North Penrith

Utilities Servicing report

Summary

This report outlines the proposed servicing strategies for the North Penrith development and Stage 1 of the North Penrith development. This report also details measures that would need to be undertaken to ensure existing services are maintained to the Penrith Training Depot.

A review of the background documentation and initial discussions with service authorities indicate that the North Penrith development site is well served by all utility services and it is not envisaged that existing servicing capacity will be a constraint to the viability of the proposed development.

The proposed servicing strategies for the North Penrith development and Stage 1 of the North Penrith development are illustrated on **Figure 2** and **Figure 3** respectively.

Objectives

Director General's Requirements (*DGR*s) for the North Penrith Defence Site (MP 10-0078) Concept Plan were issued on 2 July 2010. The Utilities Servicing Report addresses points (1) and (2), (3) & (4) under Section 13 in the DGR's headed *"*Utilities and infrastructure*"*. These requirements include:

(1) *"Prepare a utility and infrastructure servicing report and plan for the site that includes (but is not limited to):*

- *(a)* *Identification and assessment of the capacity of existing utility and infrastructure servicing the site;*
- *(b)* *Identification and assessment of all necessary augmentation works to service the site;*
- *(c)* *How infrastructure will be managed by each stage of the development.*

(2) *Identify the proposed sources of water supply for the development including any reliance on groundwater or local catchments*

(3) *Address water sustainability and efficiency principles including opportunities for waste water re-use within the development.*

(4) Identify projected recurrent costs for any elements of infrastructure likely to be managed by Council on an ongoing basis."

The objectives of this report are as follows:

- to describe the existing utility services located within the vicinity of the North Penrith site;
- to outline the proposed servicing strategy for the North Penrith development; and
- to outline the proposed servicing strategy for Stage 1 of the North Penrith development;
- to describe the timing of service delivery to the Penrith Commuter Car Park; and
- to nominate how the Penrith Training Depot can be serviced independently from the North Penrith development.

Methods and findings

The servicing strategies have been prepared based on a detailed review of background information at the site and initial discussions with service authorities. Feasibility application documentation and supply application documentation has been submitted to Sydney Water and Integral Energy respectively.

The key findings arising from the background information review and initial discussions with service authorities are:

- the North Penrith development will require a sewer pumping station;
- it is likely that moderate amplification of the existing sewer network will be required (*pending the results of the Sydney Water feasibility study*);
- the North Penrith development site has an abundance of water main infrastructure in its vicinity that has sufficient capacity to service the expected load demands;
- it is likely that four connection points will be made to existing water main infrastructure (*pending the results of the Sydney Water feasibility study*);
- the North Penrith development can be serviced by the Penrith Zone Substation located to the west of the development site;
- the North Penrith development will require three 11 kV feeders to meet the anticipated electrical load demands;
- the North Penrith development telecommunications system design will be compliant with the Federal Government's National Broadband Network (NBN) policy, the telecommunications infrastructure servicing each property at North Penrith will be a

fibre-optic based network provided and maintained by Telstra and/ or other telecommunications providers ('the Providers').

- the North Penrith development will require connections to be established off existing infrastructure located in Castlereagh Road and Coombes Drive;
- approximately 150 m of telecommunication lead in works will be required to fibre optic cable into the development;
- the development will not rely on the extraction groundwater or the collection of stormwater runoff from local catchments to service demand;
- in order to satisfy BASIX requirements, a 3kL rainwater tank will be provided upon each residential lot. Collected roof water will be re-used for toilet flushing and outdoor irrigation;
- the North Penrith development can be serviced by existing high pressure gas mains located nearby to the development;
- connections to high pressure gas mains will be required at Castlereagh Road and at Coombes Drive;
- approximately 150 m of gas main lead in works will be required to supply gas within the proposed development; and
- the proposed servicing strategy will not generate any recurrent costs for Council.

Consultation
In developing the servicing strategy WorleyParsons has consulted with:

- Integral Energy;
- Telstra;
- Jemena; and
- Landcom
- Penrith Council, and;
- Sydney Water Corporation.

Conclusions

There is an abundance of existing servicing infrastructure located around the North Penrith development site. Investigations and preliminary discussions with service authorities indicate that existing infrastructure has the capacity to service the anticipated loads generated by the development.

The proposed servicing strategies for the North Penrith development and Stage 1 of the North Penrith development are illustrated on **Figure 2** and **Figure 3** respectively.

The Penrith Commuter Car Park will be completed prior to any construction works occurring on the North Penrith development. As such, the Commuter Car Park will need to install temporary utility servicing arrangements. The provision of services to the Commuter Car Park via the North Penrith development will be outlined as part of the Stage 2 Project Application.

The Penrith Training Depot can maintain access to all existing services. However, an alternative connection point for high voltage electricity will be required. This connection could be made from The Crescent or via the North Penrith development.

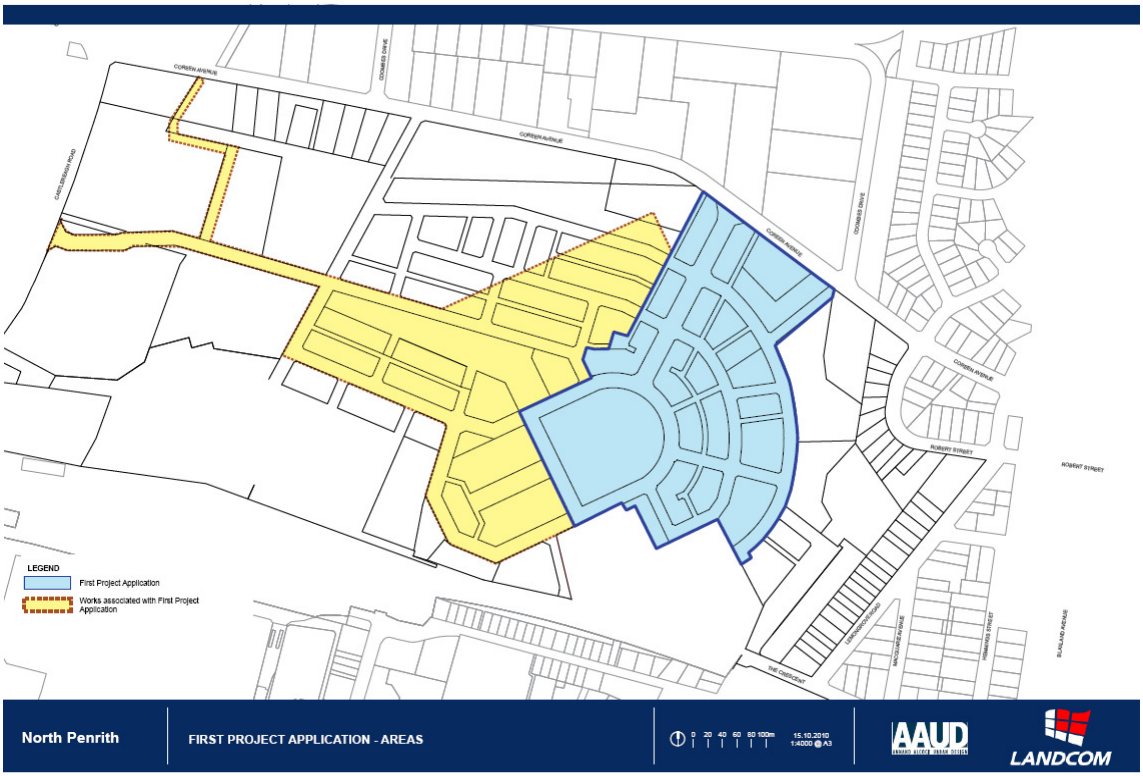
Recommendations

The site is nominated on the Metropolitan Development Program (*MDP*) for delivery in the medium term (2013/14 – 2017/18). The program nominates 850 dwellings. In response, '*Sydney Water's Growth Servicing Plan July 2010 to June 2015*', indicates that development can be serviced by connection to existing infrastructure, though some augmentation works may be required.

This report outlines a proposed servicing strategy for the North Penrith Concept Plan and for the Stage 1 Project Application. The proposed Concept Plan and Stage 1 are shown on **Diagram 1** and **Diagram 2** respectively. The proposed servicing strategies have been prepared based on detailed review of previous investigations and based upon preliminary discussions with service authorities and Landcom.

Diagram 1 North Penrith Concept Plan layout

Diagram 2 Stage 1 boundary



Although official correspondence from Sydney Water or Integral Energy has not been received, it is anticipated that the advice will generally be consistent with the advice provided previously in 2009 and 2002.

The servicing strategies for the North Penrith Concept Plan and Stage 1 Project Application will be subject to refinement during the detailed design process. The following will be required during detailed design:

- *Consultation with Sydney Water is required with regard to streamlining the Asset Creation Developer Process and for consent over the use of a proprietary sewage pumping station".* JWP 2010.

- Consultation with Sydney Water must be expediated to ensure that the approval pathway for the sewer pumping station is streamlined;

- discussions relating to the fibre optic network tendering process are required so as to have adequate time to consider the submissions that offer the most beneficial and cost effective telecommunications infrastructure package. This relates to the likes of initial capital investment for lead-in works versus cost of property reticulation works versus end user benefits. Early discussions with the Providers will also confirm infrastructure delivery can be scheduled in accordance with the overall development program.

- sewer modelling of the existing sewer network to determine the extent of any required amplification works;

- modelling of the existing potable water network to determine the extent of any required amplification works;

- discussions with Sydney Water to minimise the extent of lead in works for sewer and water services required as part of Stage 1;

- optimisation of rainwater tank sizes on each residential lot to satisfy BASIX requirements;

- discussions with Integral Energy to confirm the extent of lead in works and the proposed internal electrical network is satisfactory;

- discussions with Jemena to confirm the extent of the lead in works and the proposed internal gas network is satisfactory;

- confirmation of a shared trenching arrangement between Telstra, Integral Energy and Jemena;

- allowance for existing servicing arrangements to be maintained to the Penrith Training Depot;

- provision of utility services to meet the demands of the Community Pavilion;

- discussions with Penrith City Council to establish their intent to irrigate the oval with recycled water; and
- review of the proposed servicing strategy against the required drainage infrastructure to minimise clashes.

Contents

1. Objectives of assessment

At a glance

A utilities servicing assessment has been undertaken on behalf of Landcom to establish servicing strategies for the North Penrith Concept Plan and Stage 1 Project Application. Additionally, this assessment establishes a strategy for maintaining service connections for the Penrith Training Depot.

Objectives

This report has been commissioned to establish a utility services (*sewer, potable water, gas, telecommunications and electricity*) strategy for the North Penrith development. This report will outline:

- the existing utility services located within the vicinity of the North Penrith site;
- the strategy for maintaining services to the Penrith Training Depot;
- the proposed servicing strategy for the North Penrith development; and
- the proposed servicing strategy for Stage 1 of the North Penrith development.

The objective of this assessment is to determine a utility services strategy for the North Penrith development. This assessment considers the capacity of existing networks, potential connection points, internal reticulation of services and staging for all utility services.

2. Site analysis

At a glance

The North Penrith development site is bounded by servicing infrastructure for potable water, sewer, electricity, gas and telecommunications. The purpose of this chapter is to outline the location and extent of existing servicing infrastructure in the vicinity of the North Penrith development site. Additionally, this chapter also describes the existing servicing arrangement to the Penrith Training Depot[*].

Identification of the capacity of existing utilities and infrastructure

The extent of existing services surrounding the North Penrith development site is shown on **Figure 1**. The existing services are described below under the relevant sub-headings.

Potable Water
There are numerous existing water mains in the vicinity of the North Penrith development site, including:

- a DN600 water main on the southern side of Coreen Avenue;
- a DN200 water main on the northern side of Coreen Avenue;
- a DN150 water main in The Crescent;
- a DN375 water main running along the southern boundary of the North Penrith development site; and
- a DN200 water main located in the Castlereagh Road.

Sewer
There are numerous existing sewers in the vicinity of the North Penrith development site, including:

- a DN450 carrier in Coreen Avenue;
- a DN225 main in the south eastern corner of the North Penrith site;
- a DN150 main in the bottom south eastern corner of the North Penrith site;
- a DN 225 main located adjacent to the existing access road to the commuter car park on the northern side of the station; and
- a DN 225 main just falling short of the most western extremity of the North Penrith site.

[*] Historically the Penrith Training Depot has been referred to the as "MUD" (*Multi User Depot*) site.

Electricity
The Penrith Zone Substation is located near the western boundary of the North Penrith site. Accordingly, there are numerous high voltage and low voltage electricity services surrounding the North Penrith site including:

- 32 kV and 133 kV Integral Energy high voltage transmission assets exist to the south of the site;
- privately owned Department of Defence high voltage overhead line and a privately owned Rail Corporation high voltage overhead line (*both 11 kV*) are located within the North Penrith development site; and
- low voltage overhead lines are generally aligned with the local road network.

Telecommunications
Telecommunications infrastructure is located both within and around the North Penrith development site. Optical fibre cables are located in Castlereagh Road, at the Coombes Drive / Coreen Avenue intersection and at the western end of the The Crescent. Existing copper cable generally follows the local road network.

Within the North Penrith development site there is an extensive copper cable. These copper cables would have serviced the former buildings / warehouses that once populated the North Penrith development site.

Gas
The North Penrith development site does contain an existing connection to gas. However, existing gas infrastructure is located within the vicinity at the Coombes Drive / Coreen Avenue intersection and along Castlereagh Road.

Existing services arrangement to the Penrith Training Depot

A full description of the existing servicing arrangement of the Penrith Training Depot has been undertaken by WorleyParsons in a 2008 report entitled, '*Preliminary Existing Servicing and Drainage Investigation, Multi User Depot, Penrith*'. The Multi User Depot, Penrith is now identified as the "Penrith Training Depot".

Summaries of the existing arrangements to service the Penrith Training Depot are provided below under the relevant sub-headings.

Potable Water
Plans provided by Sydney Water show that the Penrith Training Depot is serviced for potable water via a 150mm diameter cast iron cement lined (*CICL*) pipe located in The Crescent.

Sewer
Plans provided by Sydney Water show that the Penrith Training Depot is serviced for sewer via a 225mm diameter vitrified clay pipe (*VCP*) that runs from the north-eastern corner of the Penrith Training Depot through to existing sewer infrastructure located on the southern side of the rail corridor.

Electricity

The Penrith Training Depot is serviced by a high voltage above ground line from Coreen Avenue. An overhead connection is afforded to the Penrith Training Depot via an elaborate overhead network that traverses portions of the existing Penrith commuter car park and the North Penrith development site.

Telecommunications

Plans provided by Telstra show that the Penrith Training Depot is serviced for telecommunications via a 35mm diameter plastic conduit that runs along The Crescent.

Gas

No gas pipeline extends within the Penrith Training Depot or the North Penrith development site. Gas is currently delivered to the site and stored in bottles. This arrangement is conducted on a supply and demand basis.

Existing services in the North Penrith site

Existing utility services infrastructure is located within the North Penrith site. Historically this infrastructure would have serviced Department of Defence buildings present on the site. Services include:

- high voltage electricity;
- telecommunications;
- potable water; and
- sewer.

Strategies for dealing with the existing utility services infrastructure within the North Penrith development are outlined below under the relevant sub-headings.

High voltage electricity

The existing high voltage electricity infrastructure will be removed from the North Penrith development site. Measures will be undertaken to ensure that the Penrith Training Depot maintains its connection to the high voltage network during the construction phases of the development and beyond. Such measures may include:

- establishment of a new high voltage connection point of The Crescent; or
- providing a high voltage connection via the proposed development.

Telecommunications

Existing telecommunications infrastructure can be found within the North Penrith site. This infrastructure generally extends from The Crescent to the location of former building footings.

The telecommunications infrastructure is redundant and will be removed during the construction phases of the North Penrith development.

Potable water

An existing 375 mm water main runs from The Crescent through the Penrith Training Depot before traversing the North Penrith development site and the Commuter Car Park.

Advice provided from Sydney Water is that this existing water main is to be retained.

During preliminary discussions Sydney Water has advised that they have a preference for the North Penrith development and the Commuter Car Park to not connect into the existing 375 water main. It is understood that at some point in the future, Sydney Water has the intention of making this water main redundant.

Sewer

An existing sewer line runs from the eastern boundary of the North Penrith development towards the Penrith Training Depot prior to connecting into carrier main infrastructure located on the southern side of the Great Western Railway corridor.

The existing sewer line does not service any properties upstream of the Penrith Training Depot. Pending the results of the Sydney Water feasibility study for the proposed development and the adopted sewer servicing strategy for the North Penrith development, two options exist for the treatment of the existing sewer line:

1. maintain the existing sewer line and connect a portion of the proposed development into the line (*pending the results of the Sydney Water feasibility application*); or

2. remove the existing sewer line between the eastern boundary of the site and the Penrith Training Depot if it is not required as part of the sewer servicing strategy.

3. Methods and results

At a glance

A series of background documents and desktop studies were undertaken to assist in the preparation of servicing strategies for the North Penrith Concept Plan and Stage 1 Project Application and to ensure that the Penrith Training Depot maintains access to services despite the development taking place.

The following documentation and processes were undertaken:

- lodgement of a feasibility application to Sydney Water;
- lodgement of an application to Integral Energy;
- collection of detailed survey data (*provided by Craig and Rhodes*);
- preliminary discussions with service authorities;
- desktop services search (*Dial Before You Dig*); and
- review of the following reports:
    - '*North Penrith Sewage Pumping Station Assessment/Options Report*', J Wyndham Prince, August 2010;
    - '*Preliminary Existing Servicing and Drainage Investigation, Multi User Depot, Penrith*', WorleyParsons, 2008;
    - '*North Penrith Defence Land Services Report*', J Wyndham Prince, April 2009;
    - '*Department of Defence Thorton Park Sewerage Servicing Plan – Preliminary Options Investigations*', GHD, May 2004; and
    - '*North Penrith Urban Area Redundant Defence Lands Services Feasibility Report and IT Masterplan*', Egis, March 2002.

The outcomes of any relevant preliminary discussions with service authorities and review of the aforementioned documentation has established that the North Penrith development site is well served by all utility services and that servicing capacity will not be a constraint on the viability of the proposed development. The outcomes of liaison with service authorities and summaries of background reports are provided below under the relevant subheadings.

How the development servicing needs will be managed

Potable water

A feasibility application is currently with Sydney Water Corporation (*SWC*) to provide specific advice with relation to provision of potable water to the latest development proposal (*ie to*

supply a mix of residential (approx. 1,000 lots), light industrial and retail / commercial landuse over the 40 hectare site).

Advice has also previously been sought from SWC by Egis in 2002 and JWP in 2009 for similar development proposals on the subject site.

The 2002 EGIS report determined the following:

- "*There is an existing 200mm watermain in Castlereagh Rd west of the site, a 600mm main along the entire north side of the site on Coreen Avenue and a 375mm main along the south side of the site;*
- (SWC have advised) *There is sufficient bulk water capacity to service the development. However, some local water main amplifications will be required;*
- (SWC have advised) *As the main feeder for water supply to the area would connect to the existing 600mm main in Coreen Avenue, any proposed development in this region should have at least two connections to Coreen Avenue to avoid the creation of easements for water main laying…….;*
- (SWC have advised) *For water quality reasons, roads such as Cul de Sacs and dead ends should be avoided. Where Cul de Sacs are proposed the water mains shall continue into and around to the start of the Cul de Sac;*
- (SWC have advised) *For higher densities, such as Commercial areas, the minimum size for mains is 150mm, required for fire fighting purposes;*
- (SWC have advised) *Sydney Water's Operating Licence requires a reduction in the consumption of water per capita by at least 35% in the year 2010/11. It is suggested that water saving devices be installed in residential and commercial premises for large new developments such as the above;*
- (SWC have advised) *The 375mm diameter trunk main running along the southern boundary of the site adjacent to the railway may be disused due to the age of the main". Egis 2002.*

The 2009 JWP report determined the following:

- "Sydney Water has advised that the preferred servicing option for this site is for water supply to be from an existing 600mm diameter located on the south side of Coreen Avenue. A second connection to be made to an existing 200mm main located in Castlereagh Road.
- Connection to the smaller (200mm) has already been partially constructed to the development site. Recent road works to extend Peachtree Road across Castlereagh Road and provide access to the industrial sites being developed have included construction of a 150mm water main to within 150m of Defence Road. This main could ideally be used to service the first stages of development, while a more substantial lead in main is constructed into the development from the larger (600mm) main. The logical roadway to accommodate the lead in main would not be required until a later

stage of the development. This does not exclude the construction of the main at an earlier stage, but does provide ample opportunity to construct the main" JWP 2009.

Sewer

SWC are currently providing specific advice in relation to the provision of sewerage services to the latest 40 hectare 1000 lot mixed use development proposal.

Advice has also previously been sought from SWC by Egis in 2002 and JWP in 2009 for similar development proposals on the subject site. In addition GHD has completed a sewerage servicing plan for the site in May 2004.

The 2002 EGIS report determined the following:

- " (The) *site is able to discharge to two existing sewerage systems adjacent to the site as described below:*

    1. *The south-eastern portion of the site gravitates to an existing 225mm gravity main which runs under the railway line to the Penrith CBD carrier which has spare capacity (*Note this is the line that once served the upper portion of the former Defence site and the line that currently drains the MUD site)*;*
    2. *The remaining part of the site is able to gravitate to existing carriers which run along Coreen Avenue and ultimately to an existing sewerage pumping station which is located near the intersection of Castlereagh Road and Coreen Avenue. This pumping station requires upgrading for the additional loads generated by the development;*

- *Both of these existing systems discharge to the Penrith Sewage Treatment Plant located to the North near Boundary Creek. As the staging of upgrading of the sewerage system in Coreen Avenue is being planned, options exist for part of the……site to discharge to the Penrith CBD carrier. The development strategy for the site is to be staged to enable connection of the sewerage in parallel with Sydney Waters augmentation works" Egis 2002;*

The 2009 JWP report determined the following:

- "*Sydney Water has advised that the development can be provided with sewer services from existing sewers in three specific locations. Sydney Water's preferred sewers are;*

    - *An existing 225mm sewer line located under the MUD site.*
    - *An existing 225mm sewer located to the south west on the adjacent site of United Dairies. (Both of these sewers gravitate to Sewer Pumping Station (SPS) 897).*
    - *The third sewer is located in Coreen Avenue, is 450mm diameter and gravitates to a second SPS (No 885).*

- *On the basis of the development originally proposed to Sydney Water (740 residential lot), we have not been advised on any downstream upgrades required to either of the receiving pump stations. The main difficulty in providing a sewer service to this site is achieving a minimum grade from the proposed connection points, to the entire development at normal sewer depth. The site is flat and it is possible that a pumping station would be required to service part of the site.*

- *Sydney Water has specified that the site should be connected to three specific existing sewer mains. Unfortunately the two connection points proposed for the southern half of the site are both too high for gravity sewer to be achieved. The primary sewer located on the north of the site has adequate capacity but is too high for extension to properties on the southern boundary. It is possible to fill the southern areas to a higher level and therefore provide adequate grade for a gravity sewer. This alternative is not compatible with the urban design outcomes demanded of the site. The use of individual sewer pumps within the affected properties will allow full development of the site on the proposed ground levels. The proposed use of the individual pump units may in fact be a more cost effective solution particularly as the southern areas closer to the Penrith Rail Station are proposed to be developed in a manner that is compatible with the more cost effective pump solutions, and can be managed under a form of strata or common ownership proposal. The use of non Sydney Water pumping stations can effectively reduce the cost of development on the site*." JWP 2009.

JWP further explored the assessment of internal sewerage pumping station options in a 2010 report titled "*North Penrith – Sewage Pumping Station Assessment/Options Report*", August 2010. A summary of the relevant findings of the above report is provided below.

- "*Conventional SPS can take more than 2 years to deliver and cost over $2 Million;*
- *Low pressure and vacuum sewer systems are cheaper up front but are higher cost to end users. May not be much faster to deliver as they are subject to a similar complex works approval process as an SPS;*
- *There is precedent of the implementation of a proprietary sewage pumping station within Sydney Water. These systems can save time and costs;*
- *On site Sewerage treatment plants can only be done under a private ownership arrangement;*
- *…in our opinion, the most viable option for Landcom is a sewage pumping station;*
- *While proprietary pumping station systems have advantages in terms of costs and timing for design approval and construction, Sydney Water has no current standard or process for implementing such systems. Approval for a proprietary pumping station system could be difficult and will require high level negotiations between Sydney Water and Landcom to establish an agreed position with respect to this proposal. Should*

negotiations break down then Landcom would have to recourse to a conventional sewage pumping station solution;

- *Consultation with Sydney Water should be undertaken with regard to streamlining the Asset Creation Developer Process and for consent over the use of a proprietary sewage pumping station".* JWP 2010.

The GHD 2004 report explored a number of possible sewer options including a simple cost comparison exercise. The options ranged from doing nothing (*ie connecting directly to existing sewers adjoining the site*) to a mix of gravity and pump station/rising main solutions to both SPS 884 and SPS 897. The do nothing option was not viable and the preferred options were gravity solutions which drained either to SPS 884 and SPS 897. However, it should be noted that these options did not account for the cost of the large quantity of fill required on the site to allow these options to work nor the cost of any land acquisition required downstream of the site.

Electricity

Integral Energy (IE) are providing specific advice in relation to the provision of electricity services to the Concept & Stage 1 Project Application.

A preliminary response from IE has confirmed that the Penrith Zone Substation located directly to the west of the site has capacity to supply the estimated future load of 8MVA and that ultimately would require three new dedicated high voltage feeders.

Advice has also previously been sought from IE by Egis in 2002 and JWP in 2009 for similar development proposals on the subject site.

The 2002 EGIS report determined the following:

- "*The site currently contains an electricity easement 42.67m wide running diagonal through the northwest corner of the site. This easement contains 32KV and 133KV transmission lines, which terminate at the Penrith Electricity Substation west of the site near Castlereagh Road. ….Integral Energy has advised that the development will be serviced from this substation;*
- *A second diagonal easement lies 50-120m south east of the first, 15.24m wide. The north end of the 11KV high voltage (HV) line along this easement joins up with the 11KV HV line on Coreen Avenue, just north of the site. The Coreen Avenue power line spans the entire width of the site from east to west. At the north-east corner of the site, the 11KV HV line on Coreen Avenue then follows Robert Street, runs south along Lemon Grove Road, and ends on the Crescent at the southeast corner of the site. There is also an 11KV HV line along the entire west edge of the site. The second diagonal easement connects to this power line immediately to the west of the site;*
- *Two additional overhead high voltage power lines run in an easement along the southern boundary of the site. These lines are owned by the Rail Infrastructure Corporation. It may be possible to relocate one of these HV lines underground in a*

narrower easement adjacent to the boundary although this would be subject to evaluation and confirmation by the Rail Infrastructure Corporation;

- *Integral Energy has advised that new power cables will be required along every new road. Based on the information available at this stage, it is assumed that 5 new substations will be required, along with some new high voltage infrastructure, to be provided and paid for by Integral;*
- *Integral estimates that the number of connections required to the existing system ranges from one to five, to be determined at a later design stage. For now we will assume that there will be three connections to the existing HV system. Two of these meet Coreen Avenue at the north end of the proposed roads, and one is west of the site at the mouth of the road proposed for the adjacent Castlereagh development…".* Egis 2002.

The 2009 JWP report determined the following:

- "*J Wyndham Prince has discussed servicing options with Integral Energy, to ensure adequate supply can be provided and where upgrades will need to be made to the existing system.*
- *The site can be serviced from the existing Penrith Zone substation, located on Castlereagh Road. The Zone substation in turn has access to the Penrith transmission station located immediately adjacent. This ensures adequate power supply – the only limiting factor being the physical capacity of the site to provide more outlet points.*
- *The Defence site accommodates several high voltage feeders across the site that connect into the Penrith CBD. These follow different paths and constitute both opportunity and minor constrain to development of that immediate area. These existing feeders will need to be relocated as development proceeds. The relocation will most likely be to 'underground' the feeder in the most beneficial location to the future road network. This allows for any capacity within those feeders to be taken up by the development as it progresses. This also allows for the total length of new feeder to be reduced and delayed in the development timeframe.*
- *On the basis that sufficient capacity exists within the Zone substation to provide an additional 3 to 4 feeders out, there is no real impediment to provision of electrical services to the development." JWP 2009.*

Telecommunications

Preliminary discussions have been held with Telstra in relation to the Federal Government's National Broadband Network (NBN) policy. Compliant with the telecommunications infrastructure servicing, each property at North Penrith will be connected to a fibre-optic based

network provided and maintained by Telstra and/ or other telecommunications providers ('the Providers').

The details of the infrastructure, the network reticulation and rollout, the lead-in works and the level of the service will be the subject of competitive tender and subsequent contract between Landcom and the Providers.

With regard to implementation for that part of the development that is within the Stage 1 Project Application area , the main consideration is the early start to the tendering process so as to have adequate time to consider the submissions that offer the most beneficial and cost effective telecommunications infrastructure package. This relates to the likes of initial capital investment for lead-in works versus cost of property reticulation works versus end user benefits. Early discussions with the Providers will also confirm infrastructure delivery can be scheduled per the overall development program.

Advice has also previously been sought by Egis in 2002 and JWP in 2009 for similar development proposals on the subject site.

The 2002 EGIS report determined the following:

- "*There are existing Telstra cables in Castlereagh Road, Coreen Avenue, Robert Street and Lemon Grove Road. There are also three existing Telstra pillars surrounding the site that could be used to feed parts of the site. One is on Castlereagh Road, one is on Coreen Avenue and the third is on the crescent near the south end of Lemon Grove Road;*
- *Telstra has advised that all new Infrastructure will be underground. The type of infrastructure and services required varies by land use development. Residential areas usually require copper cables, while other uses such as commercial require optic fibre, which is much more expensive and vulnerable to damage. Telstra has advised that both types are available in the area. The Penrith Exchange is 2.5km away from the site, so Telstra will decide whether its feasible to bring optic fibre phone services to the development based on commercial demand in the subdivision.;*
- *The conduits will be installed during road construction. The pillars will be installed according to staging to feed the system, and the cables will be pulled through when the roads are finished* (and) *while the houses are being constructed;*
- *According to information provided by Telstra, we estimate that up to five new pillars and approximately five connections to existing will be required, depending on staging and land use requirements. The locations of these pillars and connection points are determined by staging, new road locations, and shared trenching opportunities;*
- *Three of these points of connection will likely be located…..(*off*) Coreen Avenue. Another connection will likely be extended from Castlereagh Road…… and the fifth will connect to a recent existing cable on Lemon Grove Road near the Crescent at the south east corner of the site."* Egis, 2002.

The 2009 JWP report determined the following:

- "*Under Section 9 of the Telecommunications (Consumer Protection and Service Standards) Act 1999, Telstra have an obligation (Universal Services Obligation) to ensure that the standard telephone service, payphones, prescribed carriage services and digital data services are reasonably accessible to all Australians on an equitable basis, wherever they reside or carry on business. Therefore it is the responsibility of Telstra to provide phone services to the proposed development area.*
- *The adjoining urban area is presently serviced with overhead telecommunication cable; the extension of this to any proposed development is a relatively simple matter. In this respect the proposed development can be adequately serviced with a simple phone service.*
- *It is assumed that new development will require services be located underground and Telstra will provide the cables, conduits and access chambers while the excavation of the service trenches (along permanent access roads) into which the cable will be placed and subsequent backfilling will be the responsibility of the developer. This service trench would form part of the shared services trenching with AGL, Integral Energy and Telstra. Reticulation costs would not be incurred by the developer if suitable service trenches are provided by the developer. Furthermore, if as a result of the proposed development, any relocation of existing Telstra network infrastructure is required, it will be borne by the developer. Telstra have indicated they would require advance notice of 12 months prior to any development taking place to ensure infrastructure required to service the development can be provided.*
- *The extension of fibre optic or alternative broad band services to the area can be supplied by a number of alternative operators. Additional telecommunications conduits provided at the time of road construction would be advantageous to supporting cable based networks; this is not a significant cost imposition on the development.*" JWP 2009.

Gas

Preliminary discussions have been held with Jemena in relation to provision of natural gas services for the latest Concept & Project Application proposal. Initial indications from Jemena are that existing infrastructure would have sufficient capacity to service the proposed development.

Advice has also previously been sought by Egis in 2002 and JWP in 2009 for similar development proposals on the subject site.

The 2002 EGIS report determined the following:

- "*AGL has advised that there is adequate supply for reticulation in the area, and loading will not be an issue;*
- *An existing 200mm steel high pressure secondary main (1050kpa) runs along Castlereagh Road, starting almost as far south as the railway, and extending northwards beyond Coreen Avenue…….. A 110mm 210Kpa main joins the secondary main at Coreen Avenue, and runs east along Coreen Avenue until it gets back to Coombes Drive where it follows Coombes Drive around its inverted U shaped loop*

back around to Coreen Avenue, then continues east along Coreen Avenue. There is no gas main on Coreen Avenue between the two ends of Coombes Drive. East of the Coombes Drive loop, the 110mm 210Kpa main on Coreen Avenue turns southward and follows Lemon Grove Road to about 160m south of Robert Street;

- *Gas reticulation usually involves two points of connection to ensure that an alternative source is available in case of failure at the primary connection;*
- *AGL advised that the primary connection will likely tap into the high pressure secondary main on Castlereagh Road, extend east bound ….(to the subject site) and be reticulated from there;*
- *AGL estimates that the second connection will likely feed from either the 110mm 210kpa main on Coreen Avenue, or the equivalent size and pressure main on Lemon Grove. We have assumed that it will be on Coreen Avenue, as this would likely provide opportunity for shared trenching with power and telecommunications;*
- *AGL has advised that inner reticulation will likely consist of 50mm mains, followed by 32mm mains. These estimates are preliminary only, subject to change at a later design stage."* EGIS 2000.

The 2009 JWP report determined the following:

- "*There are several existing gas mains that are located adjacent to the development site. Extension of those mains into the development can be achieved from several points – notably from Coreen Avenue a 110mm gain main is located at each intersection with Coombes Drive. A third 110mm main is located in Castlereagh Road;*

- *A secondary (high pressure) gas main is also located in Castlereagh Road – a pressure step down facility also exists on the corner of Castlereagh and Peachtree Roads. The proposed development can therefore be service with gas through the extension of mains into the site from Coreen Avenue and Castlereagh Road. Jemena has not indicated any difficulties with the proposed extension or the supply of gas to the site."* JWP 2009.

4. Assessment

At a glance

This chapter addresses alternate sources of water and the ownership and maintenance costs of utility services infrastructure. This chapter also identifies and assesses the necessary augmentation works to:

- service the North Penrith Concept Plan;
- service the Stage 1 Project Application;
- service the community pavilion; and
- maintain services to the Penrith Training Depot.

The proposed servicing strategies establish connection points, likely lead in works and internal reticulation for all utility services. Servicing strategies for the North Penrith development and Stage 1 of the North Penrith development are included on **Figure 2** and **Figure 3** respectively. The proposed strategies are based upon:

- information provided in background reports (*refer **Chapter 3***);
- initial discussions with service authorities (*refer **Chapter 3***);
- the proposed staging plan for the North Penrith development; and
- the bulk earthworks strategy which is detailed in a separate report by WorleyParsons entitled '*Civils Assessment*', October 2010.

North Penrith Concept Plan servicing strategy

Under the following sub-headings the proposed servicing strategy for the North Penrith Concept Plan is described for all utility services. The servicing strategy for the North Penrith Concept Plan is also shown on **Figure 2**.

Potable water

The strategy for provision of potable water to the North Penrith Concept Plan has been developed in consultation with SWC but does not yet benefit from the results of the current feasibility application. The feasibility application has been lodged to SWC however the results are yet to be issued by SWC.

In addressing Item 2 of Section 13 of the DGRs, it is anticipated that the latest development layout will require four connections to the existing SWC potable water network. Two connections are proposed to the existing DN600 main located in Coreen Avenue, one connection to the DN200 main in Castlereagh Street and a fourth connection to the DN200 main in the south-eastern corner of The Crescent.

The main offtakes from the DN600 are proposed to be located at the two main intersections that the North Penrith development has with Coreen Avenue. One of the off takes is a DN300

(*at the eastern entrance off Coreen Avenue into the North Penrith development*) and the other is a DN250 (*at the western entrance off Coreen Avenue into the North Penrith development*). The connection to the Castlereagh Street main is a DN200 and the one to The Crescent is a DN100.

Dimensions for the internal potable water network are based on lot density, building heights and anticipated usage. The approximate lengths of the various sized mains are shown on **Figure 2**. At this stage the sizes for the potable water network are preliminary and are subject to confirmation from SWC.

Based on the extensive background information and previous feasibility applications submitted to SWC it is likely that there will be some requirement to upgrade the potable water network external to the site. Landcom has been in discussion with SWC & received preliminary advice in relation to modelling requirements to be taken into consideration. The nature and extent of these upgrades will only be taken into account once SWC issue the results of their feasibility assessment. Any requirement to amplify the network outside the site will be taken into account and then incorporated into the detailed design of the servicing strategy.

Some of the commercial lots fronting Coreen Avenue which are not fronting an internal road will have to be serviced from an existing DN200 main on the northern side of Coreen Avenue as a direct connection to a DN600 main is not possible.

Sewer

The strategy for the provision of sewer services to the North Penrith Concept Plan has been developed in consultation with SWC but does not yet benefit from the results of the current feasibility application. The feasibility application has been lodged to SWC however the results are yet to be issued by SWC.

The proposed sewer strategy will incorporate a sewer pumping station and will require some amplification of the existing DN225 sewer main located in Coreen Avenue to a DN375 sewer main up to the junction with the existing DN400 sewer main (*refer **Figure 2***). Prior to the results of the SWC feasibility assessment it has been assumed that the existing DN400 sewer main would have sufficient capacity to service the North Penrith development loads. Should the results of the SWC feasibility assessment indicate that upgrades of existing sewer infrastructure are required then this could be readily accommodated during detailed design of the servicing strategy.

The sewer pumping station will be located between the southern extent of the oval and the Penrith Training Depot property boundary (*refer **Figure 2***). The majority of the North Penrith development would drain via gravity to the sewer pumping station. The sewer pumping station would then pump wastewater via DN375 a rising main to the existing DN400 sewer main located in Coreen Avenue.

Dimensions for the internal sewer network will confirmed during detailed design and would be subject to confirmation from SWC.

Electricity

The strategy for providing electrical services to the North Penrith Concept Plan is shown on **Figure 2** and is summarised below.

The electrical supply strategy has been prepared based on background reports (*refer **Chapter 3***) and initial discussions with Integral Energy. Whilst a supply application has been submitted to Integral Energy for the proposed development, the proposed strategy does not benefit from the results of this application as they are yet to be provided by Integral Energy.

Initial discussions with Integral Energy indicate that there is sufficient supply to service the North Penrith development from the Penrith Zone Substation located immediately to the west of the North Penrith development site.

The proposed electricity servicing strategy incorporates three 11 kV feeders that circulate around the North Penrith development. These 11 kV feeders originate from the Penrith Zone Substation and pass through the proposed development before connecting into the high voltage network located on Coreen Avenue.

In addition to the three 11 kV feeders the North Penrith development will require the provision of a number of distribution substations (*"padmount type*"). These substations will be interconnected between each other and the 11 kV feeders to ensure a reliable electricity supply. The actual number and location of the substations will be dependant on final loads requirements of each lot. However, at this stage it is estimated that approximately 16 no. x 500 kVA substations would be required.

The electricity supply network (*both high voltage and low voltage*) will generally follow the internal road network in a shared trench with telecommunications and gas services (*refer **Figure 2***).

Telecommunications

Compliant with the Federal Government's National Broadband Network (NBN) policy, the telecommunications infrastructure servicing each property at North Penrith will be a fibre-optic based network provided and maintained by Telstra and/ or other telecommunications providers ('the Providers').

The details of the infrastructure, the network reticulation and rollout, the lead-in works and the level of the service will be the subject of competitive tender and subsequent contract between Landcom and the Providers.

With regard to implementation for that part of the development that is within the Stage 1 Project Application area, the main consideration is the early start to the tendering process so as to have adequate time to consider the submissions that offer the most beneficial and cost effective telecommunications infrastructure package. This relates to the likes of initial capital investment for lead-in works versus cost of property reticulation works versus end user benefits. Early discussions with the Providers will also confirm infrastructure delivery can be scheduled per the overall development program.

Telstra will be responsible for meeting the cost of the reticulated network

Gas
The strategy for providing telecommunications services for the North Penrith Concpet Plan is shown on **Figure 2** and is summarised below. The gas servicing strategy has been prepared based on background reports (*refer **Chapter 3***) and initial discussions with Jemena.

Jemena has indicated that the existing gas network has sufficient capacity to service the North Penrith development. The primary connection point for the North Penrith development will be to an existing main on the eastern side of Castlereagh Road. A second connection point will be required off Coreen Avenue and will need to extend westward from Coombes Drive to the proposed main entry to the site off Coreen Avenue.

All new gas mains reticulated throughout the North Penrith development will be underground and will generally follow the internal road network within a shared trench. Telecommunications and electrical services will also be located within the shared trench.

Recycled Water
Penrith City Council has a recycled water network that is primarily used to assist in irrigating playing fields. An existing recycled water main exists in Castlereagh Road. Accordingly there is the opportunity to extend recycled water infrastructure into the North Penrith development to irrigate the oval.

The decision to extend the existing recycled water main infrastructure and the expense would be at the discretion of Penrith City Council. Ongoing liaison between Landcom and Penrith City Council will take place as the detailed design of the North Penrith Concept Plan servicing strategy advances.

Stage 1 Project Application

Under the following sub-headings the proposed servicing strategy for the Stage 1 Project Application is described for all utility services. The servicing strategy for the Stage 1 Project Application is also shown on **Figure 3**.

Potable water
It is anticipated that the Stage 1 potable water load could be supplied by a single connection point to the DN600 main in Coreen Avenue. However, there may be a requirement for SWC to request a second connection point to ensure supply to Stage 1. It is likely that the second connection point would be to the DN200 main located on Castlereagh Street.

Once the results of the feasibility study are received from SWC the nature and number of the SWC required connection points for Stage 1 would be incorporated into the detailed design of the Stage 1 Project Application servicing strategy.

The reticulation of the potable water network within Stage 1 would be consistent with the proposed reticulation for the North Penrith development in its entirety.

Sewer
Stage 1 will require the construction of the sewer pumping station and associated rising main to ensure that lots can be adequately serviced for sewer. It is also anticipated that Stage 1 will likely require the necessary amplification of the existing sewer infrastructure.

The reticulation of the sewer network within Stage 1 would be consistent with the proposed reticulation for the North Penrith development in its entirety.

Electricity
Pending final advice from Integral Energy, it is envisaged that electricity services for Stage 1 would be serviced via the installation of two of the three 11 kV feeders. The 11 KV feeders will need to be constructed from the Penrith Zone Substations and complete a loop within Stage 1 prior to connecting to the existing 11 kV overhead line in Coreen Avenue.

Should the Penrith Training Depot require a high voltage connection via the North Penrith development this would be established as part of the Stage 1 works.

Telecommunications
Pending final advice from Telstra, it is envisaged that telecommunications services for Stage 1 would be serviced from a single connection off Coreen Avenue.

The nearest optical fibre network is located at the eastern most intersection of Coombes Drive and Coreen Avenue. Accordingly, a minor external upgrade (*approximately 150m*) would be required to get to the eastern access point into the North Penrith development off Coreen Avenue.

The internal reticulation of telecommunications services for Stage 1 of the development would be in accordance with the shared trenching arrangement proposed for the North Penrith development in its entirety.

Gas
Pending final advice from Jemena, it is envisage that gas services for Stage 1 would be serviced from a single connection off Coreen Avenue.

The nearest high pressure gas main is located at the eastern most intersection of Coombes Drive and Coreen Avenue. Accordingly, a minor external upgrade (*approximately 150m*) would be required to the eastern access point into the North Penrith development off Coreen Avenue.

The internal reticulation of gas services for Stage 1 of the development would be in accordance with the shared trenching arrangement proposed for the North Penrith development in its entirety.

Recycled Water
Should Penrith City Council decide to irrigate the oval with recycled water lead in infrastructure would be provided during Stage 2 of the North Penrith development. Accordingly, recycled water infrastructure does not form part of the Stage 1 Project Application scope of works.

Alternate sources of water supply

The proposed servicing strategies for the North Penrith development and Stage 1 do not rely upon an alternate source of water supply (*i.e., recycled, stormwater runoff, groundwater*) to service the potable water demands arising from the network.

Notwithstanding, the North Penrith development and Stage 1 will incorporate rainwater tanks on residential lots to comply with BASIX.

Servicing the community pavilion

The community pavilion will be located on the north-western extent of the oval. The community pavilion will be serviced for all utility services via the Stage 1 Project Application servicing strategy. Proposed utility servicing infrastructure will generally follow the proposed road network and thereby afford ample opportunity for the community pavilion to make connections for:

- potable water;
- sewer;
- electricity;
- gas; and
- telecommunications.

The detailed design of the community pavilion servicing requirements (*including external lighting requirements*) would be undertaken during the detailed design of the Stage 1 Project Application servicing strategy.

Provision of services to the Penrith Commuter Car Park

The Penrith Commuter Car Park does not form part of the North Penrith Concept Plan or Stage 1 Project Application approval pathway.

The Penrith Commuter Car Park will be completed prior to any construction works occurring on the North Penrith development site. As such, temporary utility servicing requirements will be needed to satisfy the demands of the Commuter Car Park. These temporary arrangements will be sought in approval documentation relevant to the Commuter Car Park (*i.e., not part of this scope of work*).

The North Penrith Concept Plan servicing strategy incorporates the needs of the Commuter Car Park. Details of the interaction between the Commuter Car Park and the North Penrith development will be confirmed during detailed design and will be documented within the North Penrith Stage 2 Project Application.

Maintaining services to the Penrith Training Depot

Under the following sub-headings the impact of the North Penrith development on the existing servicing arrangements to the Penrith Training Depot are outlined. Where the North Penrith development does impact upon the existing servicing arrangements infrastructure will be managed by each stage of development. With appropriate solutions put forward.

Potable water
The Penrith Training Depot is currently serviced for potable water via existing infrastructure located in The Crescent. The North Penrith development will have no impact on the Penrith Training Depot's existing potable water supply.

Sewer
Under existing conditions the Penrith Training Depot is serviced for sewer via an existing DN225 sewer main. This sewer main traverses a portion of the North Penrith development site.

The proposed sewer servicing strategy of the North Penrith development will have no adverse impact on the existing sewer arrangements currently in place at the Penrith Training Depot.

Electricity
The Penrith Training Depot electrical needs are currently serviced via existing high voltage overhead lines that traverse the North Penrith development site and the existing commuter car park. Thus, the North Penrith development will have an impact on the existing electricity supply to the Penrith Training Depot.

Stage 1 will require the existing high voltage supply to the Penrith Training Depot to be decommissioned. An alternate arrangement will be provided to the Penrith Training Depot via one of the 11 kV feeders constructed as part of Stage 1 or by establishing a connection into the existing high voltage network located in The Crescent.

Telecommunications
Existing telecommunications services are provided to the Penrith Training Depot via The Crescent and will not be affected by the Stage 1 works.

Given that telecommunications services are currently afforded via The Crescent the North Penrith development will have no impact on the Penrith Training Depot's existing telecommunications supply.

Gas
Under existing conditions the Penrith Training Depot has no access to a gas network. Gas is delivered to and stored on site on a supply and demand basis. As such, the North Penrith development will have no impact on the Penrith Training Depot's existing gas supply.

Ownership / Recurrent costs

All servicing infrastructure within the North Penrith development and Stage 1 will be maintained by the service provider (*i.e., Sydney Water, Telstra, Integral Energy and Jemena*). Thus, the proposed servicing strategies for the North Penrith development and Stage 1 will not result in any recurrent costs associated with the management of utilities infrastructure being borne by Council.

5. References

i. '*Sydney Water's Growth Servicing Plan July 2010 to June 2015*', Sydney Water, 2010.

ii. '*North Penrith Sewage Pumping Station Assessment/Options Report*', J Wyndham Prince, August 2010;

iii. '*Preliminary Existing Servicing and Drainage Investigation, Multi User Depot, Penrith*', WorleyParsons, 2008;

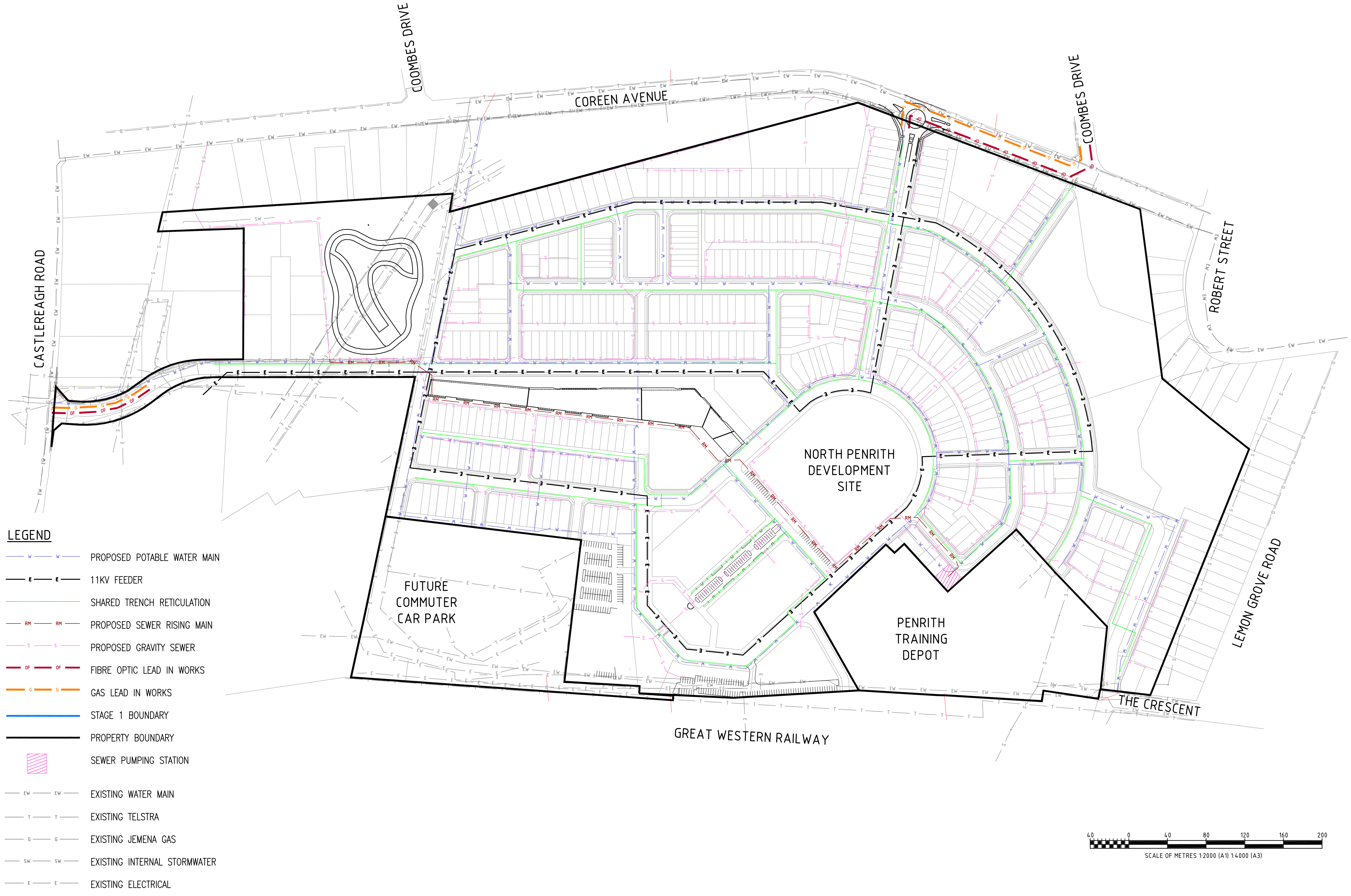
iv. '*North Penrith Defence Land Services Report*', J Wyndham Prince, April 2009;

v. '*Department of Defence Thorton Park Sewerage Servicing Plan – Preliminary Options Investigations*', GHD, May 2004;

vi. '*Civils Assessment*', WorleyParsons, October 2010; and

vii. '*North Penrith Urban Area Redundant Defence Lands Services Feasibility Report and IT Masterplan*', Egis, March 2002.

Appendix 1: Figures



CASTLEREAGH ROAD
COOMBES DRIVE
COREEN AVENUE
COOMBES DRIVE
ROBERT STREET
LEMON GROVE ROAD
THE CRESCENT
GREAT WESTERN RAILWAY
NORTH PENRITH DEVELOPMENT SITE
PENRITH TRAINING DEPOT
FUTURE COMMUTER CAR PARK
LEGEND
PROPOSED POTABLE WATER MAIN
11KV FEEDER
SHARED TRENCH RETICULATION
PROPOSED SEWER RISING MAIN
PROPOSED GRAVITY SEWER
FIBRE OPTIC LEAD IN WORKS
GAS LEAD IN WORKS
STAGE 1 BOUNDARY
PROPERTY BOUNDARY
SEWER PUMPING STATION
EXISTING WATER MAIN
EXISTING TELSTRA
EXISTING JEMENA GAS
EXISTING INTERNAL STORMWATER
EXISTING ELECTRICAL
40 0 40 80 120 160 200
SCALE OF METRES 1:2000 (A1) 1:4000 (A3)

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ISSUE	DATE	ISSUE DESCRIPTION
B	21.10.10	FINAL
A	08.10.10	ISSUED FOR REVEIW

LANDCOM

NORTH

FIGURE 2
NORTH PENRITH PROPOSED SERVICES PLAN
301015-00NP-SER-F02

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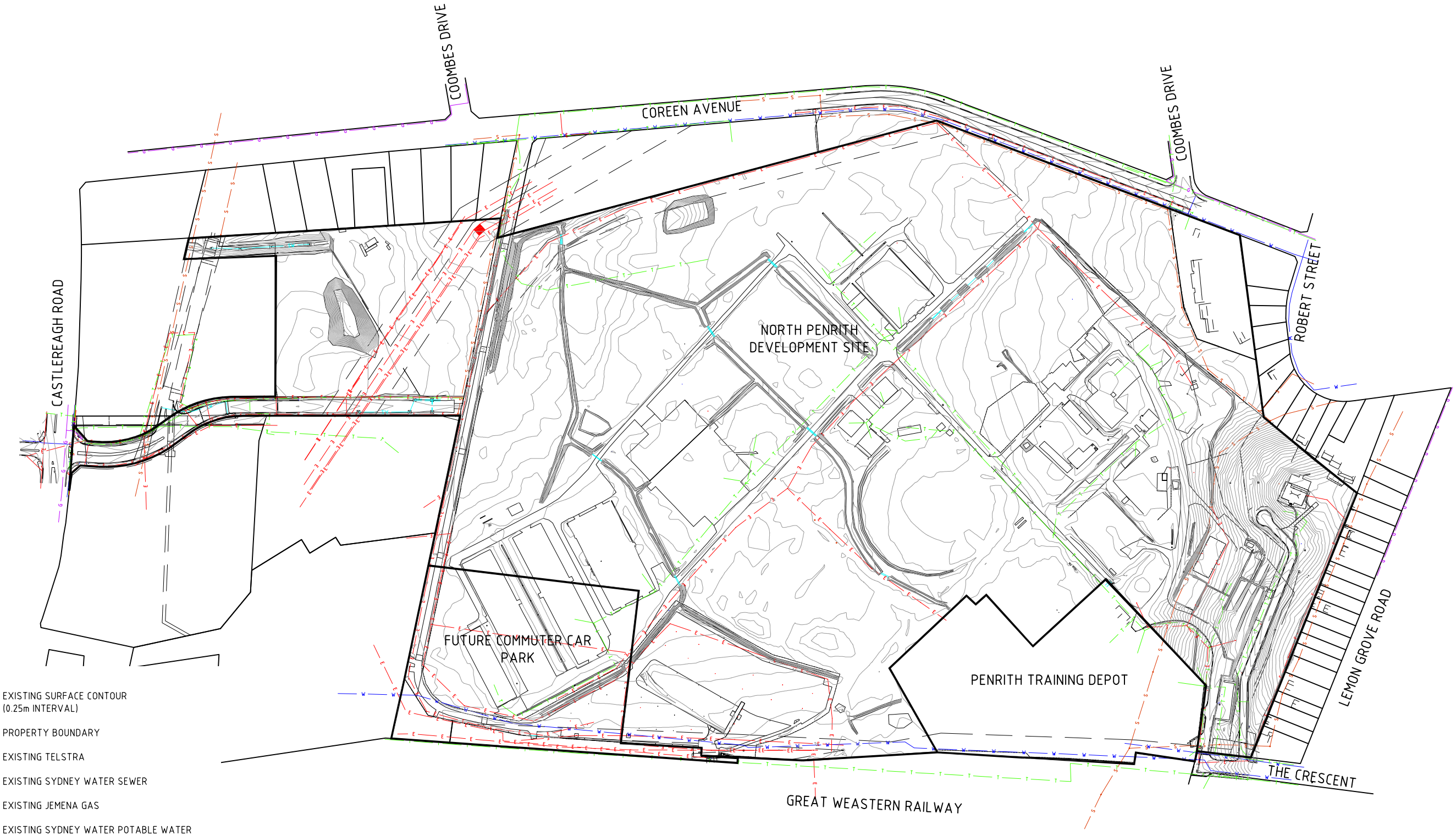

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ISSUE	DATE	ISSUE DESCRIPTION
B	21.10.10	FINAL
A	08.10.10	ISSUED FOR REVEIW

LANDCOM

NORTH

FIGURE 1
EXISTING SERVICES PLAN
301015-00NP-SER-F01

PLOT DATE & TIME: 21/10/2010 11:52:02 AM
SAVE DATE & TIME: 21/10/2010 11:34:44 AM
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Plotter:\\ausydwpprint1v\L10SYDRICOH3500RPCS

COOMBES DRIVE

COREEN AVENUE

COOMBES DRIVE

ROBERT STREET

CASTLEREAGH ROAD

NORTH PENRITH DEVELOPMENT STAGE 2

NORTH PENRITH DEVELOPMENT STAGE 1

NORTH PENRITH DEVELOPMENT STAGE 2

FUTURE COMMUTER CAR PARK

PENRITH TRAINING DEPOT

LEMON GROVE ROAD

THE CRESCENT

GREAT WESTERN RAILWAY

LEGEND

- PROPOSED POTABLE WATER MAIN
- 11KV FEEDER
- SHARED TRENCH RETICULATION
- PROPOSED SEWER RISING MAIN
- PROPOSED GRAVITY SEWER
- FIBRE OPTIC LEAD IN WORKS
- GAS LEAD IN WORKS
- STAGE 1 BOUNDARY
- PROPERTY BOUNDARY
- SEWER PUMPING STATION
- EXISTING WATER MAIN
- EXISTING TELSTRA
- EXISTING JEMENA GAS
- EXISTING INTERNAL STORMWATER
- EXISTING ELECTRICAL
- EXISTING SURFACE CONTOUR (0.25m INTERVAL)

40 0 40 80 120 160 200

SCALE OF METRES 1:2000 (A1) 1:4000 (A3)

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ISSUE	DATE	ISSUE DESCRIPTION
B	21.10.10	FINAL
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NORTH

FIGURE 3
STAGE 1 PROPOSED SERVICES PLAN
301015-00NP-SER-F03