infrastructure & development consulting

Pondicherry

Utilities Servicing Report

March 2021

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Project Number	20-510	Date	5 March 2021
Project Name	Pondicherry Release Lands	Status	Final
Client	GDC No.2	Revision	3
Author	R. Higgisson	Reviewed	C. Avis

1 Preface

In 2016, Greenfields Development Company No. 2 Pty Ltd (GDC2, the developer of Oran Park) initiated discussions with the (now) Department of Planning, Industry and Environment (DPIE) about commencing land use planning for Pondicherry using the Precinct Acceleration Protocol. Those discussions culminated with GDC2 (the future developer of Pondicherry) and Leppington Pastoral Co Pty Limited (LPC, the landowner of Pondicherry) entering a Planning Agreement with the Minister for Planning for Pondicherry's accelerated planning. The Planning Agreement was signed in April 2018.

Under the Planning Agreement, the precinct planning was to be led by DPIE. A series of committees involving other authorities, the Council and GDC2 were established under the Planning Agreement to assist in the administration of the planning process. The Planning Agreement required GDC2 to pay for precinct planning costs, including all technical studies required to determine land use capability and proposed zoning. GDC2 also had responsibility for preparing a Services Infrastructure Strategy and Implementation Plan for Pondicherry and obtaining approval for that Strategy and Plan.

Separately, in 2020 GDC2 lodged a planning proposal with Camden Council to "fast-track" rezone a portion of the larger Pondicherry precinct to ensure continued land supply. This area is known as Tranche 41 and in February 2021 the Tranche 41 planning proposal received conditional Gateway approval to proceed to exhibition.

The conditional Gateway Determination issued for Tranche 41 required that the Council provide *"relevant service providers with an infrastructure strategy that demonstrates how the subject land [Tranche 41] is to be serviced, including proposed arrangements for the wider Pondicherry Precinct"* (Condition 5). The draft Services Infrastructure Strategy and Implementation Plan prepared for the wider Pondicherry precinct contains information which meets this Gateway condition.

Consequently, it has been agreed to provide this draft report to the service authorities for their review as part of the Tranche 41 planning proposal, rather than as part of the Pondicherry rezoning as originally planned when this report was commissioned. The report is being provided to demonstrate to the servicing authorities the serviceability of Tranche 41, in the context of the wider Pondicherry precinct.

Indicative road patterns and land uses are shown for both Tranche 41 and Pondicherry on the maps and diagrams contained in this report. Some of these details may change as a result of the exhibition of either (or both) of the Tranche 41 and Pondicherry planning proposals. However, at this stage they represent the most likely land uses and indicative subdivision layout, based on the best available information at this time. Because ultimate land uses and road patterns may change in later stages of the planning process, service authorities should not share this report, in part or in whole, outside their organisations.

2 Introduction

Infrastructure & Development Consulting (IDC) have been engaged by Greenfields Development Company to prepare a utilities servicing strategy to support the Pondicherry Release Lands rezoning. This report summarises the investigations relating to the utilities infrastructure strategies for the development site at Pondicherry. The site is expected to be developed into primarily low-density residential estates, with potential for mixed use and/or higher density development around local and town centres.

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

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

- Existing utility services within the vicinity of the site
- Current and planned utility projects
- Implications of the above and potential servicing strategies for the proposed development of the site

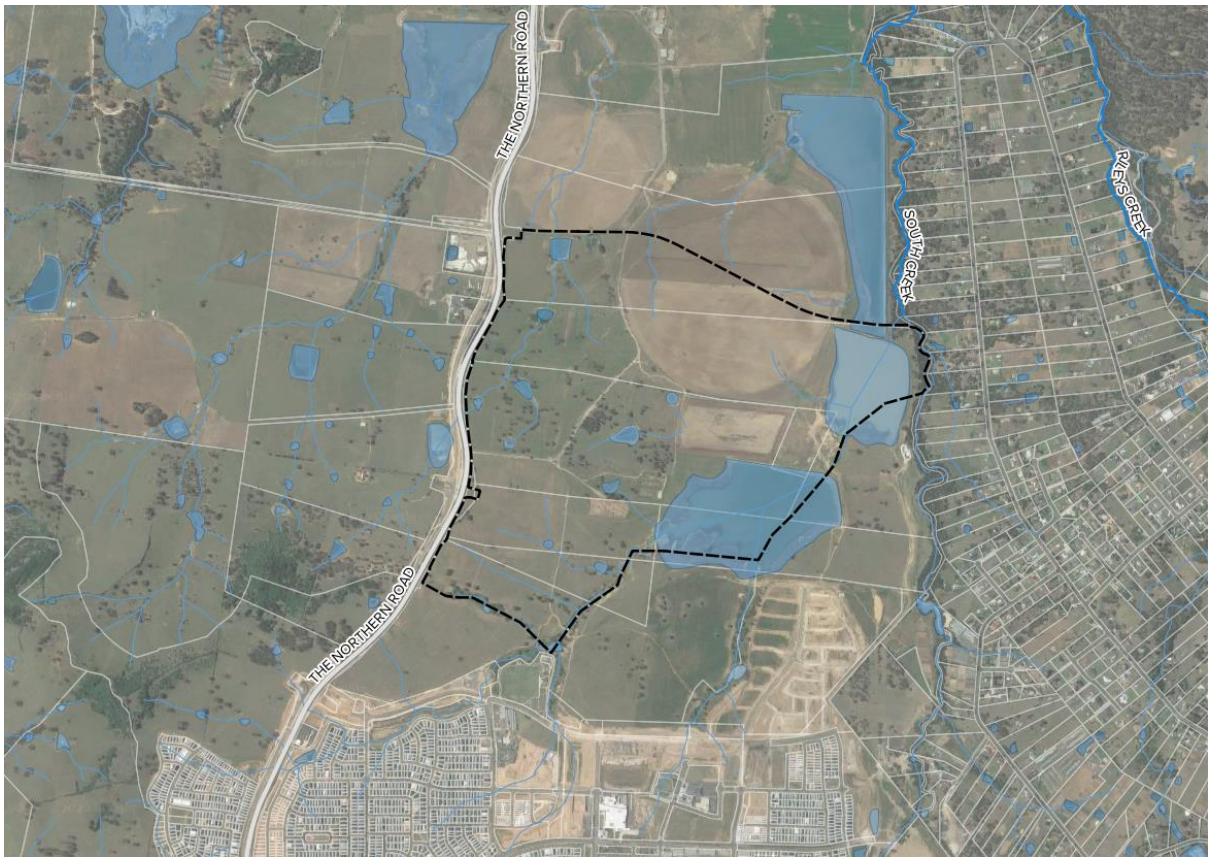
The following analyses have been undertaken to provide an overall strategy for servicing the site and to guide future detailed design through the implementation of appropriate authority controls and best management practices.

We note that the proposed servicing measures are strategic in nature and further refinement may be required during subsequent design phases of the project. However, the underlying principles and objectives of this report should be maintained.

3 The Site

The Pondicherry Release Lands site is located within the Camden City Council Local Government Area (LGA) and covers an area of approximately 210ha. The site is bound by South Creek to the east, the Oran Park Precinct to the south and the Northern Road to the west. The area to the north of the site is currently agricultural land owned by Leppington Pastoral Company (LPC) which is anticipated to be developed after completion of the Pondicherry Site.

Figure 1 - The Site

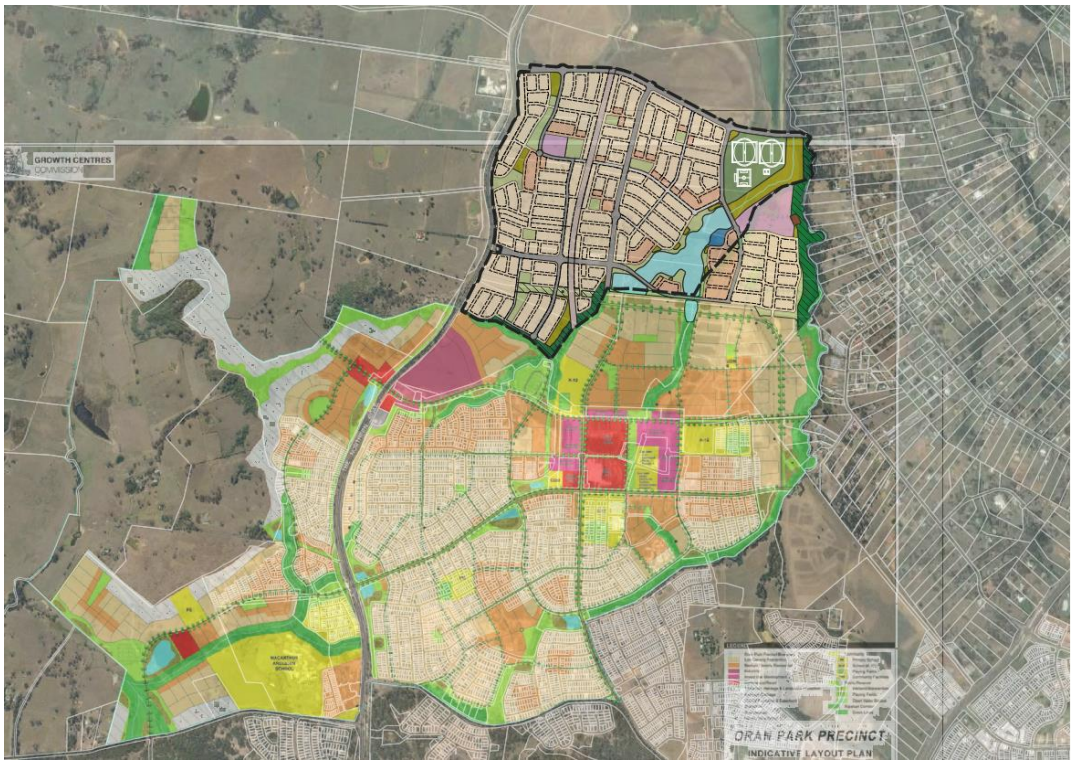


3.1 Oran Park

The Pondicherry site is located adjacent the Oran Park Precinct. The Oran Park development will provide up to 7,500 new dwellings as well as new schools, open space and employment land.

Where possible, existing utilities infrastructure will be extended from Oran Park to supply initial development across Pondicherry before new services are constructed.

Figure 2 - Oran Park Interface

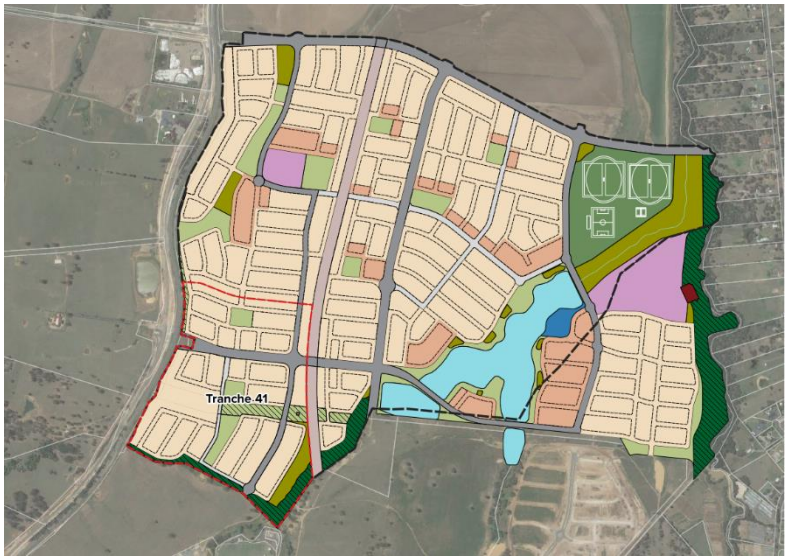


3.2 Tranche 41

The first stage of the Pondicherry development is subject to a separate rezoning application. This area is referred to as Tranche 41 and is shown in red on the figure below. The Tranche 41 area is being rezoned via an application to Camden City Council. The balance of the Pondicherry site will be rezoning by the NSW Department of Planning, Industry and Environment.

Although Tranche 41 is subject to a separate rezoning process, this study will include both Tranche 41 and the balance of the Pondicherry site to provide a holistic approach to utilities servicing.

Figure 3 – Tranche 41



3.3 Proposed Development

The Pondicherry Release Lands will be rezoned to provide a mix of development typologies. We have considered low, medium and high growth scenarios with yields ranging between 2,528 dwellings for the low scenario and 2,848 dwellings for the high scenario.

This report is based on the mid growth scenario with a total yield of 2,714 dwellings (including Tranche 41). However, we have tested the infrastructure requirements outlined in this report against the high growth scenario and concluded that the recommendations remain robust for this option. The infrastructure recommendations made in this report are therefore suitable to meet the greater demand generated in Pondicherry should the higher growth scenario be adopted. A breakdown of the staging for the mid growth scenario is provided in below.

Table 1 - Development Breakdown

Stage	Standard Residential (17.2 dw/ha)	Medium Density (30 dw/ha)	High Density (40 dw/ha)	Total
1	477	-	-	477
2	400	32	-	432
3	331	152	-	483
4	364	83	-	447
5	618	132	-	750
6	-	-	125	125
Total	**2,190**	**399**	**125**	**2,714**

The proposed indicative layout plan is shown in Figure 4 below.

Figure 4 - Pondicherry Indicative Layout Plan

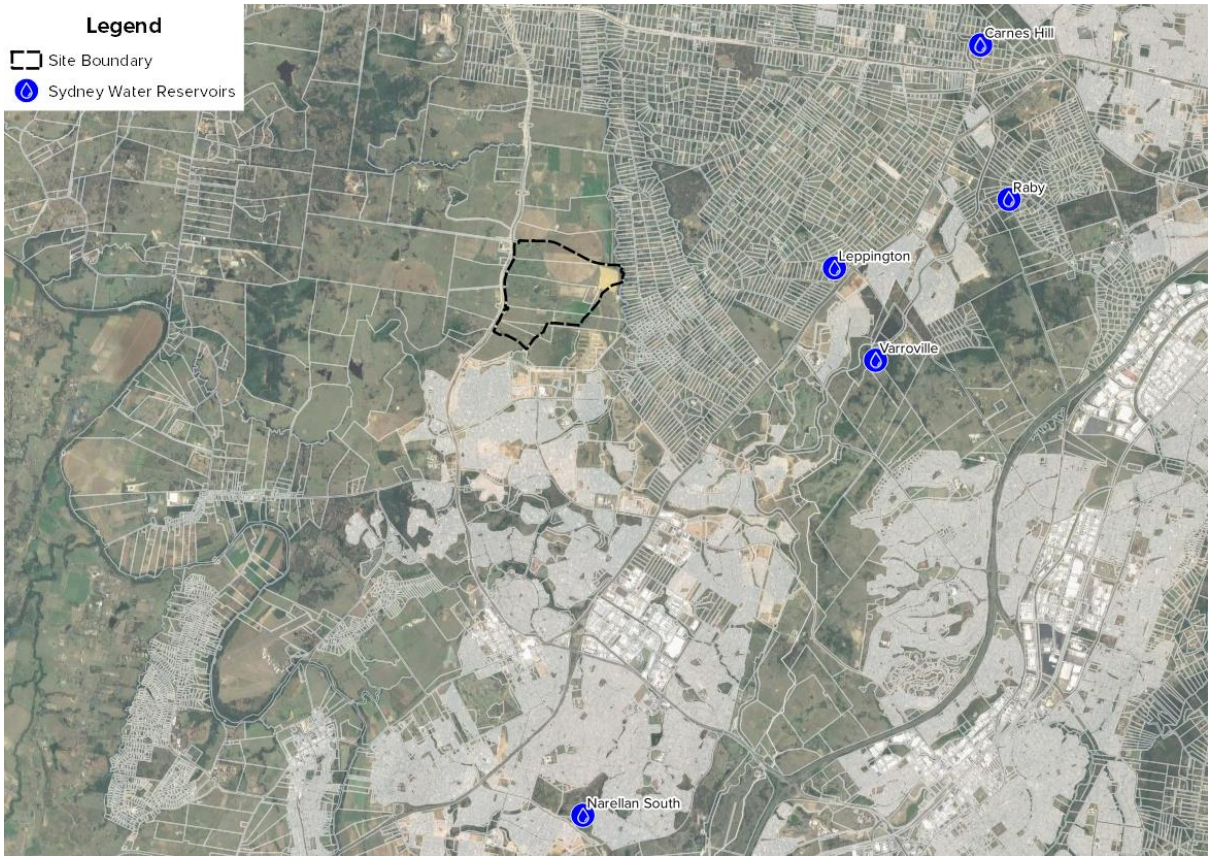
4 Water

4.1 Existing Network

The study area is not currently serviced by the Sydney Water potable water network. Existing infrastructure consists of a recently constructed trunk main along the Northern Road, residential trunk and reticulation mains servicing Oran Park to the South and smaller, rural mains supplying existing rural residential properties to the east The closest reservoir to the site is the Leppington reservoir, located 4km to the south east. This reservoir has a capacity of 15ML.

The Oran Park development is currently serviced by the Narellan South reservoir, located approximately 8km south of the study area. This reservoir has a capacity of 60ML and supplies adjacent developments at South Catherine Fields and parts of Turner Road. The existing reservoirs within the vicinity of the Pondicherry site are shown in Figure 5.

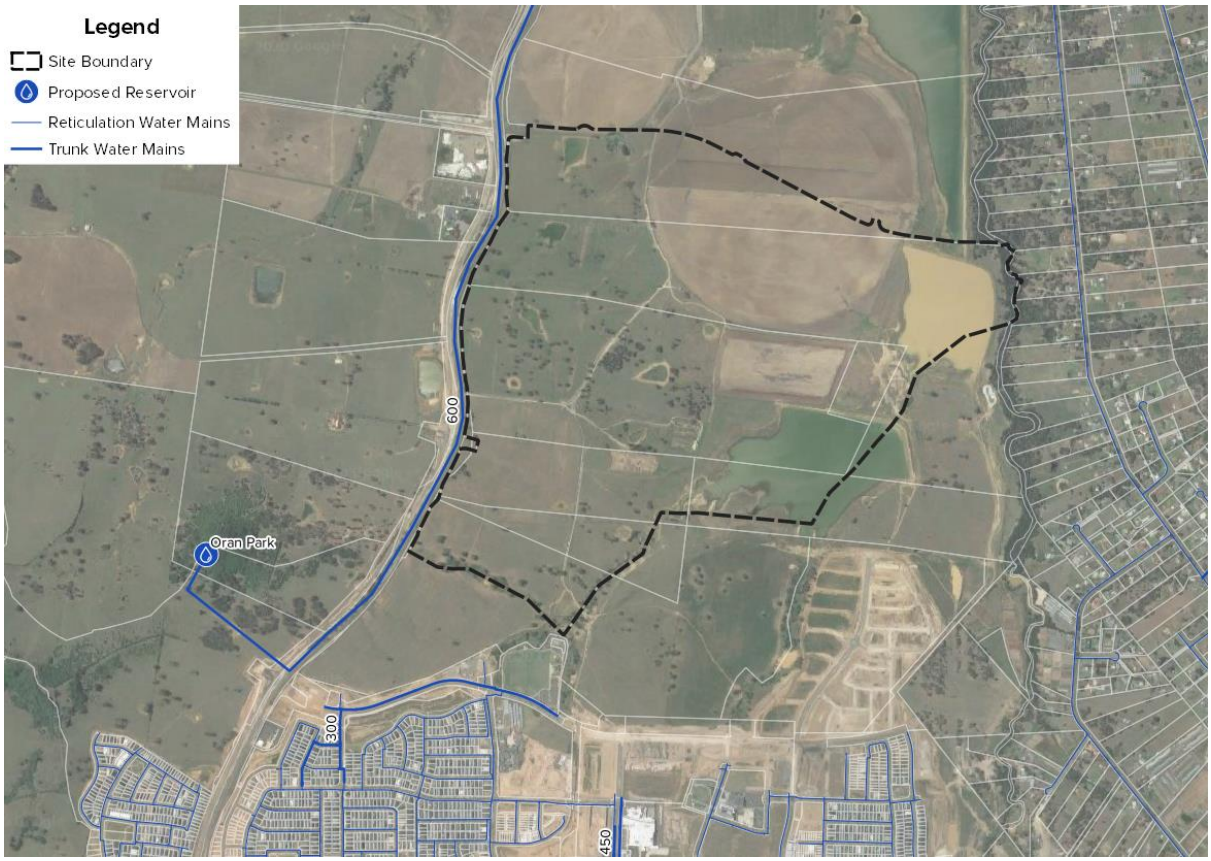
Figure 5 - Existing Reservoirs within the vicinity of Pondicherry



Sydney Water are in the advanced stages of design and/or construction of significant water network upgrades. Two 24ML reservoirs are planned for Oran Park which will include 750mm and 600mm trunk water mains from the reservoirs along The Northern Road to Badgerys Creek Road. Sydney Water have advised that these works are expected to be completed in 2021/22.

The infrastructure is expected to have sufficient capacity to supply all proposed development within the study area. The trunk potable water network is shown in Figure 6 below.

Figure 6 - Existing Potable Water Network



4.2 Proposed Network

A high-level assessment was undertaken using the Water Supply Code of Australia (WSA) to determine the infrastructure requirements to support the proposed development. This involved calculating the peak hourly demand to estimate the likely trunk main size 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 the assessment are provided in Table 2.

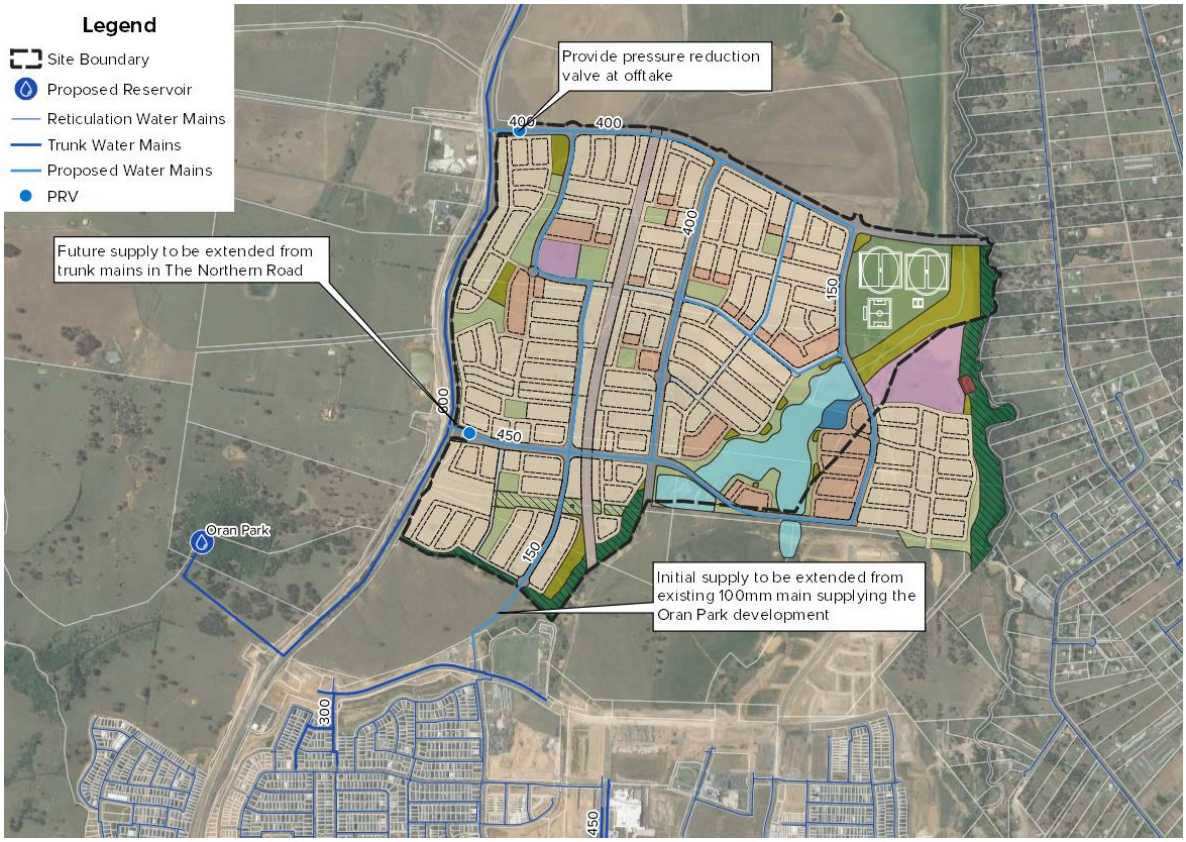
Table 2 - Proposed Water Demand Calculations

Land Use	Max Day Demand Rate (kL/Ha/day)	Max Day Demand (kL/day)	Peak Hour Demand (kL/hour)	Peak Demand (L/s)
Low Density	41	9,881.0	905.8	251.6
Total		**9,881.0**	**905.8**	**251.6**

Based on the above assessment a minimum 450mm diameter trunk main would be required to support the proposed development. Sydney Water have indicated that initial stages of development will be supplied by extending an existing 100mm main from Oran Park to the site. Later stages of development will be supplied via a new main from The Northern Road.

As discussed in Section 4.1, it is expected that the site will be supplied by the new Oran Park reservoirs. These reservoirs will be located on the western side of The Northern Road, near the southern boundary of the site. Given the proximity of the development to the proposed reservoirs, provision of potable water supply to the site is not expected to pose a constraint to development.

Figure 7 - Proposed Potable Water Network



4.3 Consultation with Sydney Water

IDC held a meeting with Sydney Water on 26th June 2020 to discuss the Pondicherry project. The purpose of the meeting was to discuss a potential servicing strategy for the proposed development. A subsequent meeting was held on 17th July 2020. The meeting minutes are contained within Appendix A.

A draft copy of this report was provided to Sydney Water for comment and assessment. Sydney Water indicated that the report is in line with planning for the area. Initial development within Pondicherry will be supplied from the existing DN100 main in the Oran Park Precinct. The future Oran Park Reservoir will supply the subsequent stages of development.

Sydney Water indicated that two offtakes from the DN600 main in The Northern Road will be required. A DN450 offtake will be provided at Marylands Link Road 1 and a DN400 offtake will be provided at Marylands Link Road 2. Sydney Water's commentary on this report is contained in Appendix B.

5 Sewer

5.1 Existing Network

The site is not currently serviced by the Sydney Water sewer network. Existing rural properties in the area utilise on-site septic tanks for sewage collection and disposal. The site is located within the Sydney Water Growth Servicing Plan area which ensures the availability of water and sewer infrastructure over the next 15 years.

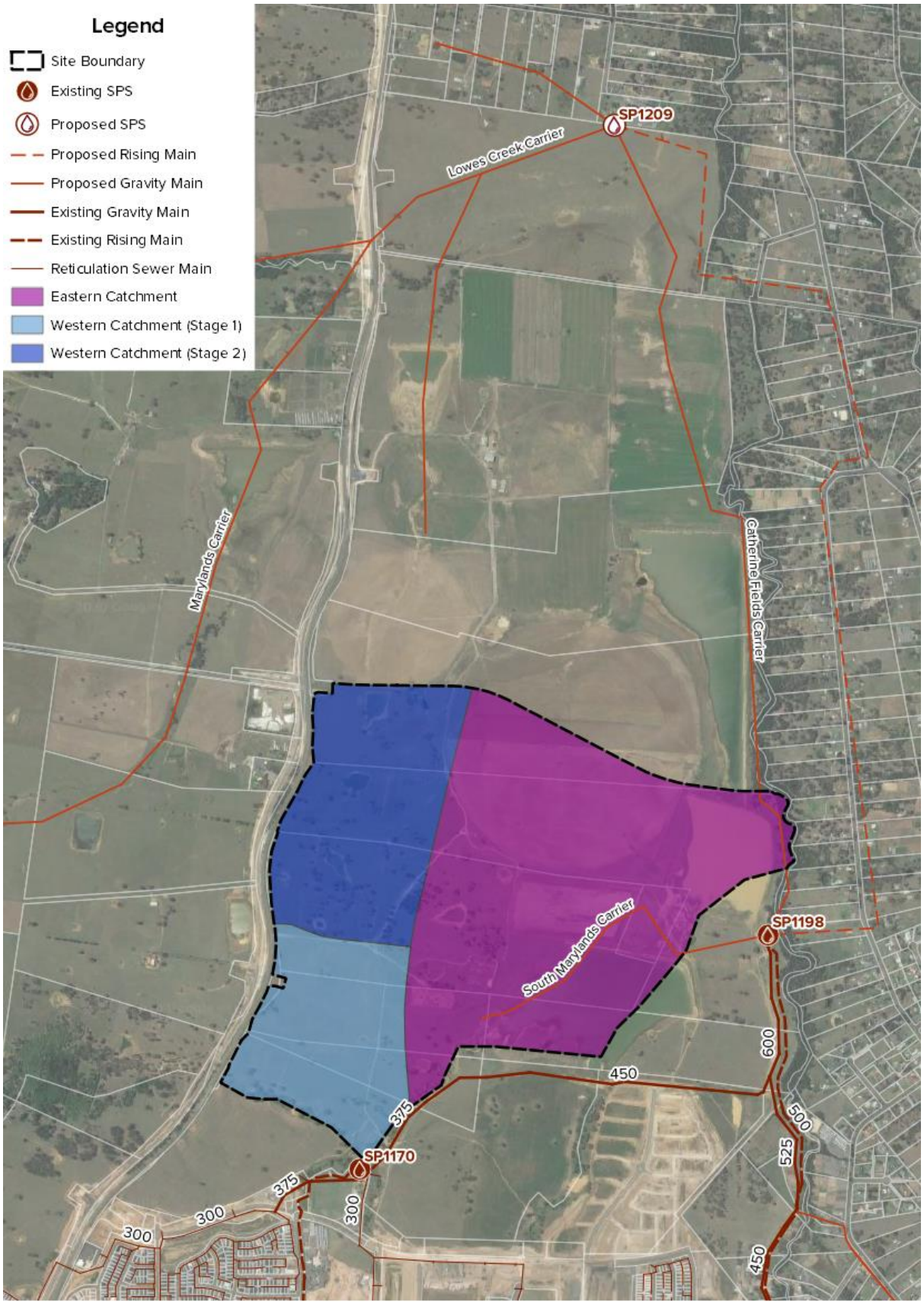
Newer developments within the Oran Park, Harrington Park and Turner Road precincts, located to the south of the site, are serviced by the Sydney Water sewer network. Sewer from these developments is pumped to the West Camden Wastewater Treatment Plant (WWTP), located approximately 10km south west of Oran Park.

Two sewer pump stations are located within the vicinity of the site. SP1170, located on the southern site boundary, receives wastewater from the Oran Park development. SP1198 is located on the eastern site boundary and has been designed to receive up to 155L/s. The existing sewer infrastructure within the vicinity of the site is shown in Figure 8.

Figure 8 - Existing Sewer Network

The site falls into two sewer catchments, separated by a crest as shown in Figure 9 below. The western catchment drains to the north to the future Lowes Creek Carrier and SP1209. The eastern catchment drains to SP1198, via the future South Marylands Carrier and the Oran Park Carrier.

Figure 9 - Regional Sewer Strategy

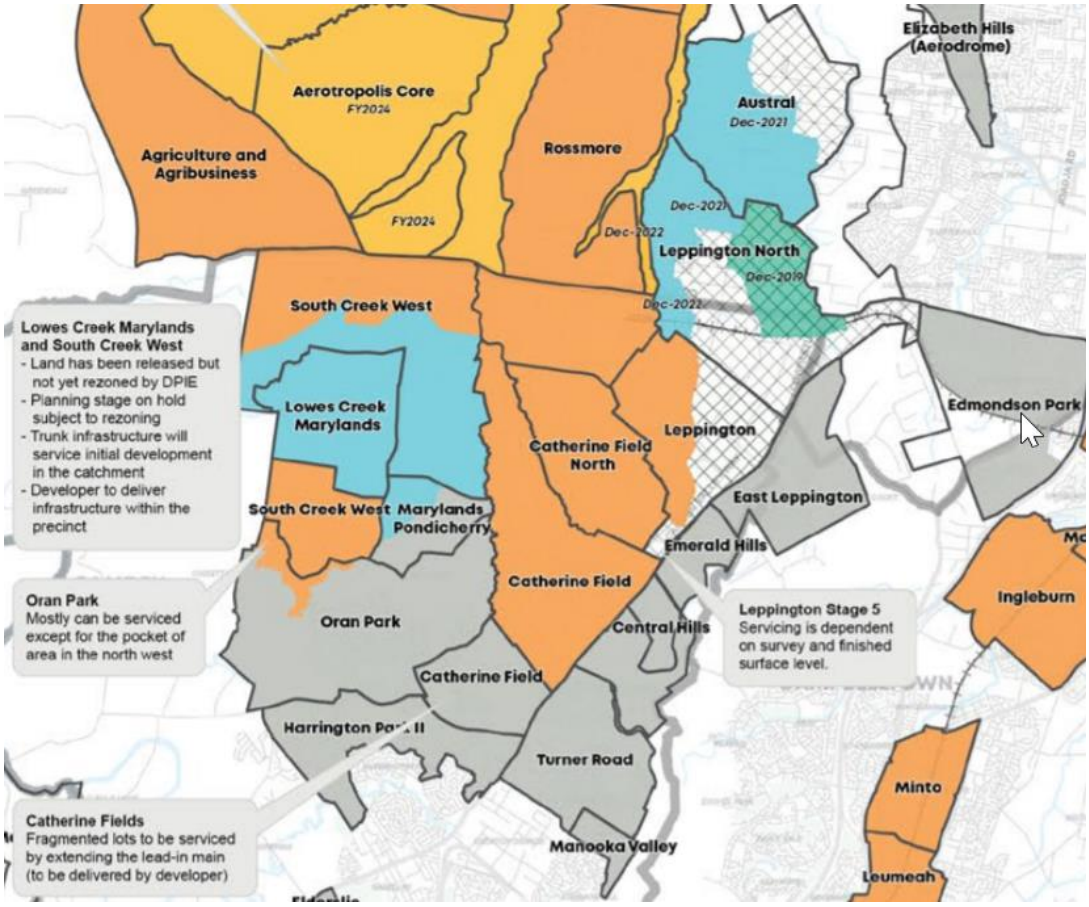


5.2 Sydney Water Growth Servicing Plan

Sydney Water's GSP indicates that the eastern catchment within the Pondicherry site has adequate existing trunk capacity to support development.

The western catchment is in the concept design phase, indicated in blue on Figure 10 below. The plan indicates that trunk infrastructure within the Lowes Creek and Marylands precincts is expected to be delivered by developers. It is unclear whether this includes the Pondicherry Release Lands. It is expected that infrastructure planning for this area will occur when the land is rezoned.

Figure 10 - Sydney Water Growth Servicing Plan - Sewer



5.3 Proposed Network

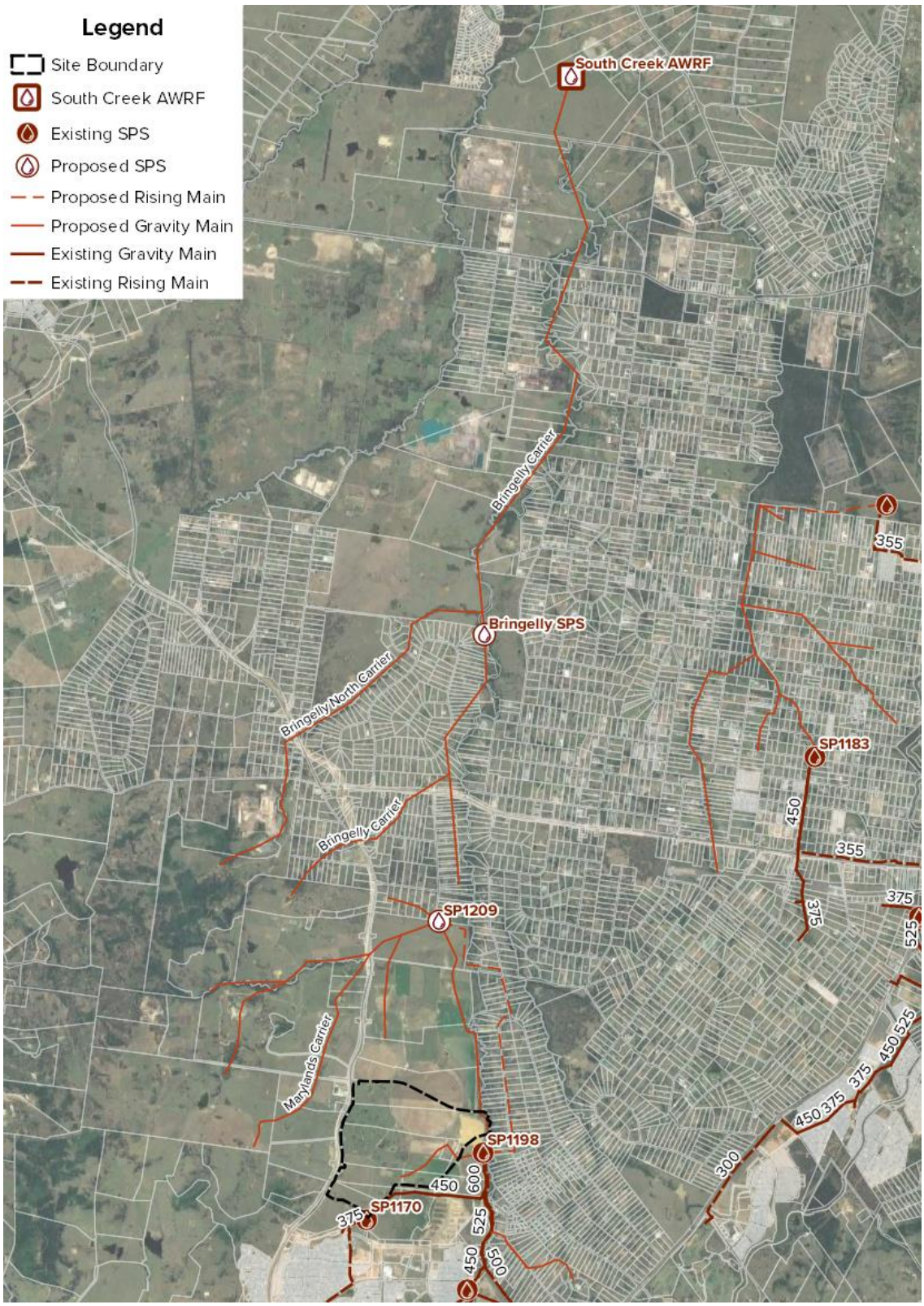
As discussed in Section 5.1, the site falls into two sewer catchments which will both drain to the future Lowes Creek Pump Station (SP1209) in the ultimate scenario. SP1209 has been designed to receive wastewater from approximately 4,000 lots as an interim solution, however Sydney Water are currently progressing designs for an ultimate servicing solution for SP1209 which would accommodate the full catchment. Sydney Water have advised that SP1209 will likely be delivered in early 2023.

Sydney Water have also indicated that the Lowes Creek Carrier main will be oversized to provide additional storage to allow for wet weather flows to be detained when required.

Ultimately, flows from SP1209, flows will be transferred to the future South Creek Advanced Water Recycling Facility (AWRF). This is expected to be operational by 2026 to align with the opening of

the Western Sydney Airport. The location of this infrastructure is yet to be finalised, however it is understood that it will be located north of Elizabeth Drive, in the vicinity of the confluence of South Creek, Badgerys Creek and Kemps Creek.

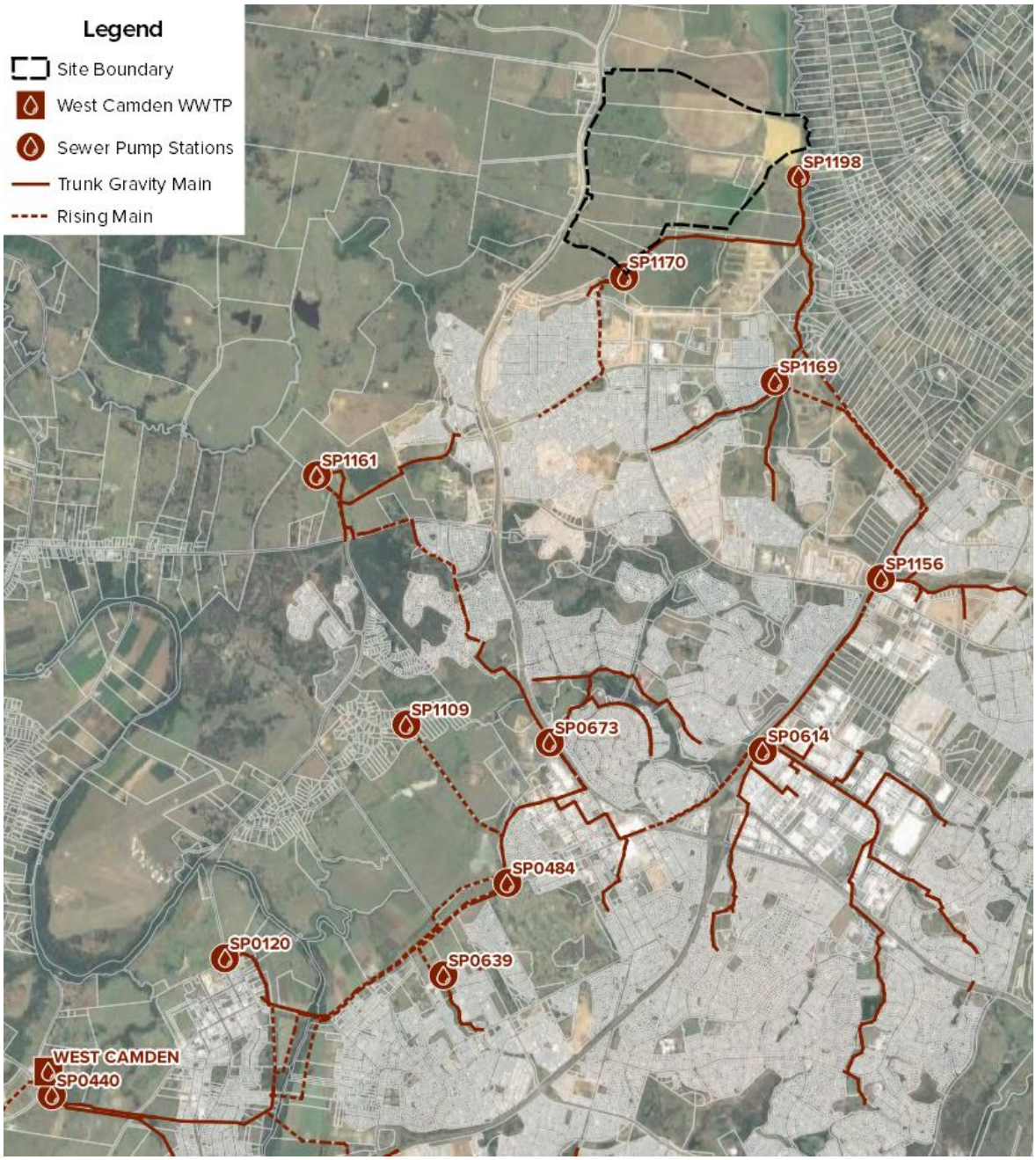
Figure 11 - South Creek Wastewater Strategy



An interim servicing strategy has been developed for the wastewater network until the future South Creek AWRF is operational. This strategy involves pumping flows from SP1198 to the West Camden WWTP via SP1156. Sydney Water have indicated that there are capacity issues in the receiving infrastructure downstream of SP1156 which have resulted in flows from SP1198 being pumped at a reduced rate. SP1198 has capacity to pump up to 215L/s, but has been throttled to 155L/s. Sydney Water would like to explore options to amplify the sewer carrier main in Camden Valley Way in the Turner Road Precinct to allow for the pumping capacity at SP1198 to be increased to 215L/s.

SP1198 will receive flows from the Pondicherry development site via the South Marylands Carrier but will also accommodate flows from SP1169 and wet weather flows from SP1170.

Figure 12 - West Camden WWTP



A high-level assessment of the required trunk sewer infrastructure was undertaken using the Sewage Supply Code of Australia (SSA). The load on the sewer network is expressed in Equivalent Population (EP). The EP for each land use was extracted from the SSA. For residential uses, EP is expressed as a rate per dwelling.

The proposed land uses were split based on the catchments shown in Figure 9. The approximate total EP for each catchment was then calculated using the EP rates tabulated below. The results are provided in Table 3.

Table 3 – Calculated Equivalent Population

Catchment	Area (Ha)	Dwellings	EP	Minimum Pipe Size (mm)
Western 1	41.3	477	1,670	225
Western 2	54.4	750	2,625	225
Eastern	145.9	1,487	5,206	300
Total	**241.6**	**2,714**	**9,501**	

5.4 Servicing Strategy

IDC have undertaken a high-level analysis to determine the most efficient sewer servicing strategy for the Pondicherry site.

As discussed in the sections above, the site falls into two sewer catchments which are serviced by different trunk infrastructure. It has been assumed that all development within the Eastern Catchment will drain to SP1198 via the South Marylands Carrier. Sydney Water have indicated that the South Marylands Carrier will be developer delivered. Based on the calculations summarised in Table 3, this carrier will need to be in the order of 300mm in diameter. It has been assumed that the infrastructure to support the Eastern Catchment can be delivered within the development timeline and will not pose a constraint to development.

Several options to service the Western Catchments have been explored and are detailed in the sections below.

5.4.1 Option 1 – Western Catchment 1 drains via gravity to Oran Park Carrier, Western Catchment 2 drains via Gravity to Lowes Creek Carrier

This option involves draining Western Catchment 1 to SP1198 via the Oran Park Carrier and Western Catchment Stage 2 to the future Lowes Creek Carrier. The Western Catchment 1 and Western Catchment 2 areas are shown on Figure 13 in light blue and dark blue respectively.

It is understood that the Lowes Creek Carrier will be delivered to align with development within the Lowes Creek Precinct and the delivery of SP1209. This has been flagged for early 2023.

This option would require the construction of a significant lead-in main from the Pondicherry site to the Lowes Creek Carrier, approximately 2,100m. This main would also service dwellings in the development site located to the north of Pondicherry (Greenway site).

To determine the required sewer main size, the number of dwellings within the Greenway site have been estimated based on the following assumptions:

- Average dwelling density of 18 dwellings/ha
- Assumed 90% net developable area

These assumptions have been adopted to provide a conservative estimate of the required infrastructure. The results of this assessment are tabulated below.

Table 4 – Calculated Equivalent Population (Greenway site)

Catchment	Approx. Area (Ha)	Dwellings	EP
A	23.5	381	1,334
B	38.5	624	2,184
C	32.3	523	1,831
Total		**1,528**	**5,349**

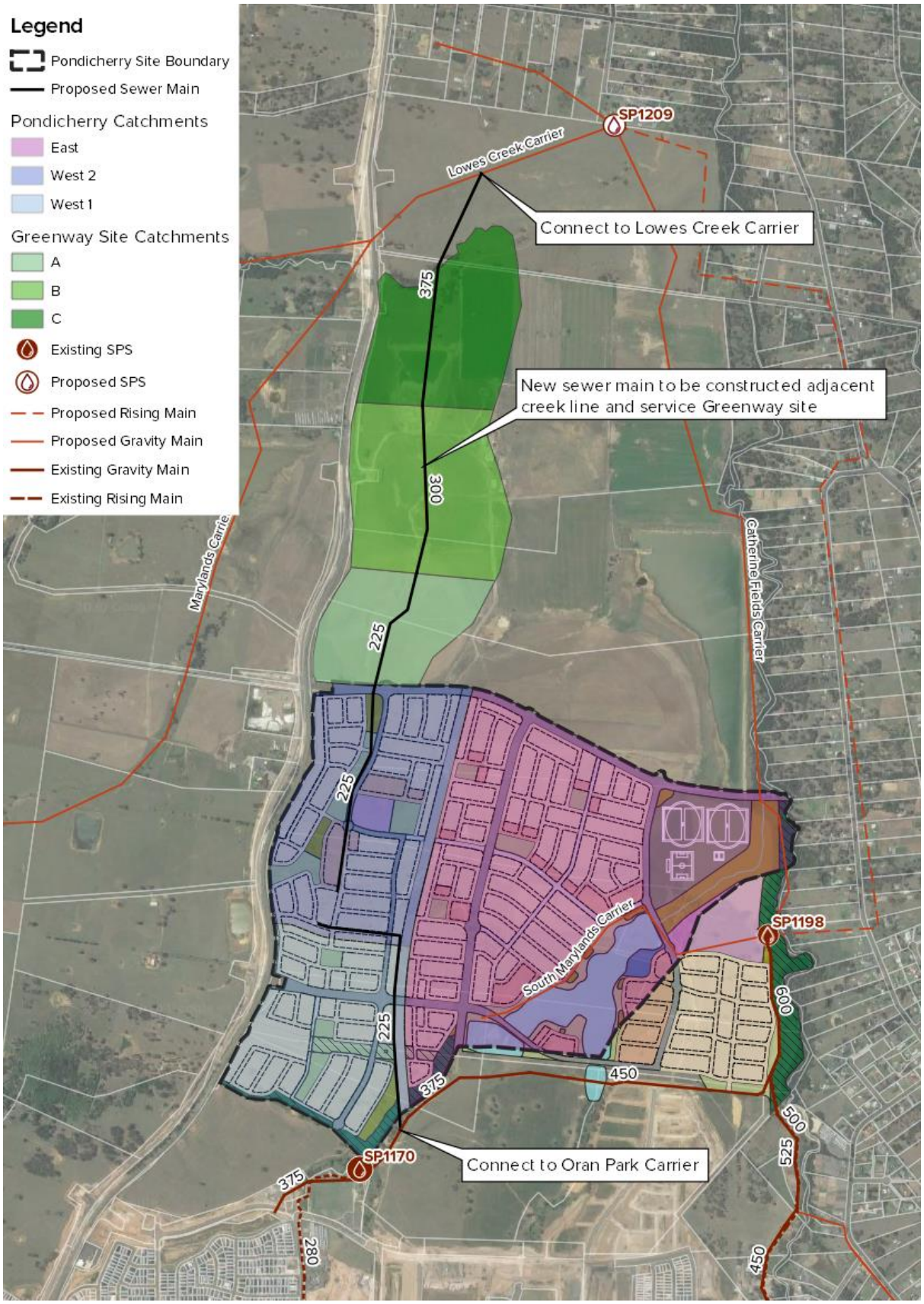
Based on the above, we have assumed that the sewer main servicing Western Catchment 2 and future development in the Greenway site will be sized between 225mm at the Pondicherry site boundary and 375mm at the Lowes Creek Carrier.

A high-level estimate of the costs associated with Option 1 are summarised in Table 5.

Table 5 - Sewer Option 1 Lead Ins - Cost Estimate

Item	Unit	Benchmark Rate	Quantity	Cost
New 225mm Gravity Main from Western Catchment 1 to Oran Park Carrier	m	$360	1,030	$370,800
New 225mm Gravity Main from Western Catchment 2 to Greenway Catchment A	m	$360	520	$187,200
New 300mm Gravity Main from Greenway Catchment A to Catchment B	m	$480	660	$316,800
New 375mm Gravity Main from Greenway Catchment B to Lowes Creek Carrier	m	$630	950	$598,500
			Total	**$1,473,300**

Figure 13 - Sewer Option 1



5.4.2 Option 2 – Western Catchment 1 drains via gravity to Oran Park Carrier, Western Catchment 2 drains via rising main to South Marylands Carrier

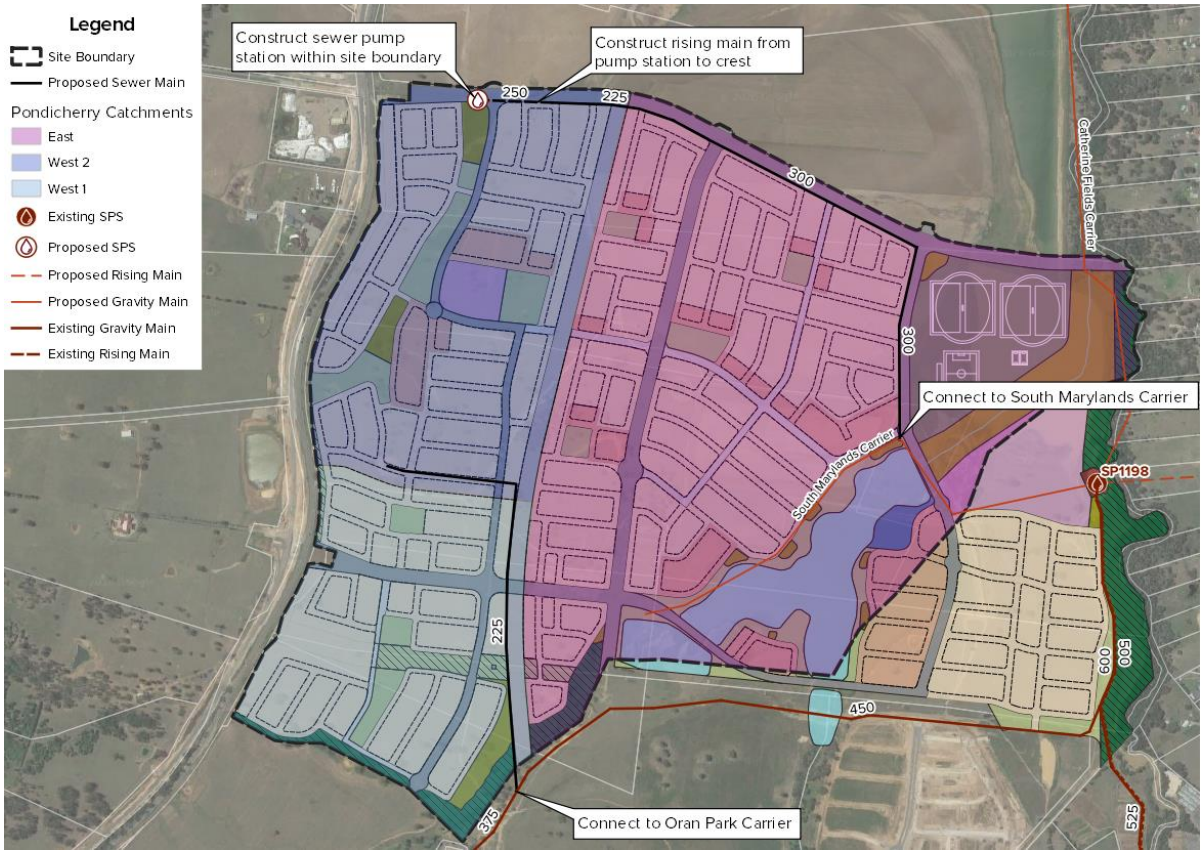
This option involves draining both Catchments 1 and 2 to SP1198. Catchment 1 would drain via gravity to the Oran Park Carrier, as outlined in Option 1. A pump station would be required to transfer flows from Catchment 2 to SP1198. This would be constructed adjacent the Greenway site boundary to pump flows over the crest of the site before draining via gravity to SP1198. This option is illustrated in Figure 14.

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

Table 6 - Sewer Option 2 Lead Ins - Cost Estimate

Item	Unit	Benchmark Rate	Quantity	Cost
New 225mm Gravity Main from Western Catchment 1 to Oran Park Carrier	m	$360	1,030	$370,800
New internal Sewer Pump Station at site boundary	item	$750,000	1	$750,000
New 250mm Rising Main from Western Catchment 2 to crest	m	$280	170	$47,600
New 225mm Gravity Main from crest to Eastern Catchment boundary	m	$360	240	$86,400
New 300mm Gravity Main from Eastern Catchment boundary to Basin B12	m	$480	760	$364,800
New 300mm Gravity Main from Basin B12 to South Marylands Carrier	m	$480	480	$230,400
			Total	**$1,850,000**

Figure 14 - Sewer Option 2



5.5 Consultation with Sydney Water

IDC held a meeting with Sydney Water on 26th June 2020 to discuss the Pondicherry project. The purpose of the meeting was to discuss a potential servicing strategy for the proposed development. A subsequent meeting was held on 17th July 2020. The meeting minutes are contained within Appendix A.

A draft copy of this report was provided to Sydney Water for comment and assessment. Sydney Water indicated that due to capacity constraints in SP1198, Option 1 is supported for both interim and ultimate servicing for the Pondicherry site. Sydney Water's commentary on this report is contained in Appendix B.

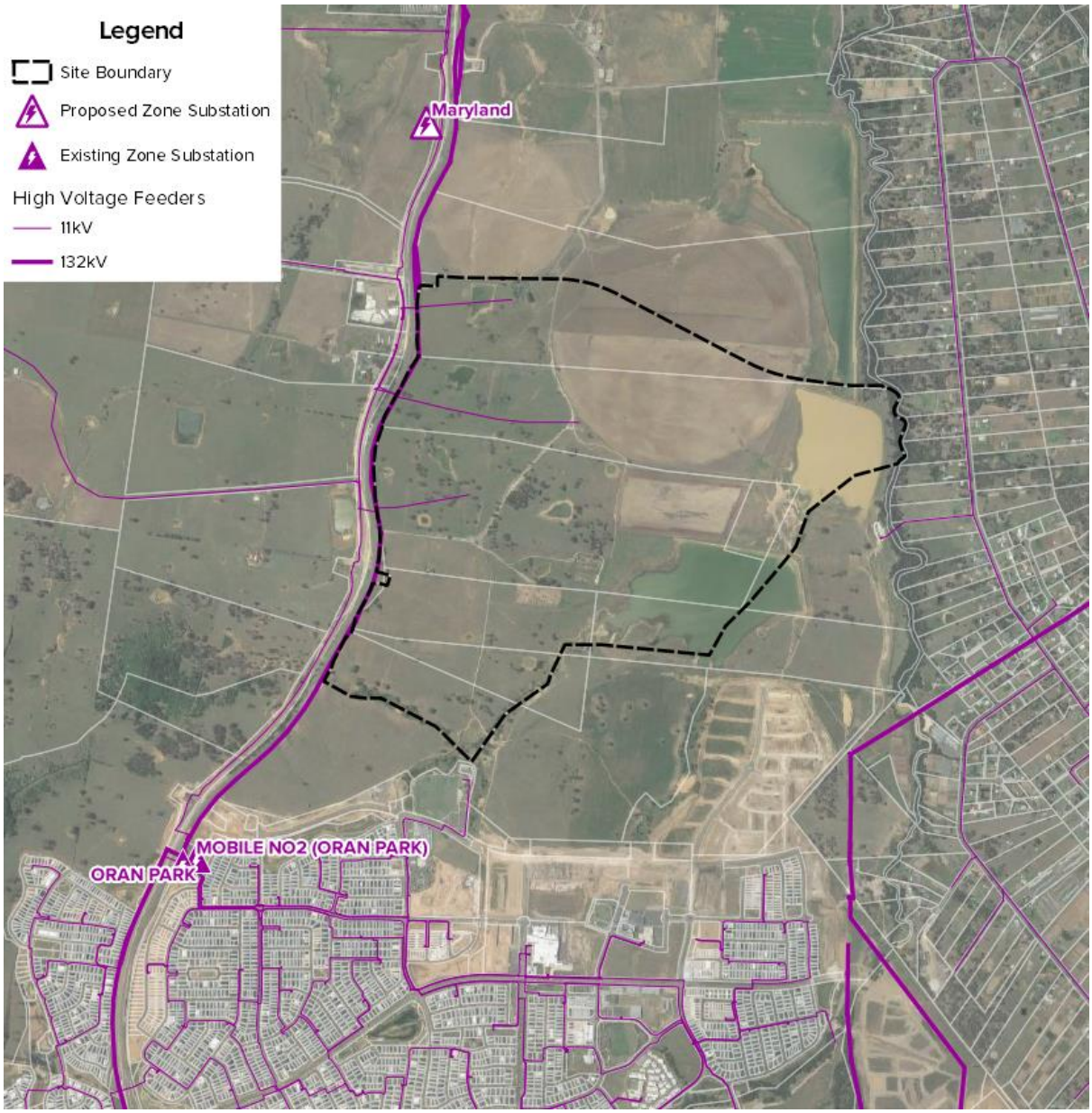
6 Electricity

6.1 Existing Network

The site is located within the Endeavour Energy electrical supply zone. The closest zone substation (ZS) to the site is the Oran Park ZS, which has a firm capacity of 45MVA.

There is currently minimal electrical infrastructure located within the site boundary. All existing infrastructure is expected to be decommissioned and demolished to facilitate the development of the site. The existing electrical infrastructure within the vicinity of the site is shown in Figure 15.

Figure 15 - Existing Electrical Network



6.2 Endeavour Energy Growth Servicing Plan

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

This includes a new substation at Marylands which will support development in the Lowes Creek and Marylands precincts. It is anticipated that 11,000 lots will be delivered in these areas which will generate an ultimate load of 44MVA. Initial development in the area will be supplied by the Oran Park and Bringelly ZS before the delivery of the new ZS in approximately 2024.

It should be noted that the Oran Park ZS has capacity to supply the Pondicherry Release Lands in the event that the Marylands ZS is delayed due to unforeseen circumstances.

6.3 Proposed Network

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. A diversification factor of 0.8 was applied to the total site load to provide a more accurate estimate of the peak load generated by the site.

Table 7 - Electrical Demand Calculations

Land Use	Dwellings	Rate (VA/Dwelling)	Load (kVA)	Diversified Load (MVA)
Low Density Residential	2,714	5,500	14,927	11.9
			Total	**11.9**

Assuming an 11kV high voltage feeder can supply approximately 4.5MVA, the Pondicherry site would require 2-3 11kV feeders to support the proposed development.

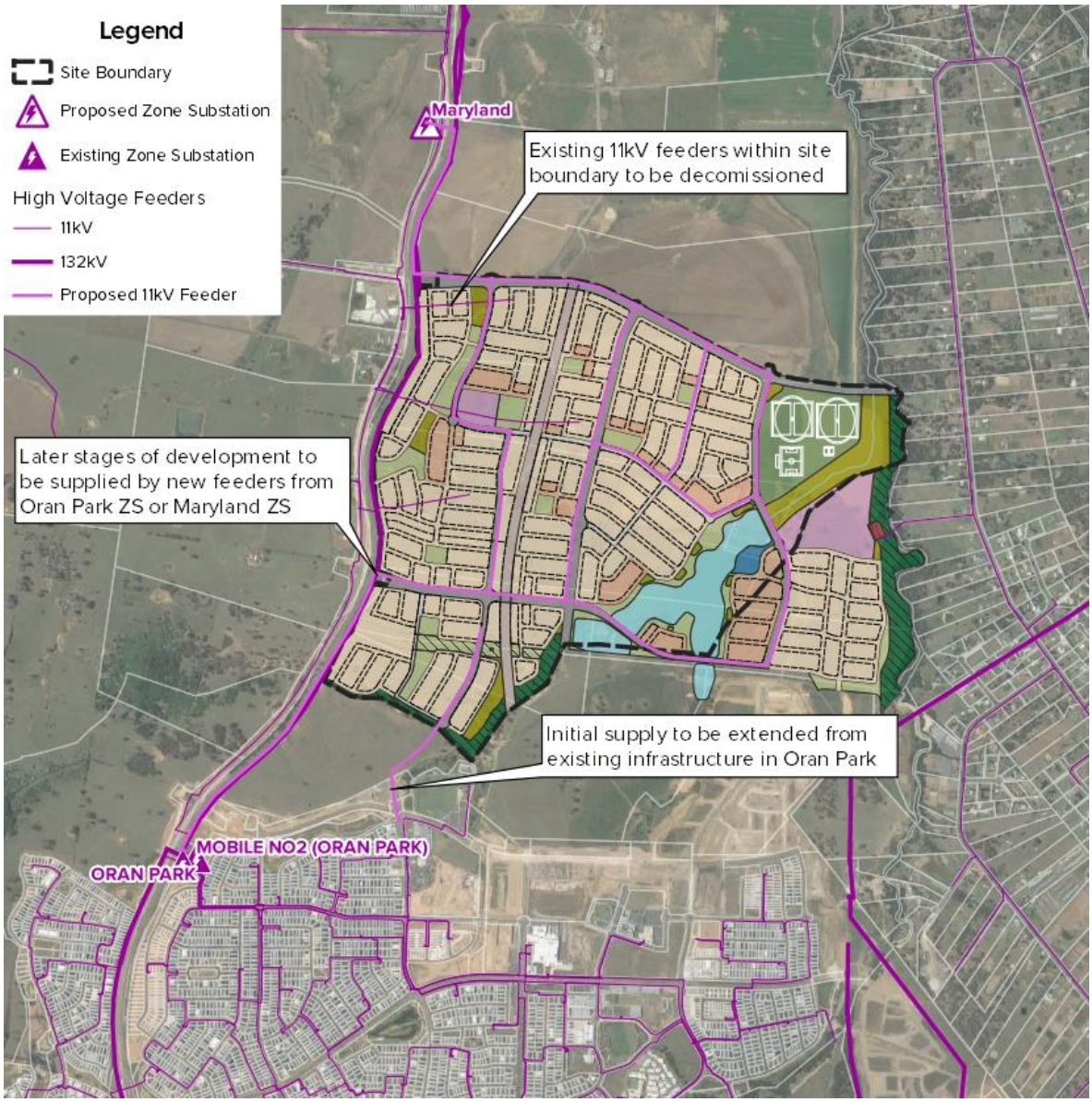
IDC held a meeting with Endeavour Energy on 30th June 2020 to discuss the project. The purpose of the meeting was to introduce the project, discuss existing infrastructure within the study area and determine a servicing strategy to suit the proposed development.

Endeavour Energy stated that the Pondicherry site will receive electrical supply from the Oran Park ZS. The development will likely require three high voltage feeders from the substation. Feeders will be rolled out in roughly 1,000 lot increments.

Initial development within the study area (all of Tranche 41 and part of Stage 2 of the development) will be supplied by extending the existing electrical network from Oran Park from the south. Electrical infrastructure will be extended from the employment land to the south of the Tranche 41 site boundary.

A new 11kV feeder will be required during construction of Stage 2. Future feeders will originate from the Oran Park ZS until the Marylands ZS has been constructed. EE indicated that the delivery timing for the proposed Marylands ZS is still unclear. It should therefore be assumed that as a worst case scenario, all development will be serviced by the Oran Park ZS.

Figure 16 - Proposed Electricity Network



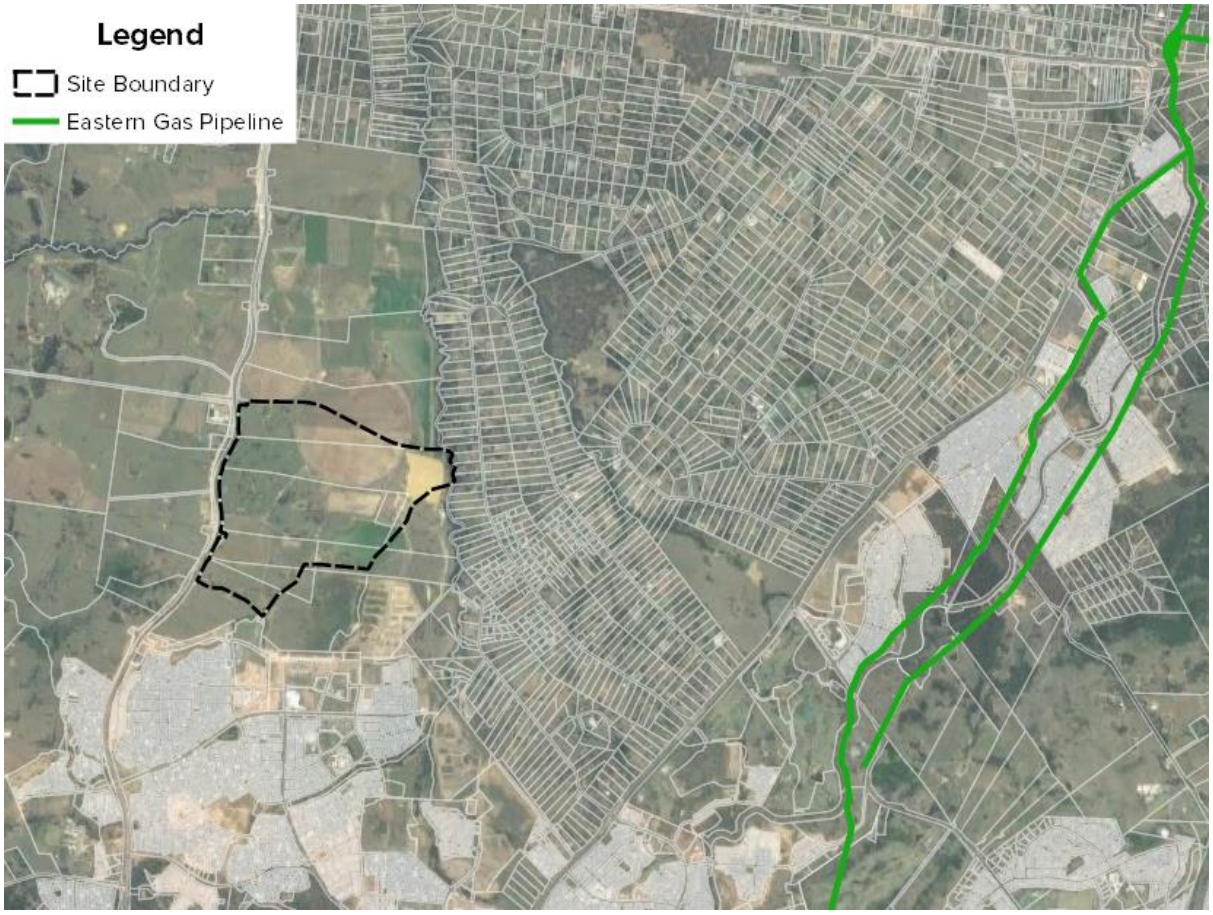
7 Gas

7.1 Existing Network

The site is not currently serviced by the Jemena natural gas network. Gas infrastructure supplies dwellings within the Oran Park precinct, to the south of the site.

The Eastern Gas Pipeline (EGP) is located approximately 5km east of the site boundary. The EGP covers a total length of approximately 800km and transports gas between Gippsland in Victoria to Albion Park, Port Kembla and Horsley Park. The location of this infrastructure relative to the site is shown in Figure 17.

Figure 17 - Eastern Gas Pipeline



7.2 Proposed Network

IDC held a meeting with Jemena on 30th June 2020 to discuss the project. The purpose of the meeting was to introduce the project, discuss existing infrastructure within the study area and determine a servicing strategy to suit the proposed development.

Jemena have indicated that initial gas supply for the Pondicherry site can be leveraged from existing infrastructure within Oran Park. A new feeder main and regulator would be required and would extend from existing infrastructure near the centre of the Oran Park site. This infrastructure is located approximately 1.5km from the Stage 1 access road.

Longer term supply for subsequent stages of development will need to be extended from the secondary main located approximately 3km from the site.

Based on our discussions with Jemena it is understood that the provision of gas supply to the site will not pose a constraint to the development of the site or it's staging.

8 Telecommunications

8.1 Proposed Network

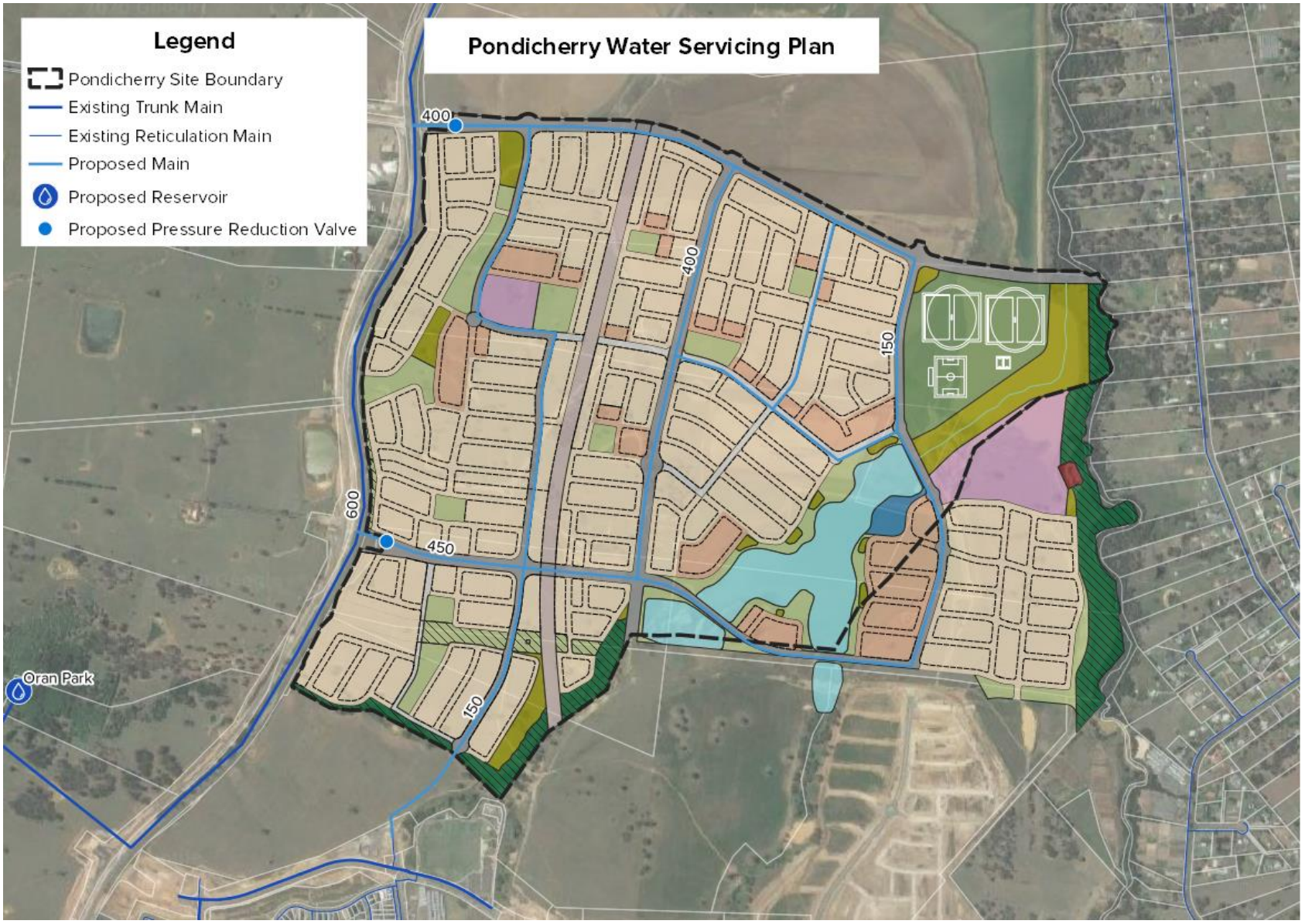
The site will be supplied with telecommunications infrastructure by OptiComm. IDC held a meeting with OptiComm on 1st July 2020 to discuss the project. The purpose of the meeting was to introduce the project, discuss existing infrastructure within the study area and determine a servicing strategy to suit the proposed development.

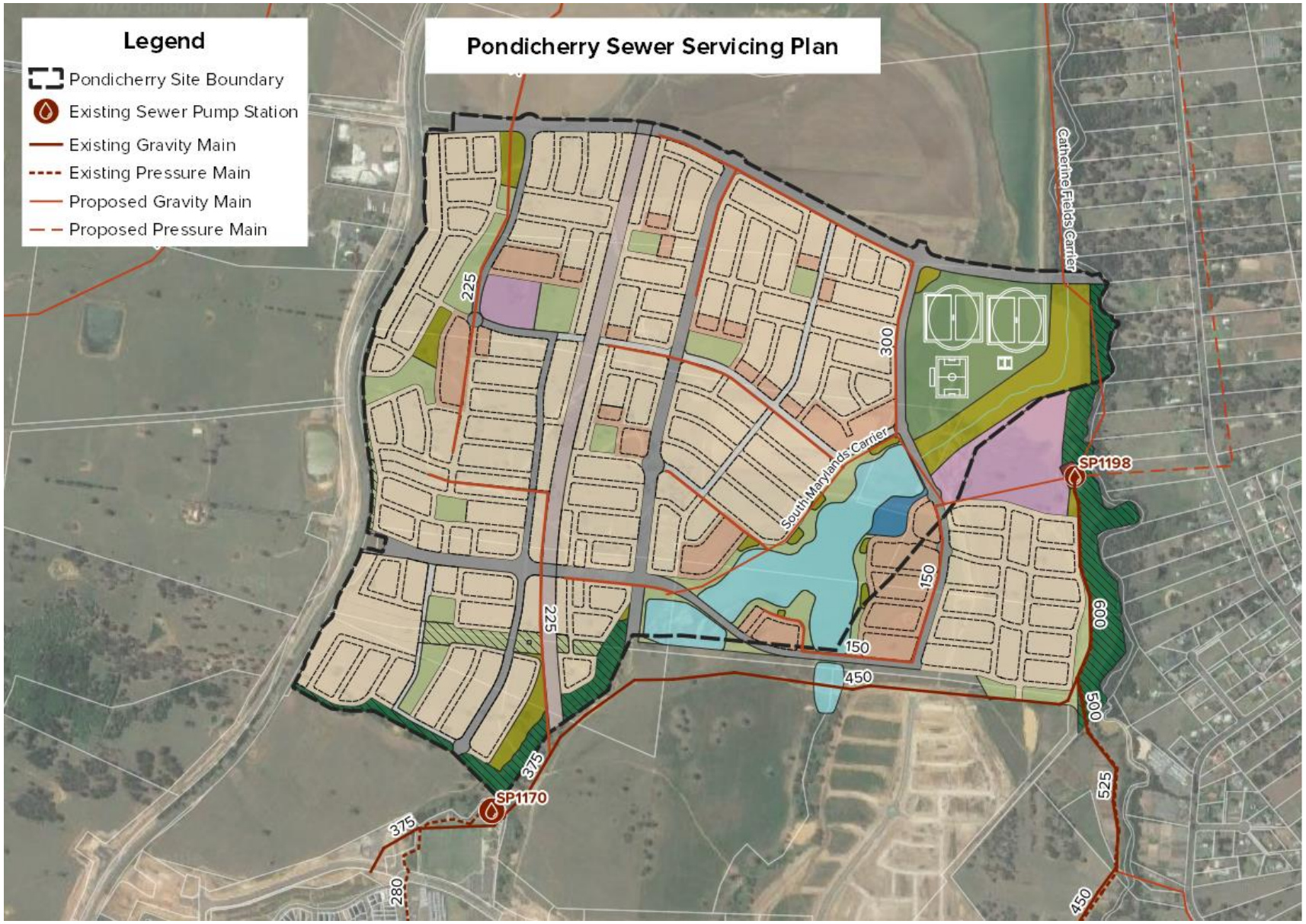
OptiComm have indicated that generally for new developments, they will construct the pit and pipe network within the standard trench allocation in the road reserve of all new roads. Fibre cables are then pulled through the new pit and pipe network to service dwellings. However, in Oran Park the pit and pipe network was constructed by the civil works contractor. It is understood this arrangement will likely be implemented for the Pondicherry site.

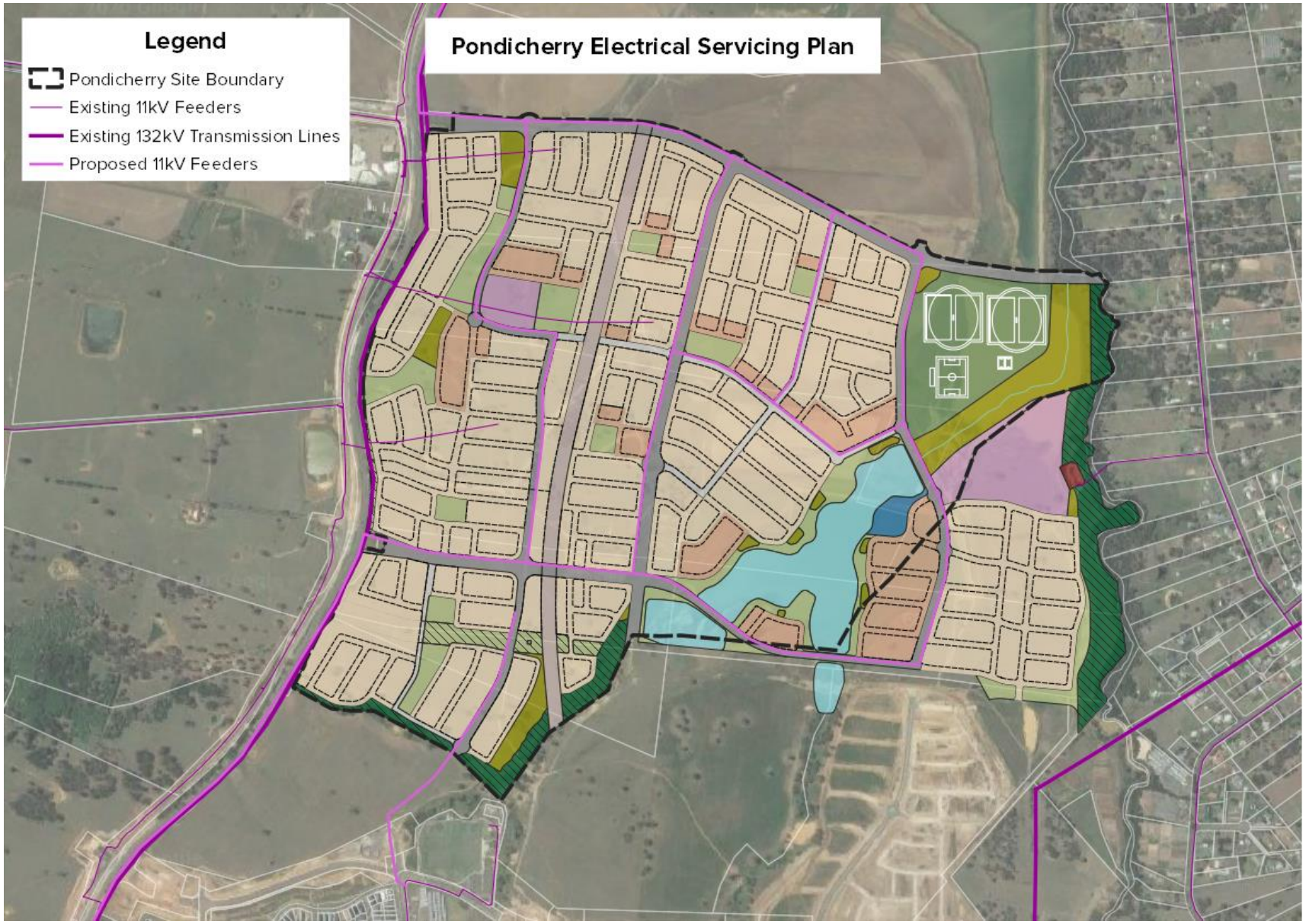
Existing services in the north east area of Oran Park would be extended up to the Pondicherry site to service the proposed development.

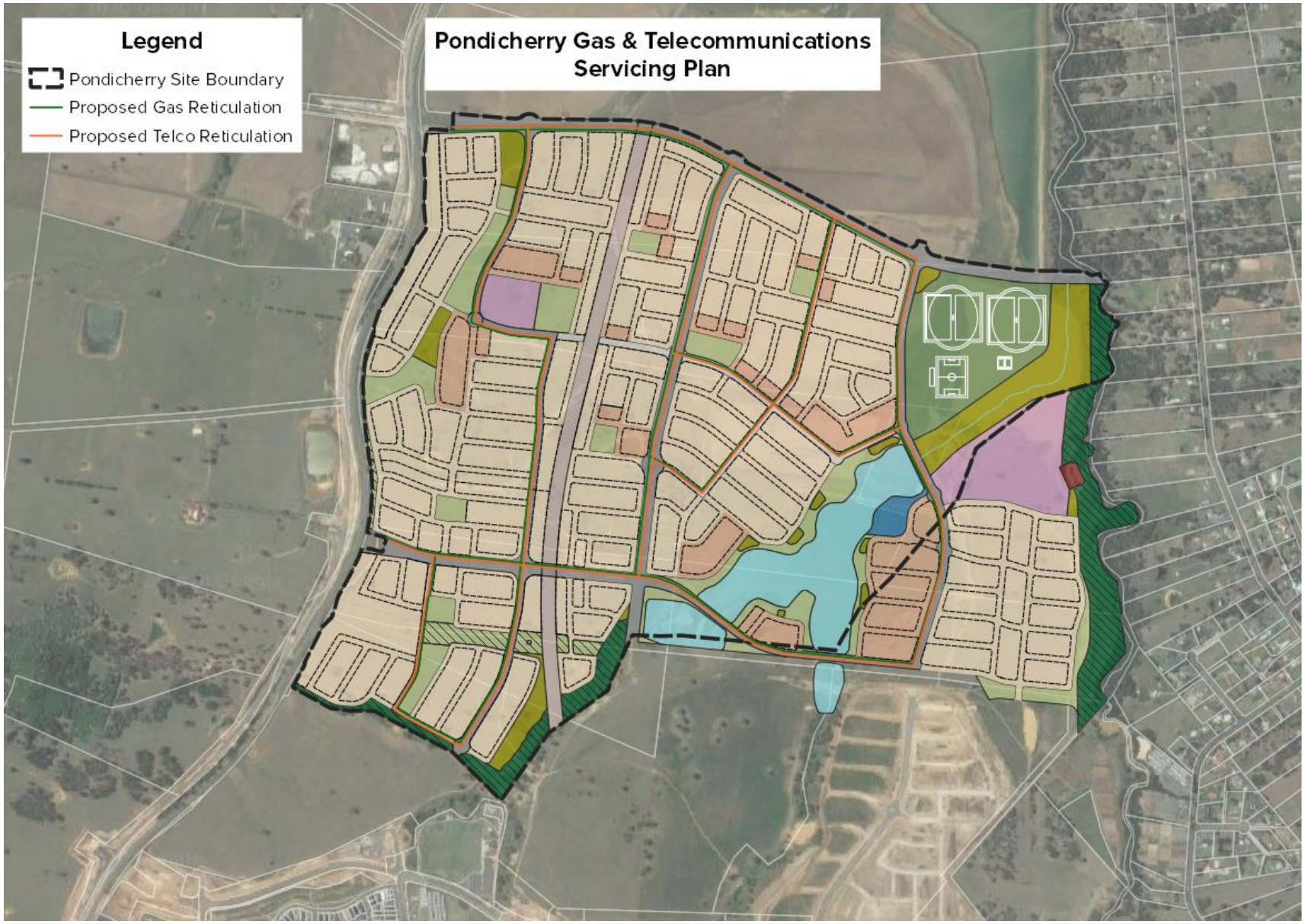
The provision of telecommunications servicing is therefore not expected to pose a constraint to development on the Pondicherry site.

Appendix A – Proposed Servicing Plans




Legend
Pondicherry Site Boundary
Existing Sewer Pump Station
Existing Gravity Main
Existing Pressure Main
Proposed Gravity Main
Proposed Pressure Main
Pondicherry Sewer Servicing Plan
Catherine Fields Carrier
South Maryland Carrier
SP1198
SP1170
225
300
225
150
150
450
600
500
525
375
375
280
450


Legend
Pondicherry Site Boundary
Existing 11kV Feeders
Existing 132kV Transmission Lines
Proposed 11kV Feeders
Pondicherry Electrical Servicing Plan


Legend
Pondicherry Site Boundary
Proposed Gas Reticulation
Proposed Telco Reticulation
Pondicherry Gas & Telecommunications
Servicing Plan