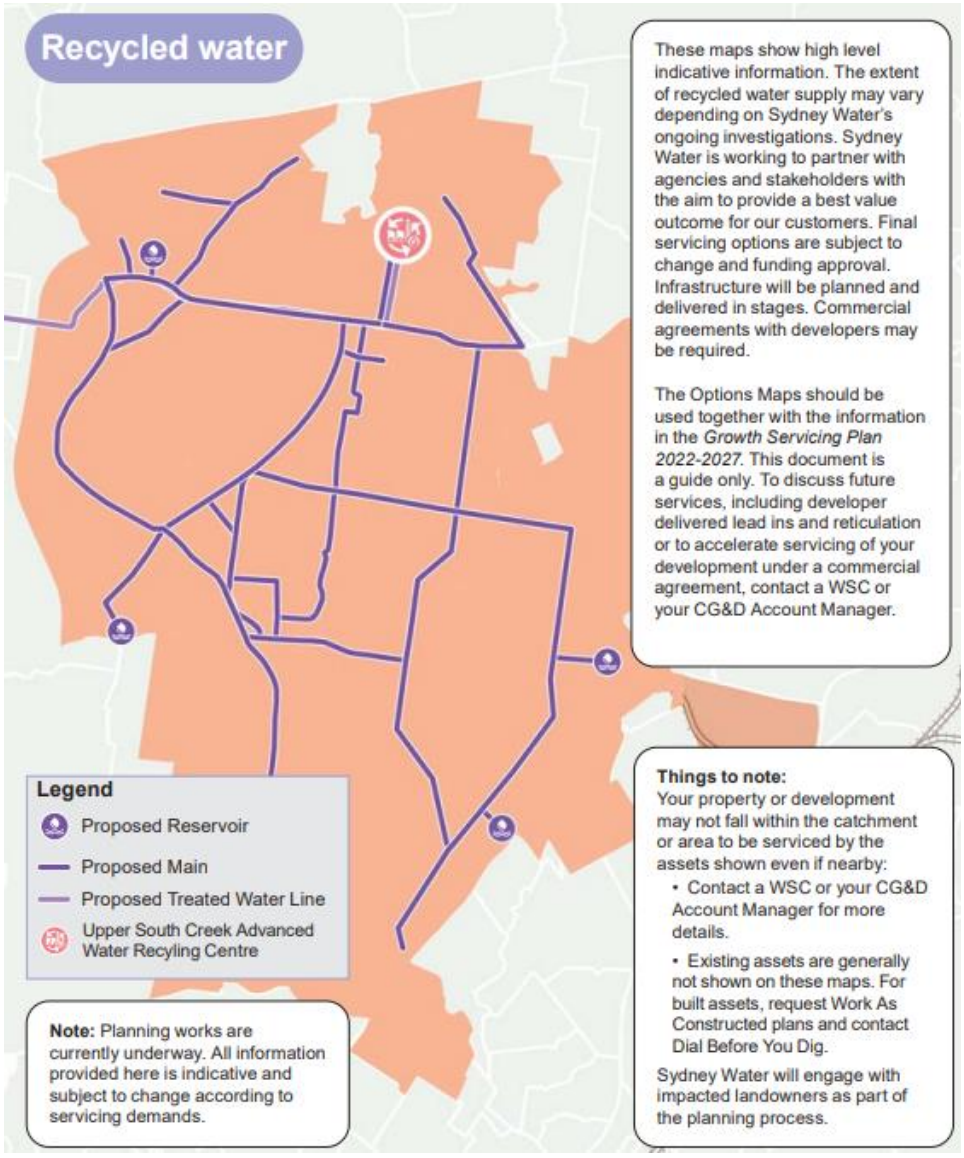
5 Recycled Water

Recycled water infrastructure is not currently available within the Investigation Area or surrounding suburbs.

Sydney Water will deliver the Upper South Creek AWRC to support development within the Aerotropolis. The AWRC will be located near the confluence of Badgerys Creek, Kemps Creek and South Creek and is expected to be operational in line with the opening of the Western Sydney Airport in 2026.

The AWRC will treat sewer from development within the Aerotropolis and South West Growth Area. Treated water will be further cleaned and disinfected to provide recycled water suitable for industrial and agricultural uses, irrigating playing fields and for non-drinking household use. Sydney Water's planned recycled water network for the Aerotropolis is shown in Figure 19.

Figure 19 - Sydney Water Proposed Recycled Water Network



Source: Sydney Water Growth Servicing Plan 2022-2027 (29/6/22)

5.1 Proposed Servicing Strategy

Sydney Water is reviewing the provision of recycled water as part of the recently commenced Orchard Hills Subregional Plan. It is anticipated that this study will take 18 months to complete. Sydney Water note they are unable to provide recycled water servicing advice prior to the completion of the study.

It is also noted that at the time of writing, Sydney Water has not committed to taking on the role of the stormwater management authority for Orchard Hills. Should this responsibility rest with Penrith Council, recycled water would need to be provided for in line with Council's policy. Council has indicated a preference for rainwater tanks over a reticulated recycled water system.

A separate integrated water cycle management strategy (Design Flow 2024) outlines an approach to recycled water for Orchard Hills that requires rainwater tanks to all dwellings. A reticulated system could be considered in future, as detailed information from Sydney Water becomes available.

If a reticulated recycled water system was implemented in future, there may be potential for a planned recycled water network originating from the Upper South Creek AWRC to be extended to supply development within the Investigation Area. If this was to occur, a trunk main would need to be constructed from the AWRC to a new recycled water reservoir, which would likely need to be located within the Investigation Area. From the reservoir, purple pipe reticulation infrastructure would be constructed within the shared trench allocation of all new and existing roads to supply development sites.

The required reservoir size would need to be confirmed by Sydney Water through a detailed assessment of the proposed demands generated by the development, and there is potential for this reservoir to be co-located with a future potable water reservoir.

In the absence of resolution regarding reticulated recycled water provision, consideration should be given to measures that would 'future-proof' Stage 1, for example requiring developments to provide purple pipe recycled water infrastructure at development stage.

6 Electricity

6.1 Existing Infrastructure

6.1.1 Endeavour Energy Infrastructure

The Investigation Area is located within the Endeavour Energy (EE) electrical supply zone. The closest zone substations (ZS) to the Investigation Area are the Claremont Meadows ZS and Kingswood ZS, located approximately 1km to the north and north west respectively. Both zone substations include three transformers and have firm capacities of 50MVA.

EE's Distribution Annual Planning Report (DAPR) includes utilisation data for all zone substations. The Claremont Meadows ZS is forecast to have 24.6MVA of spare capacity by 2026, while EE estimate the Kingswood ZS will have no spare capacity from 2024.

Within the Penrith CBD, the Penrith 11kV ZS is expected to exceed all available capacity by 2025 due to increased demand generated by development in the residential, industrial and commercial sectors. To relieve capacity constraints at the Kingswood and Penrith 11kV ZS, EE plan to deliver a new South Penrith ZS in 2026/27. The planned capacity of the South Penrith ZS is unknown at this stage.

6.1.2 TransGrid Infrastructure

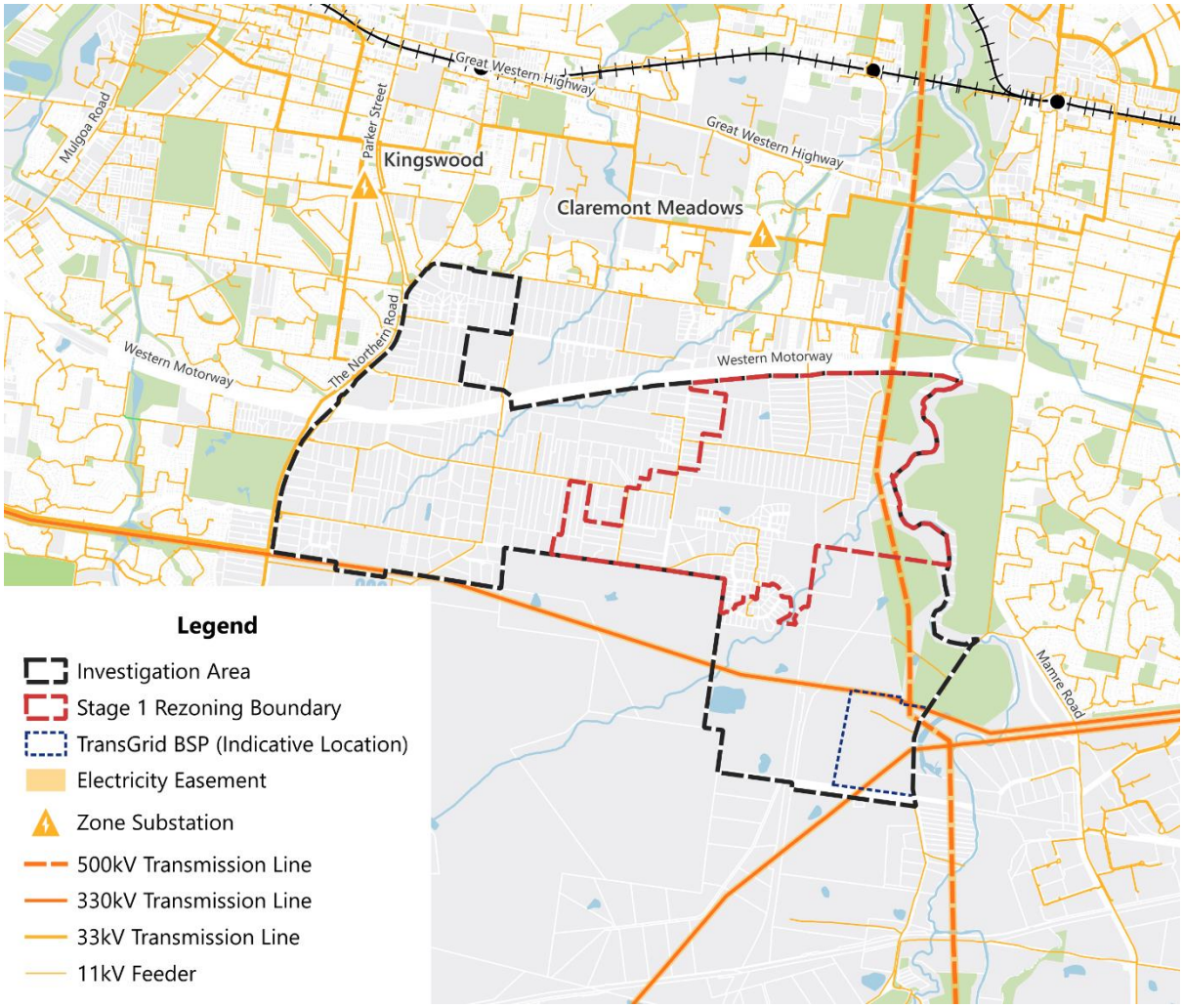
The Investigation Area is bisected by two transmission lines which are operated by TransGrid. Twin 330kV transmission lines connect the Regentville Transmission Substation (TS) to the west and the Sydney West TS to the east. These transmission lines bisect the southern portion of the Investigation Area and have an associated 60m wide easement.

Twin 500kV transmission lines connecting the Kemps Creek TS and the Eraring TS at the Eraring Power Station site bisect the existing greenspace around Wianamatta-South Creek, adjacent to the eastern boundary of the Investigation Area. The 500kV transmission lines have an associated easement width of 70m.

TransGrid also own an 86Ha site in the south east corner of the Investigation Area. It is understood that TransGrid plan to construct a 500kV South Creek Bulk Supply Point (BSP) on this site. Given the site is bisected by the Outer Sydney Orbital corridor, as well as the future Sydney Metro Western Sydney Airport line, it is likely the BSP would be located on the eastern portion of the site.

The existing electrical infrastructure within the vicinity of the Investigation Area is shown in Figure 20 below.

Figure 20 - Existing Electricity Infrastructure



6.2 Proposed Electricity Demand

A high-level assessment was undertaken to determine the electrical servicing requirements for Stage 1. The electrical demand generated by the proposed development was calculated using electrical demand rates provided by Endeavour Energy. For the purpose of this assessment, it has been assumed that schools and the urban service centre (light industrial) both have a GFA equal to 50% of the total site area. The results of the assessment are tabulated below.

Table 4 - Calculated Electricity Demand

Land Use	Load/Unit	Unit	Diversified Load (MVA)
Low Density Residential	6500	Dwelling	22.8
Medium Density Residential	5000	Dwelling	6.0
High Density Residential	3500	Dwelling	16.0
Commercial/Community	85	m^2 GFA	0.8
Retail	100	m^2 GFA	2.9
School*	85	m^2 GFA	1.5
Light Industrial*	70	m^2 GFA	1.8
		Total	**51.9**

* Assumed GFA is 50% of site area

Based on the assumption that a single 11kV feeder can supply approximately 4.5MVA, the proposed development in Stage 1 would likely require 11-12 feeders over time. Potential servicing options for the Orchard Hills Investigation Area are discussed in the following sections.

6.3 Proposed Servicing Strategy

6.3.1 Initial Servicing Strategy

Endeavour Energy has indicated that initial stages of development in Stage 1 will predominantly be serviced from the Claremont Meadows ZS. The highest initial servicing capacity will be available around the Metro station in Area A, following the disconnection of Tunnel Boring Machines (TBM). Two 11kV feeders have been constructed from Claremont Meadows ZS to supply the TBM. These feeders could potentially supply up to 2,500 dwellings within Stage 1 Area A.

6.3.2 Ultimate Servicing Strategy

A new zone substation will need to be constructed within Stage 1 to service the proposed ultimate load from Stage 1 and across the remainder of the Investigation Area. Endeavour Energy has advised that the zone substation will be serviced via two 132kV sub transmission feeders, which will be extended from the 132kV transmission line located to the south of the site boundary.

A proposed site for a new zone substation is indicated in the draft Stage 1 ILP, in the south western corner of the Stage 1 Area. At 111.3m x 122m, the site can accommodate an outdoor 132/11kV zone substation and includes a 10m landscape buffer. Endeavour Energy will undertake further detailed assessment of the site to confirm this location is suitable. A substation of this size would be capable of servicing the whole Stage 1 rezoning area.

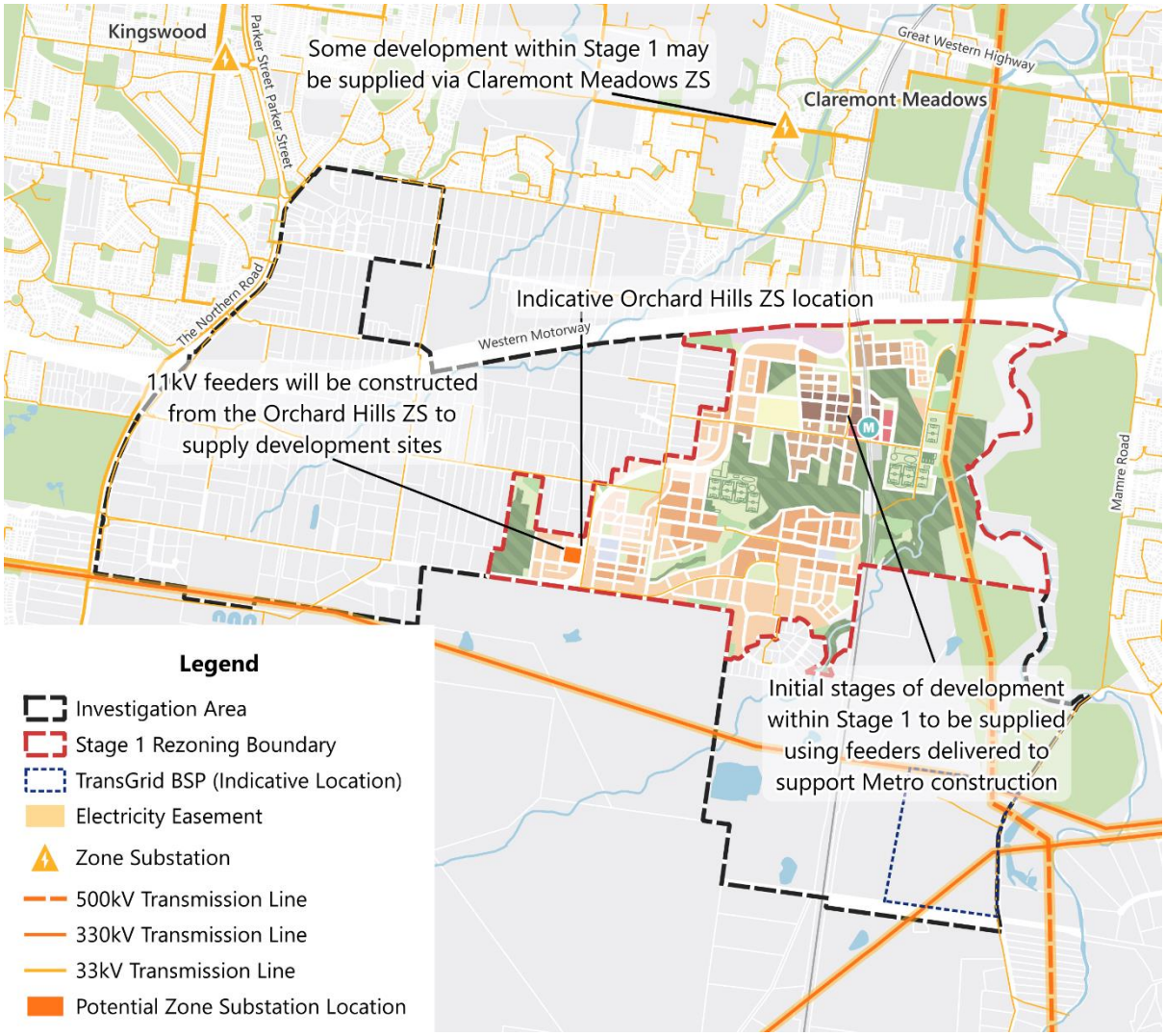
Figure 21 - North Leppington 132kV/11kV Zone Substation

Source: Nearmap (2024)

Based on the assessment undertaken in Section 6.2, we would expect a zone substation with a minimum firm capacity of 90MVA would be required. This assumes that some development can be supplied via available capacity in existing zone substations within the vicinity of the Investigation Area.

Delivery timing for the zone substation will be confirmed by Endeavour Energy following a more detailed assessment of the proposed development. Assuming the two existing feeders supplying the TBM at the Metro site can be used for initial development, it is expected that the zone substation would be required after 2030.

Figure 22 - Proposed Electrical Infrastructure



7 Telecommunications

7.1 Existing Infrastructure

7.1.1 NBN

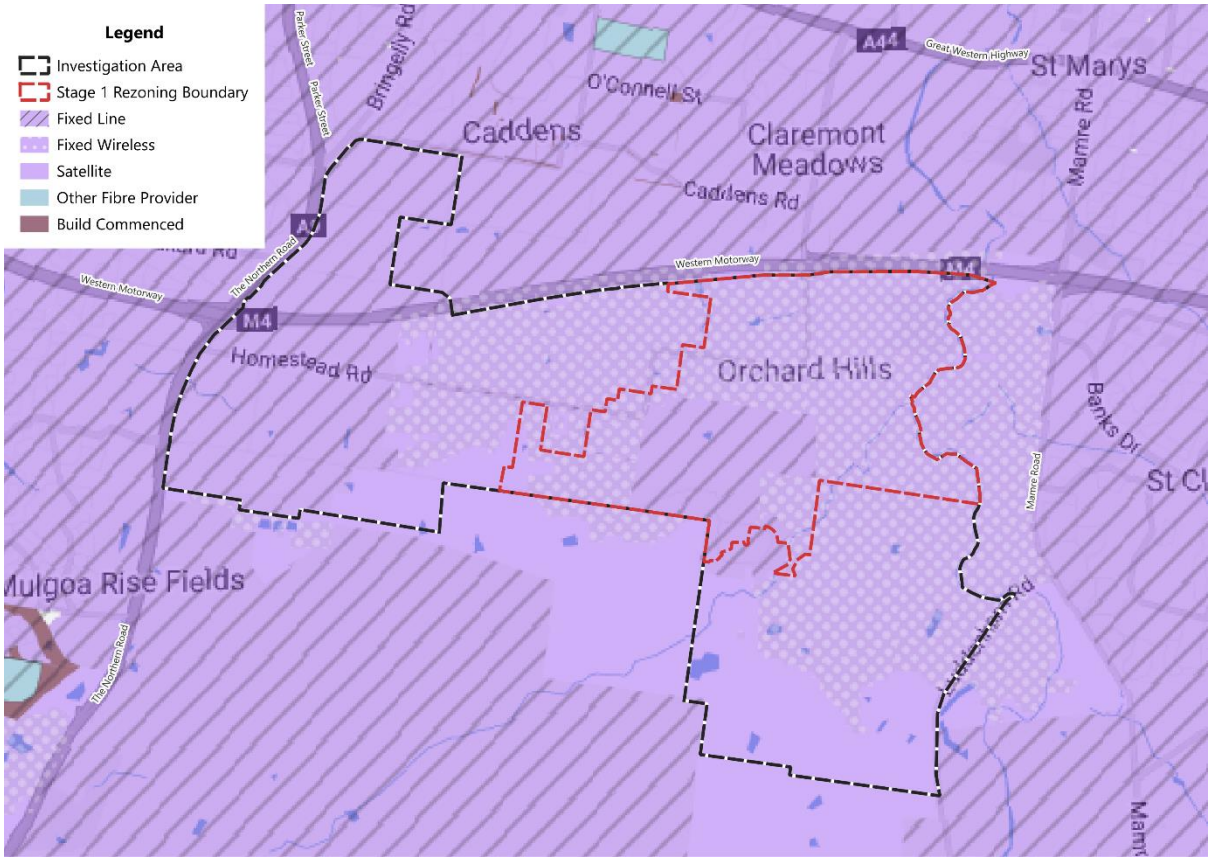
NBN Co. is the wholesale provider for new broadband connections. NBN Co. provides services on its local access network on equivalent terms to retail phone and internet providers, to provision for end users.

The Investigation Area is currently serviced by a mix of technologies. In the west and in some parts of Stage 1, existing development receives fixed line servicing, where a physical line connects each property to the network.

Areas with little existing development utilise satellite connections. Satellite technology uses signals from a satellite orbiting the earth to transmit broadband data to a small antenna or dish installed on the roof of a home or business. This technology is generally used in rural areas with large distances between residential dwellings.

The balance of the Investigation Area, including much of Stage 1, is serviced by fixed wireless technology. Fixed wireless servicing involves data traveling from a transmission tower located up to 14km from premises to a rooftop antenna.

Figure 23 - NBN Coverage

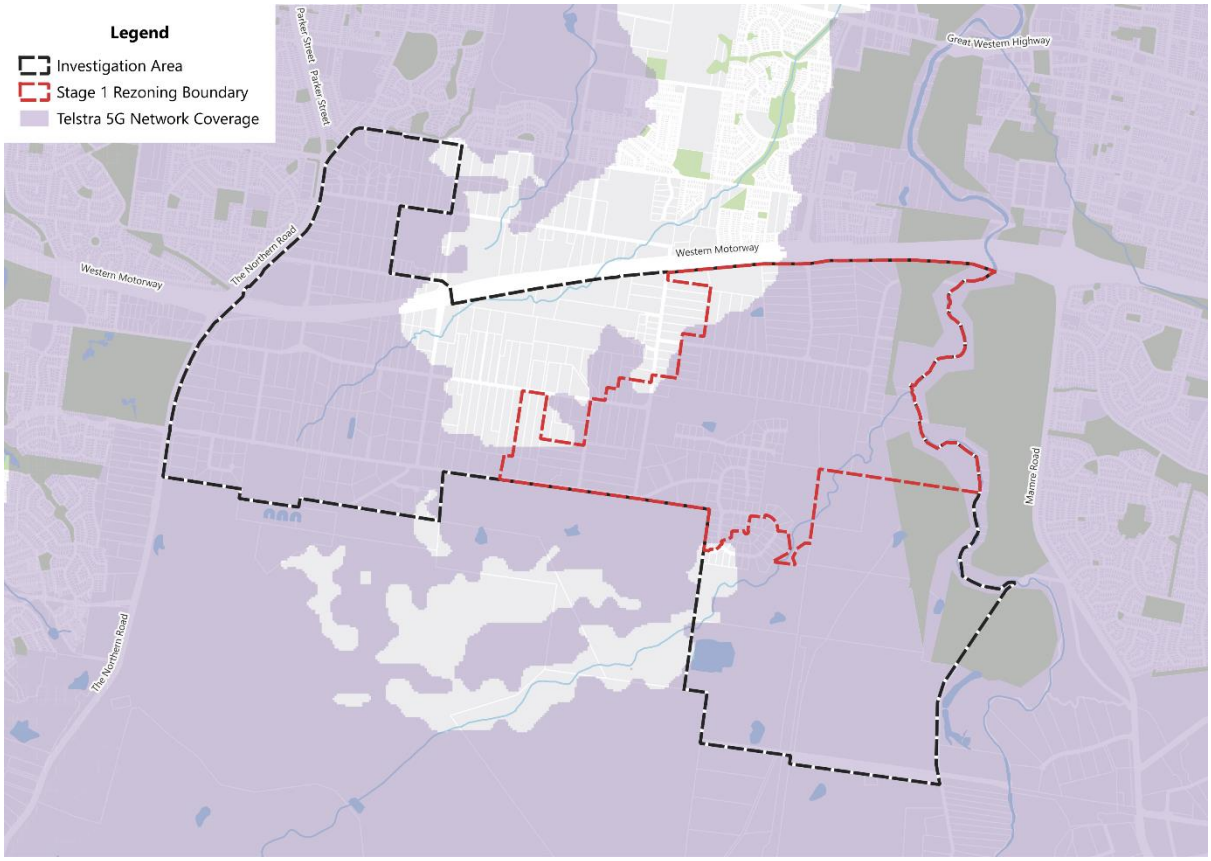


7.1 Telstra 5G

The rollout of Telstra's 5G network has commenced across Western Sydney. Eastern and western portions of the Investigation Area, including most of Stage 1, have existing 5G coverage, while areas towards the centre, around the Western Motorway do not have access to the network yet.

The existing 5G network coverage area is shown in Figure 24. Future 5G rollout across the Investigation Area is likely to be staged to match the pace of development.

Figure 24 - Telstra 5G Network Coverage



7.2 Proposed Servicing Strategy

NBN will review all development applications outside of fixed line footprint areas and determine if it is commercially viable to extend the fixed line network to the proposed development site. Given the size of Stage 1 and the close proximity to existing fixed line servicing areas, it is likely NBN would approve connection of the development to the fixed line network without associated backhaul charges.

NBN Co. policy requires developers to provide pit and pipe infrastructure within the road reserve for all subdivisions. NBN would assess each application request separately to negotiate commercial terms, however connection fees may apply to single dwelling units and multi dwelling units respectively.

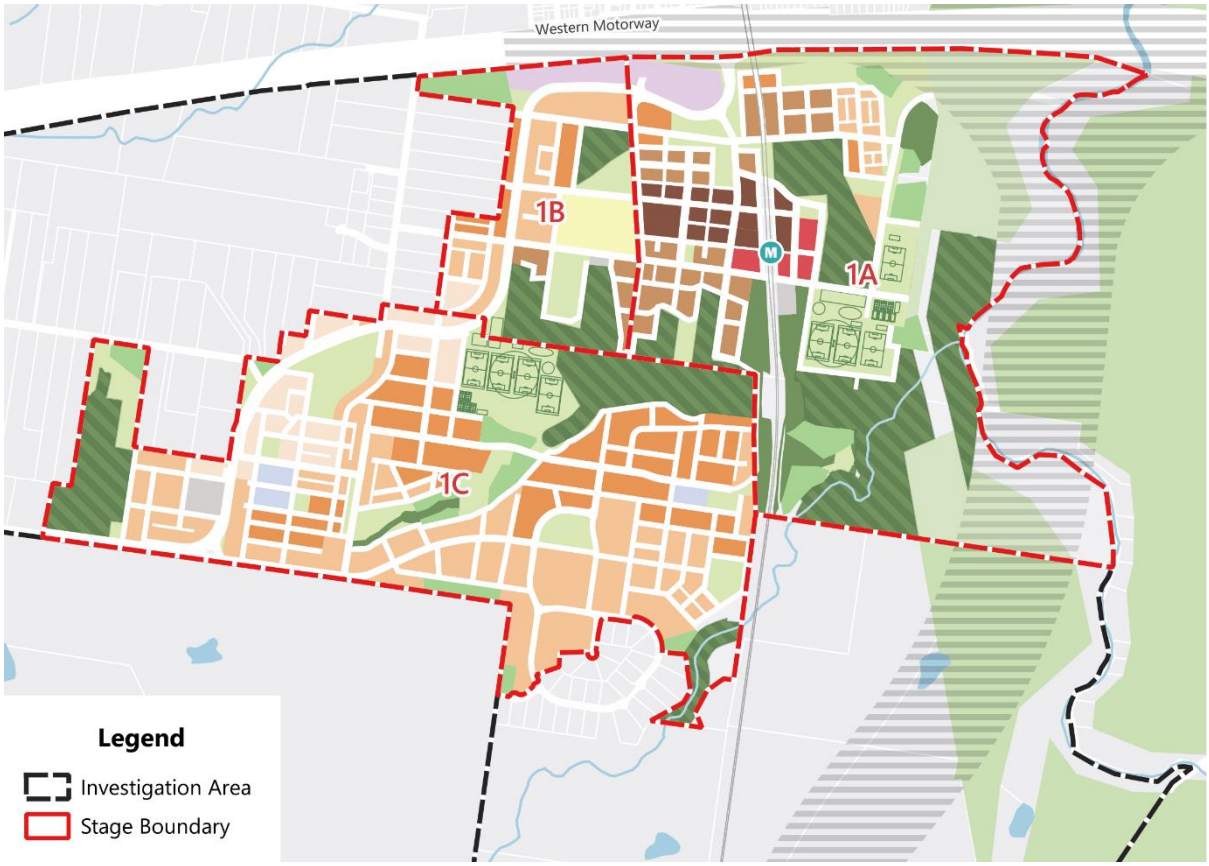
Given the fragmented land ownership within Stage 1 and across the Investigation Area, a holistic approach to the funding and construction of the pit and pipe infrastructure within road reserves will be required to ensure fixed line infrastructure can be extended to development fronts. Trunk infrastructure requirements and any associated cost are unknown at this stage and will be discussed with NBN Co. during subsequent stages of the project.

Extension of Telstra's 5G network is likely to align with proposed development growth within Stage 1 without the need for developer funded lead-ins. This will be confirmed with Telstra during a subsequent stage of development.

8 Staging

The Department is proposing to rezone Stage 1 of the Orchard Hills Investigation Area, due to its proximity to existing and committed utilities infrastructure, as well as the potential to leverage the existing road network. Within Stage 1, Areas A, B and C have been identified to indicate potential sequencing of development based on expected extension of existing infrastructure.

Figure 25 - Orchard Hills Stage 1 Indicative Staging



A brief summary of the likely utilities infrastructure required for each area is provided below. Additional information regarding the social, open space, transport and stormwater infrastructure required to support Stage 1 is provided in accompanying technical reports.

Stage 1A

Stage 1A is centred around the future Orchard Hills Metro Station and could ultimately accommodate 4,385 new dwellings. A summary of the potential utilities infrastructure required to support the development of Stage 1A is provided in Table 5.

Table 5 - Stage 1A Infrastructure Requirements

Utility	Infrastructure Requirements
Sewer	Sydney Water is supporting delivery of the Metro Station and has indicated that there is capacity to supply approximately 3,768 dwellings, including in the area around the station. Infrastructure supporting this development will drain to the South Creek Submain, to the north east of the Investigation Area.
Water	Sydney Water is supporting delivery of the Metro Station and has indicated that there is initial capacity to supply approximately 3,768 dwellings, including in the area around the station. A 250mm diameter trunk main on Kent Road could be extended to supply development. Upgrades to reticulation mains located in existing roads will also be required.
Electricity	Endeavour Energy has recently constructed two 11kV feeders to supply the Tunnel Boring Machine (TBM) for the Metro. Once the TBM is disconnected, these feeders could be used to supply development. There is capacity to supply up to 2,500 dwellings within the vicinity of the Metro Station using these feeders. Once this capacity is exhausted, new feeders will be required from an existing zone substation, or the delivery of the Orchard Hills ZS may be triggered.

Stage 1B

Stage 1B is located to the west of Stage 1A and could ultimately accommodate 1,492 new dwellings. A summary of the potential utilities infrastructure required to support the development of Stage 1B is provided in Table 6.

Table 6 - Stage 1B Infrastructure Requirements

Utility	Infrastructure Requirements
Sewer	Sewer servicing requirements for Stage 1B will be confirmed by Sydney Water as part of the Options Planning Study being undertaken for the broader Investigation Area. Stage 1B falls within the eastern drainage catchment, which naturally drains towards Wianamatta-South Creek. Infrastructure supporting downstream development within this drainage catchment is transferred to the St Marys WRRF. A number of potential servicing options are further discussed in Section 4.4.
Water	A reticulation water main extends along Lansdowne Road within Stage 1B. This main will be upgraded, and new mains will be extended along all future roads as development progresses. If required, new trunk mains will be extended from The Northern Road along Lansdowne Road to provide additional potable water capacity for development.
Electricity	Any available capacity in existing feeders will be utilised to support initial development. The Orchard Hills ZS may need to be delivered (if not already delivered as part of Stage 1A), and new feeders would originate from this zone substation.

Stage 1C

Stage 1C is located to the south of Stage 1B and could ultimately accommodate 5,730 new dwellings. A summary of the potential utilities infrastructure required to support the development of Stage 1C is provided in Table 7.

Table 7 - Stage 1C Infrastructure Requirements

Utility	Infrastructure Requirements
Sewer	Sewer servicing requirements for Stage 1C will be confirmed by Sydney Water as part of the Options Planning Study being undertaken for the broader Investigation Area. Stage 1C falls within the eastern and central drainage catchments, which naturally drain towards Wianamatta-South Creek and Bounds Creek respectively. Infrastructure supporting downstream development within these drainage catchments are transferred to the St Marys WRRF. A number of potential servicing options are further discussed in Section 4.4.
Water	Reticulation mains extend along all existing roads within Stage 1C. These mains will be upgraded, and new mains will be extended along all future roads as development progresses.
Electricity	Any available capacity in existing feeders will be utilised to support initial development. New 11kV feeders would be constructed from the Orchard Hills ZS to development sites.

Future Stages

It is expected that future stages of development in the Orchard Hills Investigation Area will reflect planned upgrades to infrastructure, in particular water and sewer. Future stages may also reflect landowner intentions/capacity to bring forward the provision of critical infrastructure and/or enter into planning agreements with Penrith Council to provide the necessary additional infrastructure required to establish new communities.