

SYDNEY SCIENCE PARK

INFRASTRUCTURE SERVICES ASSESSMENT



Prepared for:
**APP Corporation on behalf of
E. J. Cooper and Son Pty Ltd**

December 2013

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- DOCUMENT CONTROL SHEET -

Issue No.	Amendment	Prepared By & Date	Checked By and Date	Approved By and Date
A	Draft	BT (27.11.2013)	AT (06.12.13)	DJ (06.12.13)
B	First Issue	BT (10.12.2013)	AT (13.12.13)	DJ (13.12.13)
C	Second Issue	BT (17.12.2013)	AT (17.12.13)	D.J (17.12.13)
Signatures				
File location		J:\9765 - Sydney Science Park Rezoning\Design Report\Infrastructure\9765_InfReport_C_131217_FINAL.docx		

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1 EXECUTIVE SUMMARY

Sydney Science Park is a unique development that will integrate research, development, education, employment and residential land use. The proposed development area is 288 Ha.

J Wyndham Prince has been engaged by APP Corporation to undertake an Infrastructure Services Assessment for Sydney Science Park. The assessment has reviewed the provisions for electrical, sewer, potable water, gas and telecommunication utilities to service the site.

This report summarises the current status of utilities and anticipated servicing requirements to meet the needs of the development. This report has been prepared to support a planning proposal to rezone land at Sydney Science Park.

The service investigations indicate the site can be serviced in the following ways:

Electrical Supply

- Stage 1 can be serviced by two local zone substations.
- A new zone substation is required to amplify the existing electrical infrastructure to adequately service the remaining stages of the development.

Sewer

- A new lead-in service is required to connect the site to Sydney Water's sewer network.

Water Supply

- A new water trunk main needs to be constructed to connect the site to Sydney Waters water supply network.
- A new reservoir or booster pumping station is required to amplify the existing water supply network to provide adequate supply and pressure to the development.

Gas Supply

- A gas main extension is required to connect the site to the gas network.

Telecommunications

- New lead-in services are required to connect the site to the NBN network.

1.1 Electricity Services

Lead-in

Endeavour Energy confirmed the proposed development can be serviced. There is limited capacity at two local Zone Substations (ZS); the Mamre Road ZS located 5.1km north-east of the site and the Luddenham ZS located 3.5km west of the site. The overall development of Sydney Science Park will require the establishment of a new zone substation within or immediately adjacent to the site.

The first stage of the development can be serviced by the two above mentioned zone substations. Construction of new high voltage feeder lines will be required to connect the proposed development to Endeavour Energy's network (i.e. the zone substations).

The remaining stages of the development can be serviced by a new zone substation. The Application to Connect to Endeavour Energy's network will trigger the requirement to construct a new zone substation.

The developer / land owner will need to provide a one hectare site to Endeavour Energy for the new zone substation. The zone substation and sub-transmission lines will be constructed by Endeavour Energy, at their cost.

The site for the new zone substation could be dedicated to Endeavour Energy as part of Stage 1 subdivision. If this occurs, along with facilitating the design and construction phases with Endeavour Energy to fast track these processes, the new zone substation could be operational in 2017.

The design and construction of a zone substation can take three years following the transfer of ownership of the land for the zone substation site.

A commercial agreement will be in place between the developer/ land owner and Endeavour Energy for the transfer of land and delivery of the zone substation.

Internal Reticulation

The HV reticulation network from the new zone substation to service the development will be constructed by the developer.

An application to connect to Endeavour Energy's network needs to be lodged, in reply Endeavour Energy will issue a design brief outlining the requirements to service the proposed development.

1.2 Sewer Services

Lead-in

The site is not currently serviced with Sydney Water's sewer infrastructure.

The proposed sewer servicing strategy for the development is to construct a lead-in sewer from the site to the Mamre Road sewer carrier near the intersection of Mamre Road and Luddenham Road. This location is 4.5km from the site.

The Mamre Road carrier drains to the St Mary's Sewer Treatment Plant which is 13km downstream from the connection point.

The size of the lead-in main will need to be confirmed by sewer modelling. The relative shallow grade between the site and the Mamre Road carrier is a critical factor in determining the lead-in main size. For the purpose of this report we have assumed a carrier size of 1050 mm dia. For the purpose of this report, a 1050mm diameter lead in main has been assumed.

Sydney Science Park falls within the catchment of the St Mary's Sewer Treatment Plant. Sydney Water will need to confirm whether the St Marys treatment plant has capacity to service Sydney Science Park.

Internal Reticulation

A gravity sewer network will suit the undulating site and proposed subdivision. A branched lead in main can service the multiple catchments within the development area. Site regrading and deep sewers will assist the design of a gravity sewer so each catchment can drain to a lead-in line.

Sydney Water's Detailed Planning Process will need to be undertaken to confirm the capabilities of Sydney Water's existing sewer infrastructure, any amplification requirements and the design of the sewer network to service the development. The process can take up to 18 months to complete.

Either a sewer extension or Section 73 Certificate application to Sydney Water will be necessary to commence the overall planning process. Sydney Water will issue a Notice of Requirements and a Developers Agreement to outline the servicing requirements for the proposed development.

1.3 Potable Water Services

Lead-in

The closest bulk water supply is the Orchard Hills Water Treatment Plant and the twin Bringelly Reservoirs located 4.5 kilometres north-west of the site.

The water supply network surrounding Sydney Science Park site is not appropriately sized to service the proposed development. A new trunk main from the Bringelly Reservoirs will need to be constructed by the developer / land owner. This is likely to be a 450mm diameter main.

Given the topography and elevation of the site, it is possible a new surface reservoir may also be required. This will need to be carefully considered in the Detailed Planning Process as alternatives, such as local pressure booster pumps may be more appropriate and cost effective. Initial sizing would suggest that a surface reservoir in the order of 5 ML would be required. This could be located at the existing Sydney Water owned site adjacent to The Northern Road at Luddenham.

Internal Reticulation

Standard water reticulation can adequately service the site, the watermain sizes are likely to be 150mm diameter to 300mm diameter mains.

Either a water extension or Section 73 Certificate application to Sydney Water will be necessary. Sydney Water will issue a Notice of Requirements and a Developers Agreement to outline the servicing requirements for the proposed development.

1.4 Gas Services

Lead-in

The site is currently not serviced by natural gas.

The developer / landowner will need to request a gas service for the proposed development.

Jemena confirmed the proposed development could be serviced by constructing a new 7.7km long, 150mm diameter steel gas main extension. The extension would connect the site to the existing high pressure gas main at the intersection of Martin Road and Elizabeth Drive.

It is likely the developer / landowner will fund the construction of the main extension.

Internal Reticulation

Jemena have confirmed they would install new internal gas reticulation to service the proposed development under their current servicing policies.

An application to Jemena for a gas connection is required. In reply, Jemena will issue a Gas Supply Offer confirming the requirements to service the proposed development.

1.5 Telecommunications Services

Lead-in

NBN Co verbally confirmed the proposed development can be serviced by the NBN network under their current servicing arrangement and policies. The development would be serviced via an extension from the Penrith Network in the first instance, followed by an extension from the future St Marys Network (timing of the rollout in St Marys has not been announced). NBN Co would deliver the lead-in infrastructure to service the site.

The proposed development needs to be registered with NBN Co to commence the service planning.

Future application to NBN Co will formally confirm the details of the provision of the NBN services to the development.

Internal Reticulation

The developer would fund the construction of the pit and pipe reticulation as per the current servicing policies.

2 INTRODUCTION

2.1 The Project

Sydney Science Park is located within the Penrith Local Government Area near the Western Sydney Employment Hub and South West Growth Centre. The site currently falls within the Western Sydney Employment Investigation Area.

The site is bound by the Sydney Water Warragamba Pipeline along the northern boundary; Luddenham Road along the eastern boundary; rural land to the south; Gates Road and The Northern Road to the west. A large number of dams exist within two major water courses traversing the site from the southern boundary to the northern boundary. The water courses flow in the north-easterly direction forming a tributary to Blaxland Creek, flowing on to South Creek. The site has an undulating topography generally sloping towards the north east.

The site is currently registered under two lots listed in **Table 1**.

Table 1 Lot/DP numbers

Lot Number	DP Number	Area (ha)	Owner
201	1152191	87	E.J Cooper and Son Pty Limited
Part 202	1152191	206	E.J Cooper and Son Pty Limited

This Planning Proposal is submitted to Penrith City Council (Council), on behalf of E.J. Cooper & Son Pty Limited (EJC), in support of an amendment to the Penrith Local Environmental Plan (LEP) 2010. The proposal is to rezone a 288 hectare parcel of land at 565-609 Luddenham Road, Luddenham to accommodate a new integrated mixed use research and development, employment, education, retail and residential specialised centre.

The Planning Proposal is supported by a Master Plan, in **Appendix A**, which represents the overall planning framework and preferred outcome for Sydney Science Park. The Master Plan shows the integrated development mainly consisting of research/education precinct, Town Centre, residential precinct, open space, roads and infrastructure. Detail breakdown of the land use is shown in **Table 2**.

Table 2 Land use schedule

Land Use Type	
Residential	3,400 dwellings
Town Centre (Retail Floor Space and apartments)	30,000 m2
Open Space (includes riparian, playing fields and reserves)	832,000 m2
Education Floor Space	100,000 m2
Primary School	-
Employment (Research and Development)	340,000 m2

The planning proposal addresses site servicing and environmental conditions. It is also accompanied by an offer to enter into Voluntary Planning Agreements with State Government and Penrith City Council for the delivery of infrastructure and community facilities that are required to meet the future demands of Sydney Science Park. This includes road network improvements, district and local open space and a community facility.

A full breakdown and description of the proposed development can be found in the Planning Report prepared by APP (December 2013)

The first stage of the development will be a 4.73 ha employment area on the eastern side of the site. Commencement of civil works in the first stage is anticipated to be September 2015, occupation by June 2016.

The later stages will roll out after the first stage is completed over a number of years.

2.2 Scope of this Assessment

This Infrastructure Assessment reviewed the following services proposed to for the Sydney Science Park development.

Table 3 Primary Services Supplier

Services	Primary Services Supplier
Electricity	Endeavour Energy
Sewerage	Sydney Water
Potable Water	Sydney Water
Natural Gas	Jemena
Telecommunications	NBN Co

J Wyndham Prince contacted each of the primary service suppliers listed in **Table 3** to establish an understanding of the service networks status and capabilities to service the proposed development.

This report identifies the likely servicing opportunities and constraints, and provides an outline the requirements to adequately service the proposed development.

This report can be used to support the master planning and rezoning process for the development.

The proposed master plan is shown in **Plate 1**.

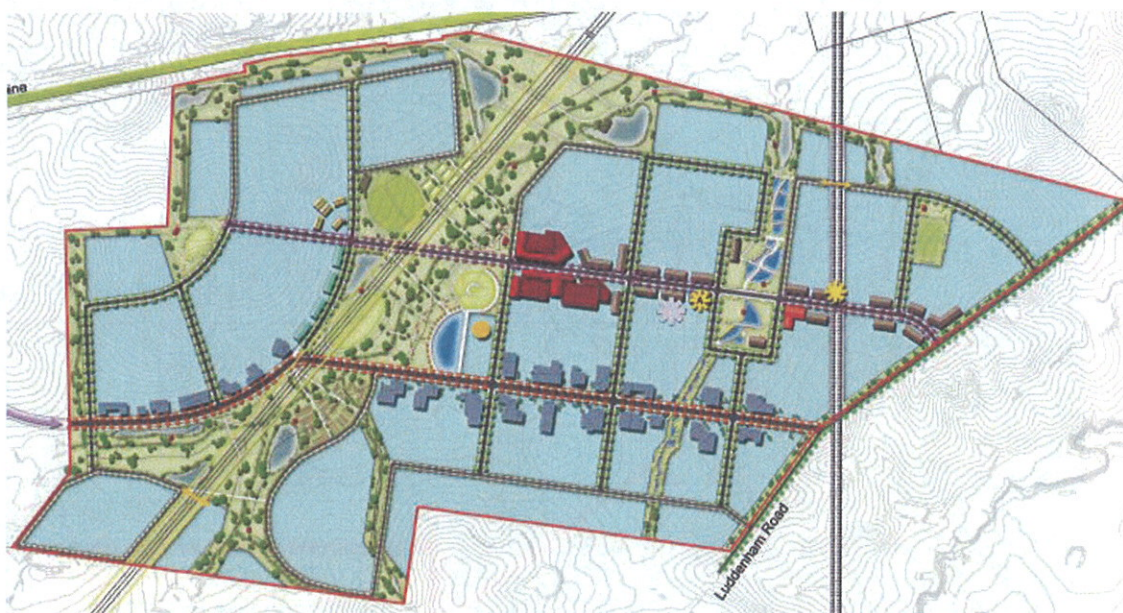


Plate 1 Sydney Science Park Master Plan 11122013 - Rev 4

3 UTILITIES ASSESSMENT

3.1 ELECTRICITY

Endeavour Energy is the energy supply authority for the site.

J. Wyndham Prince submitted a Connection of Load Enquiry application with Endeavour Energy on 14 August 2013. Endeavour Energy undertook a high-level review of the electrical network and development proposal. They confirmed the development could be serviced by the existing electrical infrastructure; however amplification of the network will be required.

Endeavour Energy stated spare capacity within the electrical network cannot be reserved until a formal application is lodged.

A TransGrid-owned 330kV transmission line passes through the site. This infrastructure is part of the Sydney West regional network and cannot be used as a direct power supply to the

development. The transmission lines are within a 60m wide easement. The proposed development layout will be designed to incorporate this easement.

Plate 2 outlines the location of the transmission line within the development site, and the single circuit steel towers shown in **Plate 3** traverse the site

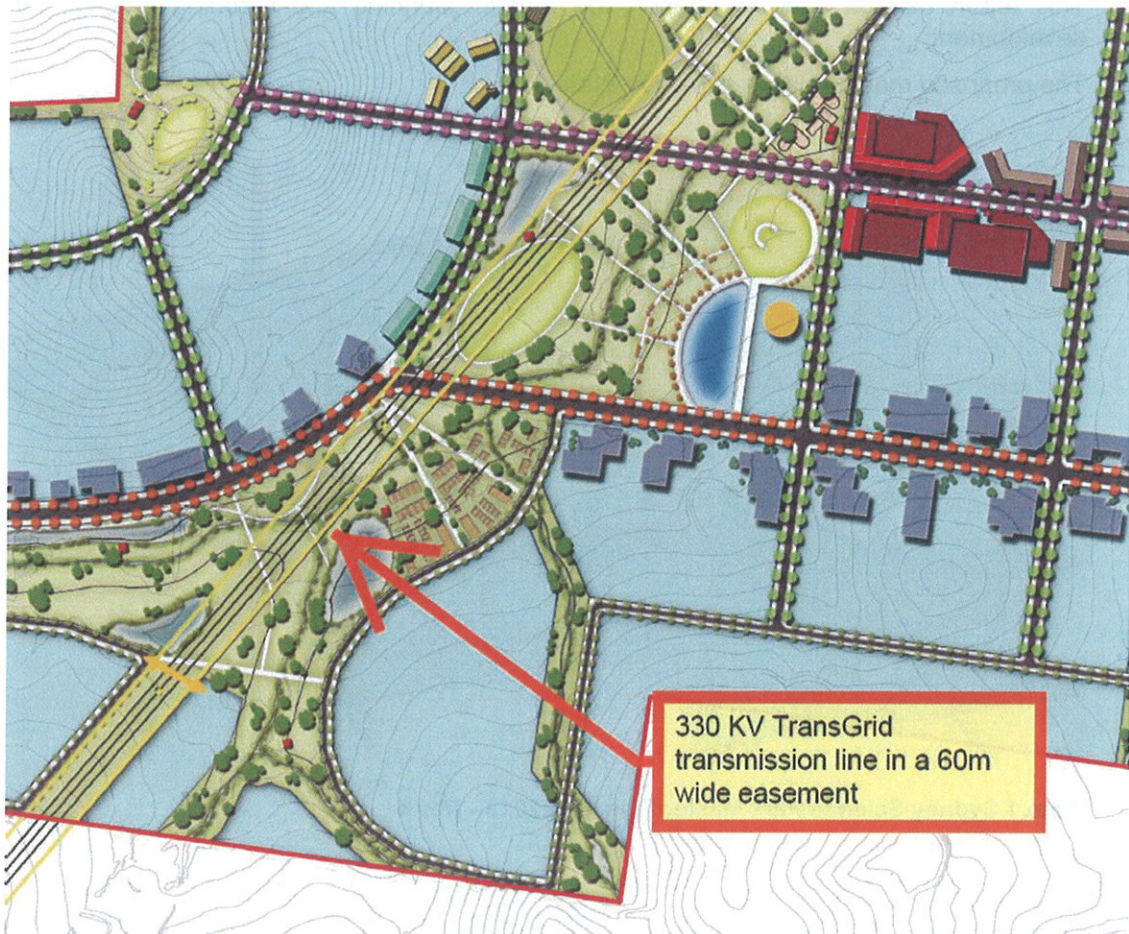


Plate 2 TransGrid transmission line easement (approx.)

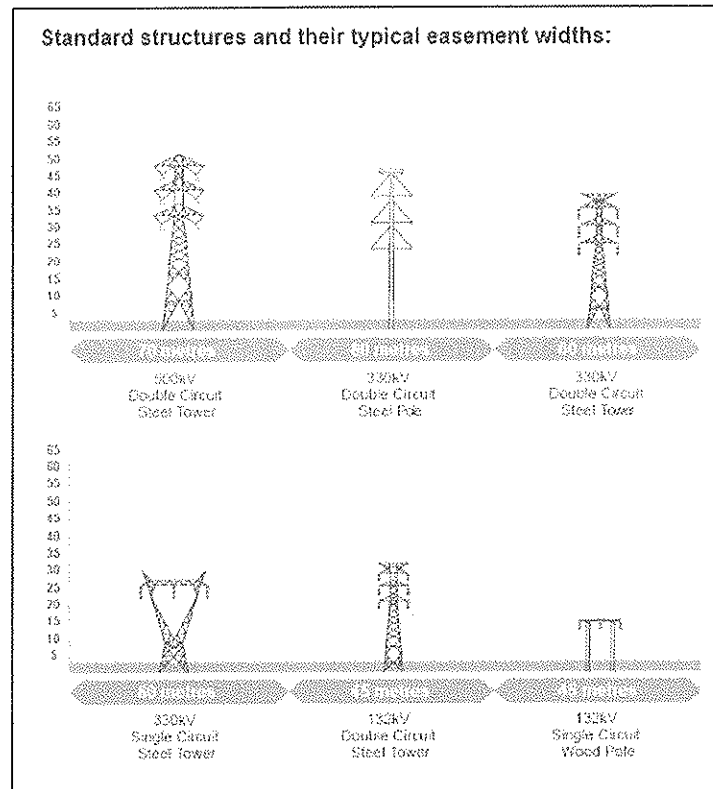


Plate 3 Transgrid transmission towers

3.2 Existing Network and Capacity

Endeavour Energy operates two local zone substations and High Voltage (HV) overhead electrical lines adjacent to the site. The zone substations provide bulk power to supply zones, whereas the HV lines provide a power supply from the zone substations to individual sites. The local zone substations are listed in **Table 4** and their locations outlined in **Plate 4**.

Endeavour Energy confirmed 5 MVA of power is available from the Luddenham ZS and 5 MVA from the Mamre Road ZS. The Kemps Creek ZS was not considered a suitable power source for the project due to the distance from the site.

Endeavour Energy advised another local project is due for completion in early 2014. Afterwards, the Mamre Road ZS available capacity will be reduced to 1.5MVA.

The first stage of the development can be serviced by the Mamre Road and Luddenham ZS. New high voltage feeder lines will need to be constructed to connect the site to these zone substations.

A new zone substation will be required to amplify Endeavour Energy's network to adequately service the remaining development stages.

Table 4 Local Zone Substation

Name	Location	Distance from the site	Available Capacity
Luddenham ZS	The Northern Road, Luddenham	3.5km	5MVA up to 2014 1.5MVA beyond 2014
Mamre Road ZS	John Morphette Place, Erskine Park	5.1 km	1.5MVA
Kemps Creek ZS	Cross St/Devonshire Road , Kemps Creek	6.6 km	Unknown

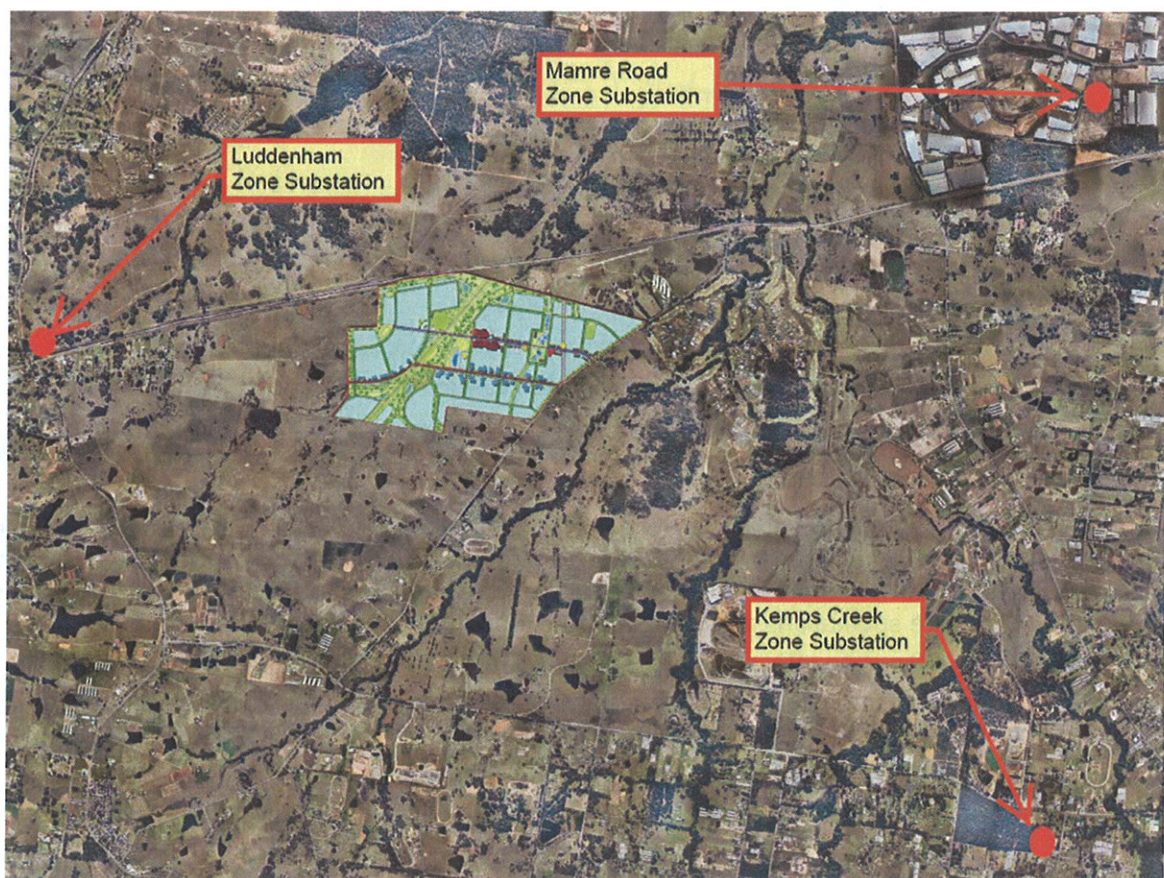


Plate 4 Existing Zone Substations

Plate 5 outlines the location of the existing overhead HV adjacent to the site. Endeavour Energy confirmed Sydney Water own the power line running parallel to the northern boundary of the site and is not available to service the development. HV lines located in Gates Road and Luddenham Road have the ability to service the development but require amplification.



Plate 5 Overhead High Voltage Lines

3.3 Power Demand Estimate

J. Wyndham Prince estimated power demand for Sydney Science Park is based on the development yields listed in **Table 5** and Endeavour Energy's average land use demands. The estimated demand calculation assumes the site is serviced by natural gas.

Table 5 Estimated Power Demand for Sydney Science Park

Name	Unit	Rate	Total Usage (MVA/day)
Residential Dwellings	3,400 dwellings	8 kVA	27.2 MVA
Employment, Retail and Education	470,000 sq m	0.044 kVA	20.7 MVA
Total			47.9 MVA

The total demand of 47.9MVA exceeds the combined spare capacity presently available at the existing local zone substation stated in Table 4. A new zone substation is therefore required to service the development.

The first stage of development is 4.73 ha of employment land use; the estimated power demand for the first stage is 2MVA. This demand is included in the 47.9MVA stated above.

The first stage of development is located on the eastern side of the site and is scheduled to commence September 2015; occupation by June 2016.

First development stage can be serviced by the Mamre Road ZS and the Luddenham ZS.

The new zone substation is required to service the following development stages by 2017.

It is recommended to complete the transfer of land to Endeavour Energy for the new zone substation site in 2014. This will allow three years to complete the design and construction of the zone substation by 2017.

Applications to Connect to Endeavour Energy's network should be lodged no later than 2014 to secure the spare capacity in the local substations for stage 1 and trigger the planning process for the new zone substation for the following stages.

3.4 Zone Substation

The new zone substation will be required to amplify the existing electrical network to continue to service the development beyond first stage.

A 1Ha site is required for a new zone substation. The landowner / developer will need to dedicate and handover an appropriate site to Endeavour Energy. The preferred location for the new zone substation is on the eastern side of the development, adjacent to the early stages of the development. The detailed planning for the subdivision layout will confirm the exact location of the new zone substation site, the preferred location for the substation is

The site for the new zone substation could be dedicated to Endeavour Energy as part of Stage 1 subdivision. If this occurs, along with facilitating the design and construction phases with Endeavour Energy to fast track these processes, the new zone substation could be operational in 2017.

The design and construction of a zone substation can take three years following the transfer of ownership of the land for the zone substation site.

The planning of the zone substation will need to commence in 2014 to ensure the timely completion to service the development.

The cost of constructing a zone substation is estimated at \$15M. New sub-transmission lines need to be constructed to connect the zone substation to the energy grid. These works will be funded by Endeavour Energy.

3.5 Electrical Internal Reticulation

The internal electrical network will include local pad mounted transformer/substations, high voltage feeder lines and low voltage reticulation lines.

A typical pad mounted substation can supply approximately 500kVA. Approximately 96 pad mounted substations will be required for the development. The first stage will require 4 pad mounted sub stations.

New high voltage feeder lines will supply power to each pad substation. Up to five 11kV feeders may need to be constructed to service these sub stations.

The low voltage reticulation will provide connections between the pad mounted sub stations and individual lots.

The internal reticulation works will be constructed and funded by the developer.

4 SEWER AND WATER INFRASTRUCTURE

The Sydney Science Park is located within the Sydney Water area of operations and therefore all sewer and water infrastructure will be designed and constructed to Sydney Water requirements and standards.

Sewer and water services can be provided by a number of utility suppliers (in accordance with the Water Industry Competition Act 2006); however Sydney Water is a supplier of both services and is the primary supplier within the Sydney metropolitan region. Consultation has solely been undertaken with Sydney Water for the purpose of this report.

4.1 Consultation

Sydney Water confirmed they do not have any current plans to upgrade the existing water and sewer infrastructure that may benefit Sydney Science Park. They have also indicated they have not undertaken any studies to further expand their services in the area.

In order to confirm the capacity of the sewer and water infrastructure, Sydney Water's Detailed Planning Process will need to be undertaken. This is a 35 step process that can take up to 18 months to complete. A Water Servicing Coordinator will need to be engaged to complete this process. The Detailed Planning Process will involve system modelling, system analysis, design calculations and risk based cost estimates in conjunction with Sydney Water. The process will determine Sydney Waters servicing requirements, existing infrastructure capabilities and the necessary asset amplification required to adequately service the new development.

With this in mind, the sewer and water provisions stated in the report are based on J. Wyndham Princes understanding of the site, the surrounding infrastructure and recent service investigations.

The Detailed Planning Process May take up to 6 months while the detailed design and design approval may take an additional 12 months. It is recommended to commence the planning and concept works as soon as possible to meet the development program.

4.2 SEWER SERVICING

4.2.1 Sewer Assets

The site is currently not serviced by Sydney Water sewer infrastructure. The proposed development can be serviced by the construction of new connection to Sydney Water's sewer network.

Sewer Treatment Plant

Current reviews suggest the St Marys Wastewater Treatment Plan (WWTP) has sufficient capacity to service the development, or at least in the early stages. If there are capacity constraints with the treatment plant that may affect the ultimate development of the Sydney Science Park, it is understood Sydney Water will need to address this to accommodate the development requirements of the NSW Government.

Sydney Science Park falls within the catchment of this treatment plant.

Sewer Carrier

The nearest carrier main is 5km to the north/east of the site, near the Mamre Road/Luddenham Road intersection. The carrier drains to the St Marys Treatment and Recycling Plant off Links Road, some 13km to the north of the site.

Sydney Water "Hydra" database indicates the section of the carrier at intersection of Mamre and Luddenham Rd is a 750mm diameter main; however the carrier increases in size to a 1200mm diameter pipe upstream of the intersection towards Erskine Park. The increase in the carrier size upstream from the treatment plant is unusual and it has been assumed that the upsizing was likely done to increase the capacity of the carrier to overcome the relative shallow grade of the carrier.

It is likely the Mamre Road carrier can service the development. Sydney Water will confirm this in their response to the Feasibility Application current lodged.

4.2.2 Sewer Disposal Demand Estimate

J. Wyndham Prince used the Sewage Code of Australia (Sydney Water Version) to determine the sewage disposal demand for Sydney Science Park.

Table 6 outlines the Average Dry Weather Flow (ADWF) estimates. For the purpose of estimating the ADWF for the residential precinct, an average of 3 Equivalent Population (EP) per dwelling has been used.

The open space total area is 83.2 ha, including all the channels, riparian, basins and stormwater treatment areas, playing field and landscape buffer. For the purpose of the sewerage demand estimate, half the area of the open space is used.